



**PDR**

# The PAKISTAN DEVELOPMENT REVIEW

## Papers and Proceedings

**PARTS I and II**

**The Silver Jubilee Annual General Meeting and Conference**

**of the**

**Pakistan Society of Development Economists**

**Islamabad, March 16 - 18, 2010**

**Volume 48**

**Winter 2009**

**Number 4**

[www.pide.org.pk](http://www.pide.org.pk)



**PART I  
CONTENTS**

|   | <i>Page</i> |
|---|-------------|
| <b>INAUGURAL ADDRESS</b>  |             |
| <i>—Syed Naveed Qamar</i>   | 327         |
| <b>THE PRESIDENTIAL ADDRESS</b>   |             |
| Investing in People <i>—Rashid Amjad</i>  | 331         |
| <b>THE QUAID-I-AZAM LECTURE</b>   |             |
| <b>Mohsin S. Khan.</b> The Design and Conduct of Monetary Policy: Lessons for Pakistan  | 337         |
| COMMENTS <i>—Waqar Masood Khan</i>  | 351         |
| COMMENTS <i>—Musleh ud Din</i>  | 355         |
| <b>THE ALLAMA IQBAL LECTURE</b>   |             |
| <b>S. Hirashima.</b> Growth-Poverty Linkage and Income-Asset Relation in Regional Disparity: Evidence from Pakistan and India | 357         |
| COMMENTS <i>—Abdul Salam</i>  | 379         |
| COMMENTS <i>—Munir Ahmed</i>  | 384         |
| <b>THE MAHBUB UL HAQ MEMORIAL LECTURE</b>   |             |
| <b>John B. Casterline.</b> Demographic Transition and Unwanted Fertility: A Fresh Assessment                                  | 387         |
| COMMENTS <i>—Muhammad Nizamuddin</i>  | 413         |
| COMMENTS <i>—Zeba A. Sathar</i>   | 415         |
| COMMENTS <i>—Iqbal Alam</i>   | 420         |

**PART II****C O N T E N T S**

|   | <i>Page</i> |
|---|-------------|
| <b>GOVERNANCE, GROWTH AND SOCIAL SECTOR</b>   |             |
| <b>Aneel Salman and Atif Abdul Majeed.</b> Sustainable Incubator Management—A Case Study for Pakistan                         | 425         |
| <b>M. Irfanullah Arfeen and Nawar Khan.</b> Public Sector Innovation: Case Study of e-government Projects in Pakistan         | 439         |
| <b>Muhammad Khan.</b> Economic Evaluation of Health Cost of Pesticide Use: Willingness to Pay Method                          | 459         |
| <b>LABOUR AND SKILL DEVELOPMENT</b>   |             |
| <b>Muhammad Khan, Fozia Aftab Kiani, Afsheen Ashraf, and M. Iftikhar-ul-Husnain.</b> Skills, Competitiveness and Productivity | 473         |
| <b>Atiq-ur-Rehman, Hafsa Anis and Saud Ahmed Khan.</b> Skill Shortage versus Subject Choice: Case of Pakistan                 | 487         |
| <b>Asma Hyder and Ather Maqsood Ahmed.</b> The Dynamics of Moonlighting in Pakistan   | 497         |
| <b>Zafar Mueen Nasir and Nasir Iqbal.</b> Employers Size Wage Differential: Does Investment in Human Capital Matter?          | 509         |
| <b>PRICING MECHANISM</b>  |             |
| <b>Adnan Haider and Drissi Ramzi.</b> Nominal Frictions and Optimal Monetary Policy   | 525         |
| <b>Safi Ullah Khan and Syed Tahir Hijazi.</b> Single Stock Futures Trading and Stock Price Volatility: Empirical Analysis     | 553         |
| <b>Attaullah Shah and Shahid Ali Khan.</b> Empirical Investigation of Debt-Maturity Structure: Evidence from Pakistan         | 565         |
| <b>PANEL DISCUSSION – I: EDUCATION SYSTEM IN PAKISTAN: LESSONS LEARNED AND THE WAY FORWARD</b>                                |             |
| <b>Pervez Hoodbhoy.</b> Pakistan’s Higher Education System—What Went Wrong and How to Fix It                                  | 581         |
| <b>Pervez Tahir and Nadia Saleem.</b> Education: The Need for Consolidation   | 595         |

|   |                            |
|---|----------------------------|
| <b>Shaukat Hameed Khan.</b> Making People Employable: Reforming Secondary Education in Pakistan   | 603                        |
| <b>HEALTH AND EDUCATION: UNDERSTANDING DISPARITIES</b>  |                            |
| <b>Christian Lorenz and Muhammad Khalid.</b> Regional Health Accounts for Pakistan—Provincial and District Health Expenditures and the Degree of Districts Fiscal Autonomy on Health  | 621                        |
| COMMENTS  | <i>Naushin Mahmood</i> 634 |
| <b>Aisha Khan.</b> Education Order in Punjab: A District Level Study  | 635                        |
| COMMENTS  | <i>Naushin Mahmood</i> 651 |
| <b>Zahid Asghar, Nazia Attique, and Amena Urooj.</b> Measuring Impact of Education and Socio-economic Factors on Health for Pakistan  | 653                        |
| COMMENTS  | <i>Naushin Mahmood</i> 673 |
| <b>Nasir Ayat and Mahmood Khalid.</b> Consumer Satisfaction in Social Security Hospital: A Case Study of Punjab Employees Social Security Institution Hospital, Rawalpindi  | 675                        |
| COMMENTS  | <i>Naushin Mahmood</i> 698 |
| <b>GROWTH, POVERTY AND INEQUALITY</b>   |                            |
| <b>Qazi Masood Ahmed and Akhtar Lodhi.</b> Inter-Governmental Funds Flows in Pakistan: Are they Reducing Poverty?   | 703                        |
| COMMENTS  | <i>Talat Anwar</i> 714     |
| <b>Muhammad Ali and Muhammad Nishat.</b> Do Foreign Inflows Benefit Pakistani Poor?   | 715                        |
| COMMENTS  | <i>Talat Anwar</i> 738     |
| <b>Nasim Shah Shirazi and Md. Fouad Bin Amin.</b> Poverty Elimination Through Potential Zakat Collection in the OIC-member Countries: Revisited   | 739                        |
| COMMENTS  | <i>Talat Anwar</i> 754     |
| <b>Rashida Haq and Nabeela Arshid.</b> Inequality and Welfare by Food Expenditure Components  | 755                        |
| COMMENTS  | <i>Talat Anwar</i> 768     |
| <b>AGRICULTURE COMPETITIVENESS</b>  |                            |
| <b>Muhammad Zulfiqar, Dilawar Khan, Anwar F. Chishti, Munir Khan, Wasiullah, Ajmal Waheed, Muhammad Zakir and Robina Karim.</b> Trade Liberalisation Could Improve Producers Profitability in Agriculture: A Case of Basmati Rice | 771                        |

|   |                        |     |
|---|------------------------|-----|
| <b>Muhammad Ilyas, Tahir Mukhtar, and Muhammad Tariq Javed.</b>   |                        |     |
| Competitiveness among Asian Exporters in the World Rice Market  |                        | 783 |
| <b>Umar Farooq, Munir Ahmad, and Ikram Saeed.</b>   |                        |     |
| Enhancing Livestock Productivity in the Desert Ecologies of Pakistan: Setting the Development Priorities                                    |                        | 795 |
| <b>Areef Suleman.</b>   |                        |     |
| Fostering FDI in the Agriculture Sector   |                        | 821 |
| <br>  |                        |     |
| <b>AID, INVESTMENT AND GROWTH</b>   |                        |     |
| <b>Syed Zia Abbas Rizvi and Muhammad Nishat.</b>  |                        |     |
| The Impact of Foreign Direct Investment on Employment Opportunities: Panel Data Analysis: Empirical Evidence from Pakistan, India and China |                        | 841 |
| <b>Nasim Shah Shirazi, Turkhan Ali Abdul Mannap, and Muhammad Ali.</b>  |                        |     |
| Effectiveness of Foreign Aid and Human Development  |                        | 853 |
| <b>Nasir Iqbal and Saima Nawaz.</b>   |                        |     |
| Investment, Inflation and Economic Growth Nexus   |                        | 863 |
| <b>Somia Iram and Muhammad Nishat.</b>  |                        |     |
| Sector Level Analysis of FDI-Growth Nexus: A Case Study of Pakistan   |                        | 875 |
| <br>  |                        |     |
| <b>TRADE, INDUSTRY AND HUMAN CAPITAL</b>  |                        |     |
| <b>Muhammad Afzal, A. Rauf Butt, Hafeez ur Rehman, and Ishrat Begum.</b>  |                        |     |
| A Dynamic Analysis of the Relationship among Human Development, Exports and Economic Growth in Pakistan                                     |                        | 885 |
| COMMENTS  | <i>M. Mazhar Iqbal</i> | 920 |
| <b>Abdul Raheman, Abdul Qayyum, and Talat Afza.</b>   |                        |     |
| Efficiency Dynamics of Sugar Industry of Pakistan   |                        | 921 |
| COMMENTS  | <i>M. Mazhar Iqbal</i> | 938 |
| <b>Tariq Mahmood, Musleh ud Din, and Ejaz Ghani.</b>  |                        |     |
| An Analysis of Technology Adoption by Export-oriented Manufacturers in Pakistan   |                        | 939 |
| COMMENTS  | <i>M. Mazhar Iqbal</i> | 948 |
| <br>  |                        |     |
| <b>FISCAL POLICY</b>  |                        |     |
| <b>Zinaz Aisha and Samina Khatoon.</b>  |                        |     |
| Government Expenditure and Tax Revenue, Causality and Cointegration: The Experience of Pakistan (1972–2007)                                 |                        | 951 |
| <b>Ihtsham ul Haq Padda and Naeem Akram.</b>  |                        |     |
| The Impact of Tax Policies of Economic Growth: Evidence from South-Asian Economies  |                        | 961 |
| <b>Attiya Yasmin Javid and Umaima Arif.</b>   |                        |     |
| Dynamic Effects of Changes in Government Spending in Pakistan's Economy   |                        | 973 |

**PANEL DISCUSSION – II: CONFLICT, SECURITY AND  
DEVELOPMENT**

|   |      |
|---|------|
| <b>Kamal Matinuddin.</b> Conflict, Security, and Development                                | 991  |
| <b>Tariq Osman Hyder.</b> Conflicts, Security, and Development                              | 1003 |
| <b>Syed Rifaat Hussain.</b> Resolving the Kashmir Dispute: Blending Realism<br>with Justice | 1007 |
| <b>ABSTRACTS</b>  | 1037 |
| <b>Secretary’s Report</b>   | 1055 |

## Inaugural Address

SYED NAVEED QAMAR

Dr Ishfaq Ahmad, Deputy Chairman, Planning Commission, Dr Rashid Amjad, President, Pakistan Society of Development Economists, Dr G. M. Arif, Secretary Pakistan Society of Development Economists, Excellencies, Ladies and Gentlemen!

It is indeed a privilege and honour to address this distinguished gathering of economists and social scientists.

Over the years the Annual Conference of the Pakistan Society of Development Economists has become one of the leading events on the calendar of meetings where experts from various disciplines discuss cutting edge issues that confront developing economies in general and Pakistan's economy in particular.

I want to especially congratulate the Society and the President on completing 25 years as it celebrates its Silver Jubilee. I am very happy that the founding President, Prof. Dr Nawab Haider Naqvi is with us today and that some of the past Presidents are also present. The Pakistan Institute of Development Economics, the home of the Society, also needs to be congratulated for holding such conferences on an annual and regular basis.

I am very happy that this meeting as in the past is being attended by internationally acclaimed economists and academics from both within and outside the country. I am especially heartened to see that students of economics from all over Pakistan have been especially invited to attend this meeting.

The theme of this year's Meeting "Investing in People" captures not only the most pressing need and challenge the country faces but is also at the heart of our Government's and our Party's economic philosophy.

As you are aware and as I became acutely aware when I took over as Finance Minister that our government inherited a very fragile economy. The unprecedented hike in oil and food prices during the second half of 2007 and early 2008 created severe macroeconomic imbalances. Poor economic management and inaction by the previous government had further worsened the situation. If immediate action had not been taken the country would have faced default and economic crisis.

Over the past two years we have tried to grapple with this difficult situation. There were difficult choices to be made and our government gave priority to restoring macroeconomic stability rather than opt for short-run political expediency.

Syed Naveed Qamar is Federal Minister for Petroleum and Natural Resources (and former Finance Minister), Government of Pakistan, Islamabad.

The Prime Minister has recently pointed out that with the Grace of God and support of the people and our friends we have achieved our short-term economic goals which the Government had set for itself. Let me elaborate on them:

- First and foremost, the economy has moved significantly towards macroeconomic stability in terms of key economic variables especially balance of payments and the fiscal deficit. We have built up our foreign reserves and remittances and portfolio investment have increased significantly. We are now moving decisively to revive economic growth and bring inflation further down. We are committed to ensuring a stable macroeconomic environment as this is essential to revive business confidence, both foreign and domestic, and to engage the multilateral and donor agencies in providing us critical support.
- Second, by taking significant steps to reverse the anti-agricultural bias of the past and by providing incentives to farmers higher agricultural prices and timely provision of inputs we have had three bumper crops and on current indications a good wheat harvest is expected. At a time when most developing countries have faced food insecurity due to shortages we have had sufficient food grains not only to meet our domestic needs but also if need be for exports. Our policies have brought economic prosperity to our farmers and the rural population, where the bulk of the people live.
- Third, given our commitment to improve economic conditions of the poor people of Pakistan, the government launched for the first time in Pakistan's history a major direct income support programme for the vulnerable and those most in need. This is reflected in a eight-fold increase in resources earmarked for social protection over the past two years. The Benazir Income Support Programme is the leading programme, under which Rs 70 billion have been earmarked for 2009-10. The programme will benefit 7 million poor households this years and this number will be increased further next year.
- Fourth, there are distinct signs of recovery in the large scale manufacturing sector after recording negative growth last year due to the unprecedented global economic recession, the contraction of the domestic market and energy shortages. This year we hope growth in manufacturing will return to its past average drawing on a revival in textiles as well as consumer durables such as automobile manufacturing.
- Fifth, we have given the highest priority to accelerate development in Balochistan, FATA and other backward regions by accelerating development projects in these areas.

While I list these achievements, I am acutely aware that the country still faces difficult challenges especially in overcoming the energy crisis. Here we have opted for transparency in overcoming our short-term power needs. We are, however, taking steps under an integrated plan to overcome energy and water shortages through fast track energy projects and building of small dams.

The financial crunch due to increased military expenditure on the war against terror has put enormous pressure on the development budget as the Deputy Chairman of the Planning Commission is acutely aware. We need to prioritise development projects.

The Prime Minister has at the same time in face of financial stringency instructed the Finance and Planning Ministries that expenditure on education and health must be protected to the maximum. I believe that this is essential to ensure long-term development and for us to compete in the global economy.

Overall, despite the global recession and domestic imperatives the economy has shown resilience under difficult circumstances. We are hopeful of positive economic growth of around 3.5 to 4 percent this year.

We look to the economists of the country to contribute to the development of a Medium-term growth strategy and to assist us in ensuring timely and efficient implementation of our policies and plans. We have mostly had good plans. What we need to ensure is that they are translated into concrete outputs which lead the way to improved living conditions and sustained and equitable growth.

This meeting therefore takes place at an opportune time as its deliberations and recommendations can feed into the framing of the 10th Five Year Plan (2010–15) “Investing in People”.

Let me in the end wish you the best in your deliberations.

## *The Presidential Address*

### **Investing in People**

RASHID AMJAD

Syed Naveed Qamar, Federal Minister for Petroleum and Natural Resources, Dr Ishfaq Ahmad, Deputy Chairman, Planning Commission, Professor Syed Nawab Haider Naqvi, Former President, PSDE, Dr Sarfraz Khan Qureshi, Former President, PSDE, Dr G. M. Arif, Secretary, PSDE, Past Presidents and Distinguished Members of the Society.

*Excellencies, Ladies and Gentlemen*

It is my pleasure to welcome you all to the 25th Annual General Meeting and Conference of the Pakistan Society of Development Economists.

We are extremely grateful to Syed Naveed Qamar, Federal Minister, Petroleum and Natural Resources, for having spared his precious time to join us at the inaugural session. It was during your tenure as Finance Minister that important and difficult economic decisions were taken to restore macroeconomic stability resulting from the unprecedented increases in international commodity prices, the global financial meltdown and neglect and inaction of past policy-makers. That the economy today has achieved macro stability in many of the key indicators is to a large measure the result of these decisions.

I am also extremely grateful to our Patron Dr Ishfaq Ahmad, Deputy Chairman, Planning Commission, for his active interest and support to the work of our Society.

A warm welcome to our members and guests who have come from different parts of the country and abroad. It is especially satisfying to see our future economists from all over the country join us at the Conference.

Let me join Dr Arif in welcoming Dr Mohsin Khan who will be delivering the Quaid-i-Azam Lecture, Professor Hirashima who will be delivering the Allama Iqbal Lecture, Professor John Casterline, the Mahbubul Haq Lecture and Professor Robin Burgess, the Gustav Ranis Lecture (which we started last year).

This is indeed a special occasion! We celebrate this year the Silver Jubilee of our Society. Looking back over the years we can say with a considerable degree of satisfaction that it has played a path-breaking role in getting together each year the leading economists from Pakistan and abroad to analyse, debate, and discuss findings based on high quality research on critical national and global economic issues.

Here, I would like to pay tribute to the Founding President of the Society, Professor Dr Syed Nawab Haider Naqvi who not only conceived the idea but also ably guided the Society to where it is today over many years. Let me also congratulate our past Presidents and all our members who have actively contributed to the success of the Society on this occasion.

Rashid Amjad <rashidamjad@pide.org.pk> is President of the Pakistan Society of Development Economists, and Vice-Chancellor of the Pakistan Institute of Development Economics, Islamabad.

As we complete our first twenty-five years, it is an opportune time to also reflect on how we plan to grow over the next many decades. An important challenge I increasingly find is how to encourage young researchers from economic institutions that are now springing up all over Pakistan to present their research results to active scrutiny by their peers at the PSDE and so contribute to the high standards of research the Society has set for itself.

I look forward to receiving suggestions on this from our members at the AGM on the last day of the Conference.

I am happy to report again this year that members of our Society from economic institutions all over Pakistan have continued to play an important role in supporting the process of economic policy formulation on critical economic challenges. Besides being well-represented on the Economic Advisory Council (EAC) to the Prime Minister, the Panel of Economists, the Task Force on Food Security, the Task Force on Climate Change, economists have been actively involved in the many different Working Groups set-up to assist the Planning Commission in the framing of the 10th Five Year Plan (2010-15) which included the Macro Group, Export Competitiveness, Monetary and Fiscal Policy, Poverty Alleviation and Employment and Human Resource Development as well as being members of other Working Groups.

This as I said last year is democracy's gift to the economists of Pakistan. Democracy encourages independent thinking, accommodates diverse view points and thus makes it possible to evolve sound policies that are both efficient and equitable. This healthy interaction between teaching, research and economic policy-making is the hall mark of a vibrant and thought provoking body of economists who are not only preparing our future generation of economists but also contributing to nation building during these challenging times.

The theme of this year's Conference "Investing in People" not only addresses the critical need for Pakistan to focus on its long neglected human resources but also is the overarching theme under which Pakistan's Tenth Five Year Plan (2010-15), to be launched in July 2010, is being prepared. The Silver Jubilee Conference, therefore, provides us an excellent opportunity to propose policies and programmes to be incorporated in the Tenth Plan.

I think it may be important for me to draw on the Approach Paper to the Tenth Plan as well as the theme of the Conference to remind ourselves that "...the past development strategies of Pakistan have not delivered high sustainable economic growth; rather have only led to boom-bust cycles. Progress in human and social indicators has been disappointing. Poverty levels remain high, job opportunities that meet the citizen's aspirations have been lacking, and stark income inequalities have appeared in the recent years. This situation demands a fundamental change in the development paradigm—common people must be at the centre of the development process and have ownership in the economic development of the country. This change requires more investment in people, leading to high sustainable growth, reduction in poverty, improvement in income distribution and harmony among regions and provinces."<sup>1</sup>

<sup>1</sup>Planning Commission, Approach Paper to the 10th Five Year Plan 2010–15 "Investing in People", Government of Pakistan, Islamabad, June 2009, 51 pages.

Almost all studies have shown that the returns on investing in people by creating a productive and employable work force would be extremely high especially as we start from a very low base in terms of our existing human development indicators. This is because investment in education, research and skills development is the key to igniting sustained growth in productivity, that alone can generate rising incomes and better standard of living for the people. Recent research has again shown, including in comparisons with India, that growth in Pakistan has been driven by increased use of factors of production rather than growth in total factor productivity. Lack of growth in total factor productivity reflects our low levels of investments in education and skills as well as in research and science and technological development. As the pioneering works of Romer and others have shown, it is the returns on investment in human capital that explains the “black box” or the large “Solow residual” that economists could not explain in breaking down long term trends in productivity growth through conventional tools such as the Cobb-Douglas production function.

In my view the whole issue of investing in people must be seen in an integrated framework that covers:

- First, the development of human resources through increased investment in education and skills development especially primary and secondary education and vocational and technical education;
- Second, the effective and productive utilisation of human resources for that only will guarantee returns on this investment through adequate wages and remuneration; and
- Third, the creation and strengthening of labour market institutions and governance that result not just in a well-functioning and efficient, but a rights-based, gender sensitive, labour market where fundamental rights at work are fully protected.

While we still have a long way to go, one sees with some satisfaction that the Government has taken measures and brought in new legislation to ensure that fundamental rights of workers are guaranteed. Also it is a subject on which I have spoken and written on many times, I will therefore concentrate on what I see are the critical challenges in relation to the first two issues I have identified.

My first major concern in the context of our current economic situation is that the current and expected growth rate over the next many years is far too low to provide productive and remunerative employment to our labour force that is expected to grow at around 3 percent. With the economy on average expected to grow around five percent (and a historical employment elasticity of around 0.45) if we continue on the old growth path this will result in increasing unemployment and under-employment. Also given the close nexus between employment and poverty this would make it extremely difficult to reduce poverty which despite arguments over its current level is still high especially in rural areas.

The pressing challenge that we face in Pakistan today is how we move the economy to a higher growth trajectory (as China and India have done) as well as a more employment-intensive growth path while maintaining macroeconomic stability.

This challenge becomes all the more daunting especially in the context of raising resources needed to invest in education and health while overcoming critical shortages in energy and water, at a time when the economy faces a severe resource crunch. The situation is further compounded by an estimated cost of the war on terror that has been calculated by PIDE at around US\$7–8 billion each year over the past few years. This is equivalent to nearly 5–6 percent of our GDP.

To add to aforementioned two major challenges namely low expected growth, and the resource crunch, we must add a third challenge which would make it difficult to change course. This is the throw-forward of already committed development resources in the PSDP which now stands at almost Rs 3 trillion, of which about half is committed to 11 mega projects including the Bhasha-Daimer Dam. This would require each year more resources than we expect to generate to complete ongoing projects before we can commit resources to new ones.

As recently announced the Public Sector Development Programme (PSDP) 2009-10 has again been reduced this year, as in the last year, and is now well below 2 percent of the GDP. To directly relate this to planned investment in education, the new Education Policy 2009 projects an increase in public expenditures on education to 7 percent of GDP by 2015 from around an existing 2 percent. How will we manage to achieve this given our current resource constraint?

My answer to this is that short-term adhoc policies are not going to be the answer to our current economic problems and development challenges. In many cases our existing problems can be traced to following short-term solutions to real structural problems and constraints that the economy faces.

To my mind, therefore, debating these critical issues in the context of a medium-term or a Five Year Plan framework would provides us an opportunity to carefully define our objectives and prioritise use of our limited resources. This is the only means of overcoming the serious imbalances we face-whether it is low levels of human development, serious energy and water shortages or the challenges that can arise in the long term from climate change. This will involve important trade-offs in terms of which sectors and projects are selected and those which are closed or delayed.

Clearly, this medium-term exercise is not development planning in the old traditional sense but one which is private sector-led and market driven in a highly globalised world economy.

Such a medium term development framework will also allow us to most effectively utilise expected increases in donor funding, which hopefully will be coming in the future in areas, which have been clearly identified as priorities in terms of our development.

This then my fellow economists is the challenge or the “problematique” Pakistan faces in prioritising the use of our limited resources.

We look to you to come up with “out of the box” and “home grown” solutions as the challenges are really daunting.

Clearly, some of them appear obvious, but it is exactly these which can prove to be the most difficult. Let me try to list them.

First raise revenue generation each year by at least 1 percent to reach at least (though still not yet very respectable) tax to GDP ratio of 15 percent by 2015.

Second, to reignite investment by the private sector both domestic and foreign by creating a conducive business environment that is transparent and profitable and reducing the cost of doing business.

Third, by encouraging private-public partnership to fund badly needed infrastructure projects.

And fourth, to attract the Pakistan diaspora to continue the high growth in remittances as well as invest in Pakistan.

While these four are essential from the supply side the question still arises as to where the demand to drive growth will come from? Again let me list what I see these to be.

- Economic reforms which will attract private investment (amongst others in modern services) and lead to more efficient allocation of resources.
- Investing and developing agriculture as a leading sector given its enormous potential in both the crop and livestock sector with the right incentives and timely inputs;
- Growth of agro-business and value-added exports leading to job creation which growth in agriculture should encourage;
- Growth of new leading sectors (such as ICT where Pakistan's share of world markets remains extremely low);
- But for this to happen we would need to overcome energy and water shortages in the first instance through short-gestation projects selected through a transparent process.

As to investing in people many years ago while delivering the Allama Iqbal Lecture I identified 4Ws as to where we should invest: Women's Education, Water, Worldwide Web and Workers' Rights.

With age one thinks even four may be too many!

So for developing our human resources let us select one priority which will serve as the beacon light and which government at all levels (Federal, Provincial, Local), private sector, civil society will own and give it its full attention. Also resources for this initiative will be protected at all costs through a separate allocation.

This target should be "100 percent enrolment in primary by 2015".

I thank you for your patient hearing.

*The Quaid-i-Azam Lecture*

**The Design and Conduct of Monetary Policy:  
Lessons for Pakistan**

MOHSIN S. KHAN

Movements in global capital during the late 1990s and the greater emphasis on price stability led many countries to abandon fixed exchange rate regimes and to design institutions and monetary policies to achieve credibility in the goal of lowering inflation. Such recent developments have brought to the forefront the idea that freely mobile capital, independent monetary policy, and fixed exchange rates form an “impossible trinity”. Inflation-targeting regimes being adopted by many countries provide a way of resolving this dilemma, and it is suggested that such a regime be implemented in Pakistan as well.

*JEL classification:* E42, E52

*Keywords:* Monetary Policy, Rules versus Discretion, Inflation Targeting

**I. INTRODUCTION**

The design and conduct of monetary policy has undergone two significant changes since the 1990s. First, a number of countries have moved from fixed exchange rate regimes to more flexible rates, thereby allowing for greater monetary independence. Second, inflation targeting regimes have been adopted as a framework for conducting monetary policy in several industrial economies, as well as in a number of emerging markets and developing countries. These changes have triggered considerable debate about monetary policy in the literature, a debate that has important implications and lessons for how monetary policy should also be designed and implemented in developing countries.<sup>1</sup>

This paper starts by discussing the key issue of “dynamic inconsistency”, which has led to the major shift in the thinking about monetary policy. Dynamic inconsistency and inflationary bias in monetary policy arise because policy-makers have an incentive to “fool” the public by generating an inflation “surprise” to achieve a short-term gain in output. Setting up rules, or targets, for money and credit growth, interest rates, the exchange rate, and inflation are all mechanisms designed to overcome the dynamic inconsistency problem. In this connection, the paper will outline the principal arguments in the rules versus discretion debate to determine if there are significant advantages to be had from adopting a rules-based monetary policy like inflation targeting in the case of Pakistan.

Mohsin S. Khan <mkhan@piie.com> is Senior Fellow, Peterson Institute for International Economics, Washington, DC, USA.

*Author’s Note:* The author is grateful to Laurence Harris, Waqar Masood Khan, Syed Salim Raza, and participants in the conference for helpful comments and suggestions. Christine Ryan provided excellent research assistance in the preparation of the paper. Paper prepared for the Pakistan Society of Development Economists Silver Jubilee Conference, Islamabad, Pakistan.

<sup>1</sup>The standard reference to modern monetary analysis is Woodford (2003). A recent survey by Chari and Kehoe (2006) also provides a useful description of where things stand with respect to the new developments in the design of monetary policy.

The paper is organised as follows. Section II provides a general discussion of dynamic inconsistency and inflationary bias. The issue of rules versus discretion in the operation of monetary policy is covered in Section III. Section IV outlines the evolution of different monetary frameworks that fulfil the need for a nominal anchor, and Section V discusses inflation targeting, focusing on the preconditions for implementing such a regime. Section VI considers the feasibility of inflation targeting in Pakistan, and Section VII contains some concluding remarks.

## II. DYNAMIC INCONSISTENCY AND INFLATIONARY BIAS

While both theoretical and empirical studies have demonstrated that there is no long-run relationship between inflation and unemployment, under certain circumstances a short-run trade-off between these variables may be found. The existence of this short-run Phillips curve is widely believed to be associated with the presence of sticky wages and prices. The possibility that an expansionary monetary policy could increase output and employment in the short-run leads to what has been termed the “problem of dynamic inconsistency,” developed principally by Kydland and Prescott (1977) and Calvo (1978).<sup>2</sup>

Dynamic inconsistency refers to the difference between the optimal policies that a central bank announces it would carry out, and the policies that the central bank would carry out after the public had made decisions on the basis of its expectations. If the central bank announces that it will target a particular rate of inflation, and the public engages in contracts based on that announcement, the central bank has an incentive to renege on its promise and try to achieve higher output by producing surprise inflation. But the public will then know this, and will adjust its inflationary expectations upward, thereby limiting the desired output gain. Another way of putting this idea is to say that policy-makers unconstrained by rules have an incentive to “cheat” the private sector in order to spur an output gain. However, since rational agents recognise the incentive of policy-makers to produce surprise inflation, they will change their behaviour accordingly, creating an economy with an inflationary bias.

One could therefore ask the following question: Are countries condemned to an equilibrium with high inflation rates, where the public distrusts the government because of its incentive to inflate? Of course, there are institutional reforms that countries can adopt to lower inflationary expectations and still keep some flexibility to counteract shocks in the economy. Chari and Kehoe (2006) propose two possible ways of alleviating the dynamic inconsistency problem and the consequent inflationary bias. One option is to pass legislation that would require the monetary and/or fiscal authority to abide by a clear set of rules. The second option is to tie the hands of the government by delegating policy to an independent authority. This brings the issue of rules versus discretion in the operation of monetary policy into the picture.

## III. RULES VERSUS DISCRETION

Most economists and central bankers now agree that central banks cannot act in a completely discretionary manner. Some kind of guideline or rule is essential for good policy, and acting without a rule may have adverse consequences. This consensus

<sup>2</sup>For a good summary of the time inconsistency problem, see Chari and Kehoe (2006).

emerges from a long debate among economists regarding the relative merits of rules versus discretion in the conduct of monetary policy.<sup>3</sup>

Traditionally, economists have focused on two main kinds of instrument rules:

- Money growth rules [advocated by McCallum (2000 and 2004)] are extensions of Friedman's (1960) proposal for constant money growth but have been extended to include feedback elements as a way to correct past mistakes or to gradually adjust to permanent shifts in velocity.
- Interest rate rules [advocated by Taylor (1993)] also include feedback elements: the central bank raises interest rates when expected inflation rises but also reduces interest rates when unemployment rises above an undesirable level.

Which of these target rules should be more successful in restraining inflation, preventing unnecessary business cycle fluctuations, or encouraging growth over the long term remains an unsettled question. More recently, economists have come to agree that rules may apply to targets as well as instruments. Examples of target rules include both exchange rate management regimes and inflation targeting regimes. Finally, most economists now agree that any rules-based regimes still permit a margin for discretion, and have come to reject the idea that rules and discretion are diametrically opposed. The more well-defined the rule, the more effectively can discretionary policy be applied.

#### **IV. THE NEED FOR A NOMINAL ANCHOR: EVOLUTION OF MONETARY FRAMEWORKS**

As policy-makers in many countries throughout the world have gravitated toward an approach based more on rules than on full discretion, the issue of choosing an appropriate target for policy has become key. In a rules-based policy, the target serves as a communication tool with the public, as it reveals policy-makers' intentions and priorities, and indicates whether a policy action—for example, a change in the short-term interest rate, or intervention in the foreign exchange market—will be required. In turn, to the extent that the public observes and understands this target, it establishes a “nominal anchor” for agents' expectations, thus helping to achieve and maintain price stability.

Nominal anchors can either be price or quantity based. The list of possible price anchors is relatively extensive, encompassing for example, the exchange rate, the price of gold, and the inflation rate. On the other hand, discussion of quantity anchors tends to focus on two major candidates: monetary (and credit) aggregates and to a lesser extent, nominal income.

In practice, countries adopting rules-based frameworks in recent years have chosen either monetary or exchange rate targets as their nominal anchors. Although it is possible to operate within a relatively wide range of intermediate arrangements, it is apparent that more reliance on explicit monetary or inflation targets requires allowing a greater degree of flexibility in the exchange rate and, likewise, adherence to an exchange rate target or peg leads to greater volatility in monetary aggregates and inflation.

A number of factors weigh in favour of adopting monetary over exchange rate targets. Having a flexible exchange rate allows a country the option of pursuing an

<sup>3</sup>See, for example, Woodford (2003), Chapter 1, for a comprehensive discussion of this debate.

independent monetary policy, which may then be used countercyclically to minimise fluctuations in real activity. A flexible exchange rate could act as an automatic stabiliser in the event of adverse trade shocks, for example, by providing stimulus to demand for non-tradable when the market for a country's exports has been hit with a negative shock. Finally, the experience in recent years has shown that fixed exchange rates tend to be particularly vulnerable to speculative attacks, and thus currency crises are more likely when a government commits to a pre-announced level for the exchange rate.

For those countries that opt for greater exchange rate flexibility, the choice then shifts to what monetary target is more appropriate: monetary aggregates or the inflation rate itself. Targeting monetary aggregates has one appealing advantage: policy-makers exert much greater control over monetary aggregates such as M1 and M2 than they obviously do over the inflation rate. However, there are two major drawbacks to targeting monetary aggregates. First, monetary aggregates are less easily understood by the public, and thus their informational content is considerably lower than that of the inflation rate. Second, in order to be effective, monetary targets require that a stable, or at least predictable, relationship exist between the aggregate and the rate of inflation. If this is not the case, then policymakers run the risk of consistently missing the target for monetary aggregates yet missing the (implicit) inflation target. Thus, policymakers will ultimately fail in their goal of lowering and stabilising the inflation rate, thereby rendering the exercise futile. Numerous studies have shown that instability of money demand is particularly common to developing countries undergoing processes of financial liberalisation, and even industrialised countries are not immune. Thus, most countries choosing monetary over exchange rate targets in recent years have favoured an inflation targeting framework over one that targets a monetary aggregate.

## V. INFLATION TARGETING<sup>4</sup>

Over the past two decades, a number of countries have moved to an explicit and formal inflation targeting framework. Table 1 lists the 29 countries by the date at which the new regime was adopted. Starting in the late 1990s many developing and emerging market countries also adopted inflation targeting, and by 2007 some 19 of these countries were classified as formal "inflation targeters."

The successful implementation of an inflation targeting regime requires the presence of certain macroeconomic, institutional, and operational conditions.<sup>5</sup> First, the authorities should be fully committed to price stability as the primary goal of monetary policy. This rules out the possibility of targeting at the same time any other variable, including nominal exchange rate or unemployment (output). In this context, exchange rate arrangements with limited flexibility—crawling pegs or target zones—could coexist with inflation targeting as long as the latter has priority. Also, in a flexible exchange rate regime, central bank intervention in support of the exchange rate should be limited to smoothing out the effects of temporary shocks on inflation. This is particularly important in the case of small open economies in which the pass-through from the exchange rate to inflation may be high.

<sup>4</sup>For a recent survey of inflation targeting, see Freedman and Laxton (2009).

<sup>5</sup>A detailed exposition of inflation pre-conditions can be found in Carare, *et al.* (2002) and Freedman and Laxton (2009).

Unemployment (real output) stabilisation may also be given some consideration within an inflation targeting regime, but only as a secondary goal of monetary policy. In a “strict inflation targeting” regime the monetary policy instrument may respond to the output gap, but only to the extent that it affects the inflation forecast, and not because it enters in the central bank’s loss function.

A second major consideration for an inflation targeting regime is central bank independence in the conduct of monetary policy, or what is known as “instrument independence” as opposed to “goal independence”. Once the goal of monetary policy (the inflation rate to be achieved) is established either by the central bank, the government, or

Table 1

*Inflation Targeting Regimes*

| Country                     | Effective IT Adoption Date |
|-----------------------------|----------------------------|
| New Zealand <sup>1</sup>    | January 1990               |
| Canada <sup>1</sup>         | February 1991              |
| United Kingdom <sup>1</sup> | October 1992               |
| Sweden <sup>1</sup>         | January 1993               |
| Finland <sup>1</sup>        | February 1993              |
| Australia <sup>1</sup>      | April 1993                 |
| Spain <sup>1</sup>          | January 1995               |
| Czech Republic <sup>1</sup> | December 1997              |
| Israel <sup>1</sup>         | June 1997                  |
| Poland <sup>2</sup>         | October 1998               |
| Brazil <sup>2</sup>         | June 1999                  |
| Chile <sup>2</sup>          | September 1999             |
| Colombia <sup>2</sup>       | September 1999             |
| South Africa <sup>2</sup>   | February 2000              |
| Thailand <sup>2</sup>       | May 2000                   |
| Korea <sup>1</sup>          | January 2001               |
| Mexico <sup>2</sup>         | January 2001               |
| Iceland <sup>1</sup>        | March 2001                 |
| Norway <sup>1</sup>         | March 2001                 |
| Hungary <sup>1</sup>        | June 2001                  |
| Peru <sup>2</sup>           | January 2002               |
| Philippines <sup>2</sup>    | January 2002               |
| Guatemala <sup>2</sup>      | January 2005               |
| Slovakia <sup>1</sup>       | January 2005               |
| Indonesia <sup>2</sup>      | July 2005                  |
| Romania <sup>2</sup>        | August 2005                |
| Turkey <sup>2</sup>         | January 2006               |
| Serbia <sup>2</sup>         | September 2006             |
| Ghana <sup>2</sup>          | April 2007                 |

Source: Roger (2009).

<sup>1</sup>High income countries; <sup>2</sup>Low income countries (based on World Bank Development Indicators classification).

jointly, the central bank has to be able to choose and manage its instruments to achieve that goal. Instrument independence requires the absence of what is called “fiscal dominance”. Fiscal dominance, a situation in which monetary policy is governed by the financial needs of the government, undermines the ability of the central bank to achieve the inflation target. This is particularly the case in which the public sector relies systematically and significantly on revenues from money creation, or on continuous placements of government bonds in thin domestic financial markets. Under these conditions the central bank may resist an increase in market interest rates to correct deviations of the forecasted inflation from the target because of the potential impact on the fiscal position.

A third major condition for the implementation of the inflation targeting is accountability of the central bank for achieving the goal, and transparency in communicating to the public the main aspects of policy design and implementation. This is essential to increase discipline and to enhance credibility in a framework in which monitoring performance against targets is difficult because of lags in the transmission of policy actions. It also contributes to reducing political pressures to deviate from the announced policy. Transparency implies the following: first, the explicit announcement of inflation targets; second, availability of clear and sufficient information to the public to assess the stance of monetary policy; third, the announcement of any changes in monetary policy, a clear explanation of the reasons behind the changes, and the expected impact on the inflation outlook; fourth, an ex-ante indication of a possible target breach, its causes, and the policy actions that will be taken to bring inflation back on track; and finally, an ex-post comprehensive analysis of the performance of monetary policy. The central bank may use different mechanisms to communicate these issues to the public, including through the periodic release of Inflation Reports, regular press releases and press conferences, and publication of the minutes of monetary policy meetings in the central bank.

Inflation targeting requires an operational framework to guide the authorities in conducting monetary policy. This framework relies on: first, reasonably well-understood channels between policy instruments and inflation, the relative effectiveness of different monetary instruments, and the lags involved; second, a methodology to produce inflation forecasts using different approaches and considering all information available; and third, a forward-looking operating procedure that derives an optimal policy rule—the central bank’s reaction function—by which changes in the instrument depend on deviations of the inflation forecast from the inflation target.

One main issue present in several emerging market economies tends to complicate the task of the central bank in monetary management. Countries that have large capital movements may require some degree of central bank intervention in the foreign exchange market in the case of temporary shocks. The key issue here is for the central bank to be able to assess the true nature of the shocks, and determine if there is clear case of exchange rate appreciation or depreciation, which is by no means an easy task.

Although there is some disagreement on the criteria used to classify a country as a full-fledged inflation targeter, it is clear that there is an increasing trend in targeting inflation as the main goal of monetary policy. Even some emerging market economies that do not have in place all requirements for the adoption of a full-fledged inflation

targeting framework have initiated a transition process leading toward a future implementation of this framework.

In emerging markets the legal framework deserves greater attention prior to the adoption of a full-fledged inflation targeting. In this context, several emerging market countries have revised the central bank charter to allow for more institutional independence, including prohibiting central bank financing of the government. However, there is a clear and unique mandate to the central bank for achieving price stability only in a few countries. In most emerging market countries monetary policy objectives aim at achieving both internal and external stability. Finally, in most full-fledged inflation targeting countries, the government is involved in the setting of the inflation targets. This provides an additional support in those cases in which price stability is not a clear and legal mandate of the central bank.

There are some common features and several differences in operational issues between advanced countries and emerging markets. All inflation-targeting countries employ market-based instruments of monetary policy to achieve the desired level of the operating target—usually, the short run interest rate. With regard to differences, emerging market economies tend to rely less on econometric models in the conduct of monetary policy, and more on the use of judgment, due to the higher degree of uncertainty with respect to transmission channels and the effectiveness of monetary policy instruments because of ongoing structural changes. This also explains why in emerging markets central banks use shorter horizons as well as bands instead of point targets for inflation targets. Also, there are more frequent interventions of the central bank in the foreign exchange market, partly explained by the existence of a higher pass-through from the exchange rate to inflation, and its role in forming inflationary expectations.

On balance, the inflation targeting approach appears to be very promising for developing countries. It offers a number of operational advantages, and it compels policymakers to deepen reforms, enhance transparency, improve the fiscal stance, and eventually converge to the international level of inflation.

It is important to keep in mind that the inflation-targeting strategy is not a panacea. It is a useful framework for conducting monetary policy under constrained discretion. It relies on rules, as the adoption of explicit targets requires commitment by the central bank toward policy consistency. At the same time, it leaves at the central bank's discretion the decision on how to deploy its instruments, which allows for some flexibility in responding to unforeseen domestic and external shocks. In the end, maintaining sound macroeconomic fundamentals still remains the necessary condition for price stability under any monetary framework.

## **VI. INFLATION TARGETING IN PAKISTAN?**

The principle objectives of monetary policy in Pakistan are to promote growth and maintain price stability.<sup>6</sup> The objective of achieving higher growth by monetary policy measures can, however, conflict with the goal of keeping inflation low. This section argues first why controlling inflation should be the primary objective of the State Bank of Pakistan (SBP), and then discusses what type of monetary regime is best suited to attaining this objective.

<sup>6</sup>These dual objectives are enshrined in the State Bank of Pakistan Act of 1956.

## 1. Inflation and Growth

Ask a macroeconomist what is meant by “macroeconomic stability” and the usual answer would be “low inflation”. Why? Because high inflation has well known negative effects—it imposes welfare costs on society, impedes efficient resource allocation by obscuring the signalling role of relative price changes, inhibits financial development by making financial intermediation more costly, hits the poor disproportionately because they do not hold financial assets that provide a hedge against inflation, and perhaps most importantly, reduces long-term economic growth. As discussed in earlier sections of the paper, while it is possible to generate a spurt in the growth rate, or more precisely in the level of output, through expansionary monetary policies, this effect cannot be sustained and fairly soon growth will falter.<sup>7</sup> In the long run, the relationship between inflation and growth is negative.

So if inflation is inimical to long-term growth, it obviously follows that central banks should aim for a low rate of inflation. But how low should inflation be? There are several empirical studies now that provide fairly convincing evidence that the relationship between inflation and growth is nonlinear in nature.<sup>8</sup> More specifically, at low levels of inflation, the relationship can be positive or nonexistent, while at higher rates it becomes negative. In principle, it is possible to estimate the *threshold* level of inflation at which the sign of the inflation-growth relationship would switch from positive (or zero) to negative.

There are now several empirical studies that estimate this threshold level of inflation. Using panel data covering 1960-1996, Sarel (1996) estimates the threshold level of inflation to be in the 8-10 percent range. Below the threshold inflation rate of 8 percent, inflation has no significant effect on growth, but when it gets above 8-10 percent the effect is negative and statistically significant. Ghosh and Phillips (1998), using a larger sample than Sarel (1996), find a substantially lower threshold level of inflation of around an annual rate of 2 ½ percent. Khan and Senhadji (2001) show that the inflation thresholds tend to be higher in developing countries, with threshold estimates falling in the 7-11 percent range versus 1-3 percent for industrial countries. They also find the negative relationship between inflation and growth beyond the threshold level of inflation is quite robust to sample size, model specification, and the estimation method. Two studies on Pakistan also find evidence of a threshold between inflation and growth: Mubarik (2005), using time series data over 1973–2005, finds that an inflation higher than 9 percent harms growth in Pakistan, and Hussain (2005), on the other hand, estimates the threshold to be between 4-6 percent.

Growth and inflation are not, however, the only objectives that the SBP considers. Other objectives include the improving the external current account balance, increasing the stock of international reserves, and stabilising the real exchange rate.<sup>9</sup> But in contrast

<sup>7</sup>This was very evident over the past decade in Pakistan. During 2001-2005 easy monetary policy supported a higher growth rate while the inflation rate was fairly modest. But in 2006 inflation started to pick up and growth began to slow down steadily. By 2008 inflation had gone over 20 percent, and growth had fallen to only 2 percent.

<sup>8</sup>Fischer (1993) was the first to describe the possibility of this nonlinear relationship between inflation and growth.

<sup>9</sup>Malik (2007) specifies and estimates a policy reaction function for the SBP relating the policy interest rate to the output gap, inflation, exchange rate, interest rate smoothing, and the trade deficit. He finds the most of the coefficients of these variables are statistically significant.

to the growth-inflation relationship, monetary policy geared to lowering inflation would reduce aggregate demand, and thereby improve the external imbalances and increase international reserves. Therefore, there is no trade-off between objectives. Similarly, achieving a rate of inflation equal to inflation rates in partner countries will stabilise a real exchange rate. Again, there is no trade-off here either.

## 2. Inflation Targeting by the SBP

The SBP has historically followed a regime of targeting monetary aggregates (basically M2 and bank credit) and continues to do so at present. As mentioned earlier, this type of regime assumes that the demand for money is a stable function of a well-defined set of variables, and that there is a close link between money and credit growth and the ultimate objectives of growth, inflation, and international reserves.

One reason for choosing a monetary targeting regime is that by controlling monetary aggregates the SBP can affect the outcome variables with some degree of reliability and predictability. But it should be noted that another important reason is that Pakistan has had a series of IMF programmes, and that the IMF “financial programming” approach gives credit a preeminent role.<sup>10</sup> This approach is based on the proposition that in a regime of fixed (or semi-fixed) exchange rates, the aggregate money supply is beyond the direct control of the central bank and is in fact endogenous. The central bank can only control the volume of credit, one of the sources of monetary expansion. Within this framework, the distinction between the monetary base (or money supply) and its domestic credit component becomes critical. For a given expansion of the demand for money, an equivalent increase in the money supply can be realised through a suitable increase in domestic credit. However, when the rate of domestic credit creation diverges from the changes in money demand, the difference is made up by equivalent changes in net foreign assets arising from a balance of payments surplus or deficit.

Using this financial programming framework, it is relatively straightforward to design the basics of an IMF financial programme. In the simplest case, only three steps are required. First, one has to set a target for changes in net foreign assets over some period of time, usually one year. Second, an estimate is made of the demand for money over the same period. This involves projecting the main determinants of money demand, such as real income and prices. This is the critical behavioural relationship in the analysis. The demand for money must be stable in order for there to be a predictable relationship between the balance of payments and domestic credit. Finally, given the forecast of the demand for money during the period in question and the overall target for the balance of payments (i.e., for the change in net foreign assets), the corresponding change in domestic credit is derived from the balance sheet identity of the assets and liabilities of either the central bank or the banking system. In IMF programmes these values for the change in domestic credit become “credit ceilings” that are used to monitor performance under the programme. That is why in all programmes, including the current one with Pakistan, performance criteria always include a ceiling on domestic credit expansion.

<sup>10</sup>During the past decade, for example, Pakistan has had programmes with the IMF in 6 out of 10 years: a Stand-by arrangement (November 29, 2000-September 30, 2001); a PRGF arrangement (December 6, 2001-December 5, 2004); and most recently another Stand-by arrangement (November 24, 2008-October 23, 2010). As a matter of fact, in the 1990s Pakistan had an IMF programme every year.

The instruments that the SBP uses to affect monetary and credit aggregates are the standard ones of monetary policy: changes in the rediscount rate; open market operations; and reserve requirement changes. It should be noted that interest rates have at times themselves become a target if the SBP believes that the market is pushing rates up too much. In this case the SBP loses an important instrument of monetary control, and has to rely on direct controls, such as individual bank credit ceilings, or moral suasion to persuade banks not to extend credit beyond what is considered desirable by the SBP.

Several studies have questioned monetary targeting, principally by casting doubt on one of the key assumptions of this type of regime, namely the stability of the demand for money.<sup>11</sup> Although money and credit variables have been found to have a reasonably strong link with the ultimate objectives, the predictability of these effects is uncertain.<sup>12</sup> After 2001, M2 has consistently exceeded its target growth, and since 2004 inflation has been above the target number. Clearly, the targeting of monetary aggregates has not been particularly successful in recent years. It has been argued by some that this is a consequence of financial developments and financial innovations that have led to a breakdown of the money demand function, thus calling into question the monetary aggregates targeting regime. This is not a phenomenon unique to Pakistan, as many emerging market and developing economies have experienced similar problems and been forced to think of alternative monetary regimes.

In circumstances where the link between monetary aggregates and inflation is weakened or breaks down, it makes sense to move directly to targeting inflation. Essentially, this is what led 19 emerging market in developing countries (listed in Table 1) to adopt formal inflation targeting as the monetary policy regime.<sup>13</sup> Should the SBP then move to formal inflation targeting? This is a question that has been debated in the SBP, although the decision is apparently to stay for the present with the monetary targeting framework.<sup>14</sup> So if the SBP were to move to inflation targeting, are the preconditions outlined in Section VI met?

#### **(a) Commitment to Price Stability**

This has to become the highest priority for the SBP, even though it is not necessary to completely forgo other objectives like output and the balance of payments. However, if there is a conflict among objectives, inflation stabilisation must dominate the others. In recent years, the SBP appears to have made inflation its highest priority, and inflation targeting would simply formalise an existing practice.

#### **(b) Flexible Exchange Rate**

While not freely floating, the exchange rate has considerable flexibility. In fact, full flexibility may not be desirable in countries like Pakistan that are prone to external

<sup>11</sup>In an IMF paper, Bokil and Schimmelpfennig (2005) show that the money demand equation for Pakistan has non-constant coefficients when estimated with either annual or monthly data. Similar instability has been found by SBP researchers; see Moinuddin (2009) and Omer and Saqib (2009).

<sup>12</sup>For example, by Ahmed, *et al.* (2005) and Khan and Schimmelpfennig (2006). Qayyum (2008) questions this supposed link, particularly since 2000 on.

<sup>13</sup>In fact many other countries have adopted the same practice, albeit less formally.

<sup>14</sup>For a discussion of the pros and cons of inflation targeting in Pakistan, see Felipe (2009) who does not favour it, and Moinuddin (2009), who argues that the SBP should move in this direction.

shocks and where the pass-through from exchange rate changes into consumer prices may be quite rapid. Most emerging market and developing countries intervene in the forex market to counter excessive movements in the exchange rate.

**(c) *Independent Central Bank***

The SBP became more independent from the government since 1994, but its operations are still significantly influenced by the Ministry of Finance. However, an amendment to the SBP law to enhance the central bank's operational independence was submitted to Parliament in December 2009, and is expected to be passed in 2010. In the meantime, the SBP announced the formation and composition of the nine-member Monetary Policy Committee (MPC) of the SBP Board, and this committee started its work in November 2009. At this point, the MPC reports to the SBP Board and includes two members of the Board, which is unusual since the MPC should ideally be independent of the Board as well, but possibly the reporting requirement and the composition of the MPC will change as the amendments going through Parliament become law.

**(d) *Absence of Fiscal Dominance***

In order for the SBP to implement formal inflation targeting, it must have instrument independence. That is, it must be able to focus exclusively on inflation and be able to use the instruments at its disposal, particularly interest rates, to achieve the target. Fiscal dominance can interfere with this objective in two related ways. First, the government can oblige the central bank to finance its fiscal deficit, thereby creating excess liquidity in the economy. Second, the government can pressure the central bank to keep interest rates low so as to lower the government's borrowing costs as well as the interest payments on its outstanding debt. In such a case, the central bank will likely be unable to achieve its goal of low inflation, since its ability to manage monetary conditions and liquidity in the economy will be circumscribed.

The SBP has operated under the constraint of fiscal dominance throughout its history. While it has gained a measure of independence since 1994,<sup>15</sup> nevertheless the government has continued to have a major influence on its operations. The most obvious example is the period leading up to the recent crisis that ended up with Pakistan approaching the IMF for a programme. Starting in early 2007, as international oil prices continued to rise steadily, basically for political reasons the Musharraf government decided to abandon the domestic oil pricing formula, and the increases in international oil prices were not passed on to the public.<sup>16</sup> As a result, the government's subsidy bill ballooned, and the fiscal deficit jumped from 4 percent of GDP in 2007 to 7.3 percent in 2008. This fiscal deficit was financed mostly by the SBP, to the tune of Rs 650 billion (nearly \$10 billion). Effectively this amounted to printing money to finance the fiscal deficit, and the two well-known consequences of such a policy are inflation and a loss of international reserves. That is exactly what happened. Inflation, which was already rising because of the increase in food prices, jumped to over 20 percent in 2008, almost triple

<sup>15</sup>Prior to 1994, the SBP functioned like an agency of the Ministry of Finance, and all major monetary policy decisions had to have the implicit, if not the explicit, approval of the Secretary of Finance (who also still sits on the SBP Board).

<sup>16</sup>This policy was continued by the successor caretaker government in early 2008.

the 2007 rate, and the country lost nearly \$6 billion in international reserves between June 2007 and June 2008.

Very reluctantly the government then approached the IMF at the end of 2008 for a programme. Recognising the reasons why Pakistan had got into the crisis, the IMF introduced an important condition into the programme—SBP financing on the government had to be eliminated.<sup>17</sup> It is worthwhile noting that the condition has been met during the course of the programme, even though the ceiling on the fiscal deficit has not.<sup>18</sup> Therefore, it is certainly possible to argue that the government can adhere to the condition of no borrowing from the SBP if it so chooses, and fiscal dominance can be eliminated as a constraint on SBP operations.

In a sense, the adoption of inflation targeting by the SBP would in fact lead to a fundamental institutional change, unrelated to an IMF programme, that would restrict the Ministry of Finance from borrowing from the SBP and trying to keep interest rates below market-determined levels. From that standpoint alone, the adoption of inflation targeting would serve as an important disciplining device on the government in exercising undue influence over the SBP in the conduct of monetary policy.

#### **(e) *Transparency and Operational Capability***

The SBP already has initiated a policy of making public its inflation reports and the MPC monetary policy decisions. A substantial degree of transparency has already been achieved, and presumably more transparency and accountability will follow, hopefully with the publication of the minutes of the MPC discussions. The SBP has the basic operational capacity to make inflation forecasts, and further work on both econometric models and short-term forecasting models should enable it to make their projections. The tools and the capacity are there, and it is only a question of how they are refined and utilised in the design of monetary policy. Furthermore, as argued previously in the paper, because of ongoing structural and institutional changes, inflation forecasts in emerging market and developing countries have to rely on judgment as well as models.

Overall, a move to inflation targeting by the SBP is both desirable and feasible. All the preconditions that are considered necessary for implementing inflation targeting are satisfied, save one. And that is the absence of fiscal dominance. However, by adopting an inflation targeting regime the independent SBP would be in a position to turn down any Ministry of Finance request for deficit financing if it ran counter to its policy of keeping a low rate of inflation. It would also be a clear and transparent rules-based policy and easily understood by the public, leading to greater accountability for the SBP. Right now the SBP is held responsible for inflationary developments even though it may only be supporting the policies of the fiscal authorities. With inflation targeting, the responsibility will rest squarely with the SBP and it would be accountable to the public, the government, and Parliament for the outcomes.

The new monetary regime could be implemented in the fairly near future as the amendments to the SBP Act become law. However one issue to take into account is the

<sup>17</sup>More specifically, net borrowing by the government from the SBP was to be zero on a quarterly basis.

<sup>18</sup>It has been argued that meeting the zero net borrowing target has been achieved through an element of “window dressing”. That is, net borrowing takes place during the quarter, creating excess liquidity in the system, and is brought down to zero in the last days of the quarter. So while the ceiling is formally met, the damage has been done.

current IMF programme, which is based, as argued before, on the monetary aggregates targeting framework. The standard IMF programme would therefore be inconsistent with inflation targeting, although it can be adjusted to fit the different framework.<sup>19</sup> However, as the IMF programme ends later this year, it may be advisable to wait until then to establish the new framework so as not to go through a protracted renegotiation of the current programme. Inflation targeting could therefore be implemented in January 2011, leaving enough time to make the necessary operational and institutional preparations for the new monetary regime.

## VII. CONCLUSIONS

In developing countries, monetary policy has become increasingly important in recent years, even though capital accounts have been progressively liberalised. The reason is that the large movements in global capital during the late 1990s forced many of these countries to abandon fixed or closely managed exchange rate regimes and implement monetary policies to control inflation. Such recent developments have brought to the forefront the now well-known fact in international monetary economics: namely that freely mobile capital, independent monetary policy, and fixed exchange rates form an “impossible trinity,” or “Trilemma,” as it has come to be called. Specifically, it is possible to have any two of these policies, but not all three.

In a globalised capital markets environment, there is less room for divergence of views among market participants about the appropriate stance of exchange rate and monetary policy, less time to adjust to shocks, and greater pressure to achieve closer convergence of economic performance among trading partners. As a result, a number of developing countries have adopted exchange rate regimes with more flexibility—and therefore provided greater scope for monetary policy.

Traditionally, monetary rules have been based on the behaviour of monetary instruments. However, in an environment of large international capital flows with continuing financial innovations and ever more sophisticated asset markets, rules based on monetary aggregates have become more difficult to implement. Accordingly, central banks have increasingly embraced the inflation-targeting approach. In some cases, the approach has helped monetary policy become more coherent, transparent, and credible. And, if supported by proper fiscal measures, the inflation-targeting approach has helped policymakers guide inflation rates lower, while permitting them some discretion to stabilise output. This regime has become increasingly popular even in developing countries, and so far the results have been promising. It is a monetary regime that the SBP should adopt if it is to fulfil its role as guardian of monetary and financial stability in Pakistan.

## REFERENCES

- Ahmed, Noor, Hastam Shah, Asif I. Agha, and Yasir A. Mubarik (2005) Transmission Mechanism of Monetary Policy in Pakistan. Karachi: State Bank of Pakistan. (SBP Working Paper No. 9).
- Bokil, M. and Axel Schimmelpfennig (2005) Three Attempts at Inflation Forecasting in Pakistan. Washington, DC: International Monetary Fund. (IMF Working Paper 05/105).
- Calvo, Guillermo A. (1978) On the Time Consistency of Optimal Policy in a Monetary Economy. *Econometrica* 46: (November), 1411–28.

<sup>19</sup>This was in fact done in the case of the last IMF Brazilian programme in 2002-2003.

- Carare, Alina, Andrea Schaechter, Mark Stone, and Mark Zelmer (2002) Establishing Initial Conditions in Support of Inflation Targeting. Washington, DC: International Monetary Fund. (IMF Working Paper 02/102.)
- Chari, V. V. and Patrick J. Kehoe (2006) Modern Macroeconomics in Practice: How Theory is Shaping Policy. *Journal of Economic Perspectives* 20: (Fall), 3–28.
- Felipe, Jesus (2009) Does Pakistan Need to Adopt Inflation Targeting? Some Questions. *SBP Research Bulletin* 5: (May).
- Fischer, Stanley (1993) The Role of Macroeconomic Factors in Growth. *Journal of Monetary Economics* 32: (December), 485–512.
- Freedman, Charles, and Douglas Laxton (2009) Why Inflation Targeting? Washington, DC: International Monetary Fund. (IMF Working 09/86).
- Friedman, Milton (1960) *A Programme for Monetary Stability*. New York: Fordham University Press.
- Hussain, M. (2005) Inflation and Growth: Estimation of Threshold Point for Pakistan. *Pakistan Business Review* (October).
- Ghosh, Atish and Steven Phillips (1998) Warning: Inflation May Be Harmful to Your Growth. *IMF Staff Papers* 48: (March), 1–21.
- Khan, Mohsin, S. and Abdelhak S. Senhadji (2001) Threshold Effects in the Relationship Between Inflation and Growth. International Monetary Fund. *Staff Papers* 48:1, 1–21.
- Khan, Mohsin, S. and Axel Schimmelpfennig (2006) Inflation in Pakistan: Money or Wheat? *SBP Research Bulletin* 2.
- Kydland, Finn E. and Edward C. Prescott (1977) Rules Rather Than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy* 85: (June).
- Malik, Wasim, S. (2007) Monetary Policy Objectives in Pakistan: An Empirical Investigation. Pakistan Institute of Development Economics, Islamabad. (PIDE Working Papers 2007:35).
- McCallum, Bennett T. (2000) The Present and Future of Monetary Policy Rules. *International Finance* 3: (Summer), 273–86.
- McCallum, Bennett T. (2004) Misconceptions Regarding Rules vs. Discretion for Monetary Policy. *Cato Journal* 23: Winter, 365–71.
- Moinuddin, (2009) Choice of Monetary Policy Regime: Should the SBP Adopt Inflation Targeting? *SBP Research Bulletin* 5.
- Mubarik, Yasir A. (2005) Inflation and Growth: An Estimate of the Threshold Level of Inflation in Pakistan. *SBP Research Bulletin* 1.
- Omer, Muhammad and Omar F. Saqib (2009) Monetary Targeting in Pakistan: A Skeptical Note. *SBP Research Bulletin* 5.
- Qayyum, Abdul (2008) Does Monetary Policy Play Effective Role in Controlling Inflation in Pakistan. University of Munich, Munich. (MPRA Paper No. 13080).
- Roger, Scott (2009) Inflation Targeting at 20: Achievements and Challenges. International Monetary Fund, Washington, D.C. (IMF Working Paper 09/236).
- Sarel, Michael (1996) Nonlinear Effects of Inflation on Economic Growth. *IMF Staff Papers* 43, 199–215.
- Taylor, John B. (1993) Discretion versus Policy Rules in Practice. Amsterdam: North-Holland. *Carnegie-Rochester Conference Series on Public Policy* 39, 195–314.
- Woodford, Michael (2003) *Interest and Prices: Foundations of a Theory of Monetary Policy* Princeton, NJ: Princeton University Press.

## Comments

At the outset I would commend Mohsin Khan's efforts in preparing a very good paper on a subject that is quite important for understanding the efficacy of economic management in Pakistan. I feel the paper would serve as good reading material both in macroeconomics as well as in monetary theory.

Although he discusses a variety of objectives and instruments of monetary policy, the main thrust of the paper is to highlight the critical role of central bank in ensuring price stability through a rule based policy, particularly in developing countries where inflation remains an important fact of life. It is underlined that in the backdrop of weak institutional arrangements and low credibility of central bankers in such countries incentives are created that promote dynamic inconsistency and inflationary bias in the conduct of monetary policy. The paper comprehensively surveys the instruments available to central banks in achieving the objective of policy stability and narrates in some details how the use of such instruments has evolved over the last several decades.

I would take the liberty of moving straight to the key recommendation of the paper, which is for the SBP to move toward inflation targeting. It has already been noted that in the framework of an IMF programme monetary aggregates still remain the dominant modes of conducting monetary policy. It has also be recognised and despite this being the case inflation remains an important consideration in judging the success of stabilisation programme. And even though inflation may not be a performance indicator like the build-up of reserves or credit expansion yet it remains a guiding principle, for instance in interest rate setting. Without having a formal linkage, since interest rate remains an important part of the programme, an implicit mechanism of worrying about inflation is already available in the present programme. This is not to suggest that we already have an inflation targeting monetary policy in place. Clearly, there is work to be done before we can claim to be amongst the countries following rule based monetary policy.

At the outset, let me state that the pursuit of price stability should not be a basis to create wedge within the apparatus of economic management. I see many implications of this recommendation that may be unintended but in the context of past experience in Pakistan, they are quite pregnant with suggestions that will promote precisely such consequences.

To begin with, and without de-emphasising what has been proposed, it needs to be recognised that inflation has not been a problem in Pakistan the way it has affected many other emerging markets. The unusual inflation we experienced last year is an outlier in the data on inflation, which may have occurred once or twice more in the last six decades of our existence. As one of the papers read out in the conference has demonstrated, the average inflation in the past 60 years has been in the range of 5-6 percent. And that is because this is a country, with low income and high population, where peoples' capacity to absorb large doses of inflation is quite low. The country produces a great deal of its own food and many people are engaged in subsistence agriculture and are occasionally paid in-kind, which is an effective way of insulating them from price-hikes. This may be a reason behind the relative price stability observed over a very long period of time. Again, speaking in relative terms, inflation has not been a problem which could warrant a one-dimensional conduct of monetary policy.

In the case of Pakistan, I would suggest that rather than inflation it is growth that has been a more worrying concern for the policy-makers. It is growth, or lack of it, that pushes people into poverty. Obviously, you will argue that growth itself is affected because of inflation. Without denying the growth retarding character of inflation, it should be noted that there have been episodes of major decline in growth which had nothing to do with inflation nor, as I have already suggested, has inflation been so menacing as to retard growth. For instance, the unusual draught in the first few years of the present decade clearly had nothing to do with price stability or loss of it. That draught had pushed people significantly below the poverty line. Similarly, we have had long spells of growth without high inflation.

Let us recognise that we should be interested in price stability *per se*. For there are mechanisms, indeed very brutal ones for that, for instance through ceding the country's sovereign right to create money tremendous price stability can be achieved. If a country does not print money beyond that which is absolutely necessary to meet the growing needs of the economy, barring the questions of stability of demand for money function, then clearly there will be no inflation. But it will be difficult to make out a case for a country like Pakistan that it should move in that direction, for we have never had inflation so problematic as to warrant such an extreme step. Accordingly, by price stability it should not be meant that the country should lose its sovereign right to enjoy the seigniorage which is a legitimate income of any government. Needless to say that this has to be within reasonable limits.

When we move toward price stability through the mechanism of inflation targeting this issue has to be solved as to who will have the right to decide as to what level of inflation should be targeted. Will it be an empirical thing or judgment? And if it's a judgment, whose judgment it will be? The paper has spelled out the conditions needed for efficient conduct of inflation targeting. It has been particularly noted that SBP's freedom or independence is an important requirement for the success of this exercise. The author and I have had the privilege of witnessing together how this issue of central bank's autonomy has evolved in Pakistan over the years. Clearly, prior to 1990-91, when public auction of debt started there was not much by way of monetary management. The entire capital market was in the public sector. There was not much public debt traded by banks or general public, it was held exclusively by the nationalised commercial banks. It all started with the public auctioning system. The first step toward giving autonomy to State Bank was taken in 1993. When a new initiative was proposed by the IMF in the current programme, I had really wondered what is wrong with the current quantum of autonomy that would call for yet another round of amendments in the law.

It has been stated that the SBP was treated like an attached department of the ministry of finance and that the secretary finance or additional secretary were running the SBP. Frankly, I have not had this privilege to treat SBP in this fashion, not that I wanted to, or to influence in any way, the manner in which the SBP was run. To the contrary, I saw on many an occasions that the powers that vest in the Board of Directors of SBP were freely exercised by the Governor, and occasionally, not entirely in accordance with the law. The first three Governors the country has seen since the central bank was made autonomous would conduct monetary policy as a one person show. They will take decisions and will come to the meeting of the Board simply announcing their decisions. Clearly, this is not the kind of freedom or autonomy that is envisaged in the SBP Act.

The package of autonomy, when approved in 1993, had envisaged a Monetary and Fiscal Coordination Board which were to set the basic policy parameters, including a determination of the inflation target for the year. The Board has not met as frequently as it should have. But that does not take away the significance of its existence. If State Bank has to work as an insulated institution divorced from what is happening in economic management in the rest of the economy, clearly there will be huge coordination problems. The paper apparently does not address this issue. I would also like to bring before this august forum the Indian Reserves Bank Act, which was precisely the same as SBP Act before it was amended in 1993. There has been not been a single notable amendment in the Indian law since its promulgation the way that we amended our law or are going to do yet again. Now I wonder if India is wanted in any way in the conduct of its monetary policy or its economic management of the type we have just been discussing.

It is important to note that it is the federal government that interacts both with the IMF and the World Bank. It is the government that negotiates the programmes with these bodies. I have had occasions to share candidly this with these institutions that the way they are promoting the notion of autonomy and independence of several economic institutions, it is only encouraging—I hate to say disintegration—divisions within the government and thereby affecting the coherence in economic management and perhaps, on occasions, we may working at cross purposes. Accordingly, the quality of economic management expected of the government is missing precisely. New agendas are added to an already complex policy-making regime with little significance and relevance, which adversely affect the ability of the ministry of finance to deliver on the discipline that is imposed through a Fund programme.

Although not part of the paper, the author in his discourse has expressed a view regarding the causes behind the recent inflationary episode which eventually led the country into an IMF programme. He has said the Musharraf Government had not passed-on the oil price increase to consumers for political expedience and the resulting deficit was financed through central bank borrowing. He suggested that had the central bank been independent it would have refused to finance this huge deficit and the consequent derailment of economic stability would have been avoided. I would beg to differ with this description as the facts are quite different than what is being suggested.

There is clear evidence that during those important days the auctions of public debt held had witnessed considerable demand from commercial banks for government securities. It was SBP's decision, who curiously was conducting such auctions and deciding on how much to take and what prices. It was SBP who decided not take those offers even when these were within the reasonable limit of interest rates and the Ministry of Finance would not have any objection in accepting those offers. I have difficulty in understanding on what basis the SBP then decided to reject those offers and instead buy those securities and create reserve money in the process.

At a broader level, let me also suggest that price stability cannot be the only objective of economic management to be handled at a different place and the rest of economic management somewhere else. There has to be coordination. There has to be some understanding amongst all those responsible for economic management. After all we should look at how the US Federal Reserve has handled the recent financial turmoil. Here again we will the contrast between what is an international best practice and what is

being done here in Pakistan. In the aftermath of the financial melt-down, Federal Reserve Bank had gone in the market and purchased any kind of securities issued by any authority, including private securities to an extent that it has doubled its balance sheet. It was discounting these securities because it wanted to provide the liquidity that was the single most important reason why the entire financial system had paralysed and frozen. Well, compared to what was happened in USA, there was not much that happened in Pakistan. In our case some small banks and mutual funds were faced liquidity problems. They had some illiquid assets, in the form of rated-TFCs (term financing certificates) of corporate sector entities, some of those carrying AAA rating. The then governor was not interested in discounting those securities. This position was not modified even when the Government was willing to provide a guarantee for this purpose. Curiously, the Governor was occasionally insisting federal government to provide it guarantee in the same form as it provides to commercial banks. This was not entirely in accordance with the provisions of law, as the federal government has the authority to give directions to central bank on such matters, and of course the responsibility and obligations incurred on this account are those of the federal government.

It may also be noted that whenever federal government borrows from the central bank it is priced at the same rate as is observed in the last auction of 6-month T-Bills and as such there is no pre-determined rate at which government borrows and this rate keep changing, because much of government borrowing is short term.

Finally, I would like to say that this issue of independence has to be settled with respect to its fullest meaning. One of the Governors, who was attending the meeting of the Senate's Standing Committee on Finance, asked the Chairman: Sir, you are part of the government, please help us in controlling the government from borrowing excessively from the State Bank. Obviously, the Chairman was shocked that the governor thought the Senate was part of the government.

Here lies the dilemma. What is it that the Central Bank would like to be? Is it part of the executive, or judiciary or legislature? Where would it like to fit in? I think there is no other model in the world but to acknowledge that central banks, despite any amount of autonomy, remains a part of the executive. Undoubtedly, they are carrying a fiduciary responsibility that calls providing it special existence, duly sanctioned under the law and with protection of tenure and insulation from normal bureaucratic intervention in its working. But such considerations cannot be carried too far to develop an antagonism with the executive branch and arrogate more responsibility for economic management than an elected government has under the Constitution of Pakistan.

I have no difficulty in supporting a programme whereby the central bank will move toward inflation targeting. But at the same we must recognise that the objectives of economic management are much broader, and in particular growth is no less important an objective. Accordingly, there has to be close coordination amongst the institutions charged with the formulation and implementation of economic policies.

**Waqar Masood Khan**

Ministry of Textile Industry,  
Islamabad.

## Comments

Dr Khan has presented a comprehensive paper on various aspects of monetary policy emphasising in particular the issues of dynamic inconsistency, the nexus between inflation and economic growth, and rules-based vs. discretionary monetary policy frameworks. The paper methodically builds on several strands of literature in the broad areas of macroeconomics and monetary economics to make a convincing case for the adoption of inflation targeting regime in Pakistan.

The idea of inflation targeting has been extensively debated in the literature and has now gained broad acceptance among academic and policy circles. The empirical evidence shows that the performance of Inflation Targeting regimes around the world has been largely positive. Average inflation in both emerging markets and developed economies is found to be substantially lower after the adoption of the Inflation Targeting regime than immediately before its adoption.

In view of the compelling theoretical arguments in favour of Inflation Targeting and broad empirical support, there can be little question on the desirability of adopting Inflation Targeting regime as long as the pre-conditions for its successful implementation are met.

The question then is of feasibility. In this context, the paper spells out various conditions that are necessary for inflation targeting; and examines in detail whether these conditions are satisfied in Pakistan. It is argued that all the conditions are met except the condition of fiscal dominance.

To be sure, the adoption of the Inflation Targeting regime would mark a fundamental shift in macroeconomic management in Pakistan. At the same time it would pose some difficult challenges too.

First and foremost is the issue of fiscal dominance. The paper argues that the adoption of Inflation Targeting would act as a disciplining device helping to restrain government borrowing from the central bank. However, this is going to be difficult in a country where:

- (1) Tax to GDP ratio has been chronically low;
- (2) Efforts to raise tax revenues have not been very successful in the past with future prospects remaining uncertain; and
- (3) Financial markets lack the necessary depth making it difficult for the government to use market-based debt instruments to finance the fiscal deficit.

All these issues would have to be resolved to effectively limit the scope of fiscal dominance.

Second, in view of diverse development challenges typically faced by the developing economies, it may be difficult to accept the primacy of price stabilisation over

all other macroeconomic objectives. For example, poverty remains a pressing issue in Pakistan and consequently, one of the major goals of economic policies is poverty alleviation. As economic growth is a necessary condition for poverty reduction, there will always be a strong temptation to achieve higher economic growth in the short term through the use of accommodative monetary policy.

Third, Pakistan would have to brace for a greater degree of exchange rate flexibility typically associated with an Inflation Targeting regime. As rightly pointed out in the paper, more flexible exchange rate could serve as an automatic stabiliser in the face of adverse external shocks. However, if the exchange rate becomes excessively volatile, this would enhance exchange rate risk which is detrimental to international trade and investment and hence economic growth. As a matter of fact, there is some empirical evidence that volatility of exchange rate in emerging countries adopting Inflation Targeting has been higher than in developed market economies.

Fourth, there may be some practical issues in the implementation of Inflation Targeting regime. For example, there is evidence in the case of Pakistan that interest rate channel of monetary policy is rather weak and that there are long lags in the pass through of short term interest rate to the lending rate. This implies that the short term interest rate—which is the principal policy tool in inflation targeting regimes—does not have significant effects on the rate of inflation. Surely there will be ways to deal with this problem but exactly how the central bank would tackle this issue needs to be looked into.

It should be emphasise here that none of these problems is insurmountable. What is required is a strong political will and a focus on long term goals rather than short term expediencies. The adoption of Inflation Targeting regime would help solve the fundamental problem of dynamic inconsistency associated with a discretionary monetary policy regime. As the paper rightly emphasises, this problem is especially important in low income countries with weak institutions and low credibility of the central bank.

Research undertaken at the PIDE corroborates this view in the context of Pakistan. The PIDE regularly conducts inflation expectations survey and these surveys have found a persistence of inflationary expectations which is taken to be a sign of low policy credibility. Incidentally, the fact that inflationary expectations are fairly entrenched partly explains the persistence of inflationary pressures in the economy despite tight monetary policy in the recent period.

Let me say in the end that the paper is a valuable contribution on modern views of monetary policy and lessons for Pakistan. The issues raised in the paper are of profound significance and deserve serious consideration and debate.

**Musleh ud Din**

Pakistan Institute of Development Economics,  
Islamabad.

*The Allama Iqbal Lecture*

**Growth-Poverty Linkage and Income-Asset  
Relation in Regional Disparity: Evidence  
from Pakistan and India**

S. HIRASHIMA

The purpose of this paper is to discuss the importance of incorporating asset holding and its distribution into the study of growth-equity relationship in the context of regional disparity. We have tried to discuss this issue by taking the Inclusive Growth Strategy (IGS) introduced by the Union Government of India in 2006.

Although it is too early to assess the impact of IGC at this stage, the followings are some of the important findings of our analysis.

First, the performance of the post-reform period is characterised by the higher economic growth and declining poverty ratio on one hand, and the increasing disparity in terms of consumption, income and asset holding on the other. Second, the magnitude of poverty and disparity is much more evident in asset holding, notably land, as compared with consumption and income, among economically and socially disadvantaged segments of rural communities. Third, if the inherent social inequality were overcome in the growth process, access to asset, notably land, has to be facilitated either by political process or through market transaction. In either case, the prospective is not yet bright.

The paper strongly advocates, among others, the necessity of incorporating income-asset relationship and structural aspects in discussing poverty and disparity issues in development.

**Keywords:** Growth-Poverty Linkage, Income-Asset Relationship, Inherent Social Inequality, Inclusive Growth Strategy, Land Market, Capital Gain, Land Reform, Rent-land Price Ratio, Gini-coefficient.

**INTRODUCTION**

The purpose of this paper is to discuss the importance of incorporating asset holding and its distribution into the study of growth-equity relationship in the context of regional disparity. We will try to discuss this issue by taking the Inclusive Growth Strategy (IGS) introduced by the Union Government of India in 2006. Although this is mainly due to the availability of relevant data in India, we believe we could derive many useful insights in considering the similar issues Pakistan faces today.

As has been well documented already, the term ‘Inclusive Growth’ was manifested in the Approach Paper to the 11th Five-Year Plan (2007–11) by the Union Government of India in 2006. Under the specific chapter on the inclusive growth, it says;

S. Hirashima <hira6480@yahoo.com> is Professor Emeritus at the Meiji-Gakuin University, Japan. He serves also as a Visiting Professor at the Graduate School of International Social Development Nihon-Fukushi University, Japan, and a Visiting Senior Advisor, Japan International Cooperation Agency (JICA).

*Author's Note:* He is deeply indebted to Dr Kensuke Kubo of IDE for his cooperation and assistance in various computing works in this paper. He is also grateful to Professor Takashi Kurosaki of Hitotsubashi University and Dr Pratap Birlhal of ICRISAT for their valuable comments on the first draft. He would like to express his deep gratitude to Professor Rashid Amjad and G. M. Arif of PIDE for the invitation extended to me to the Silver Jubilee Lecture. He is extremely grateful to the Chairperson of the Session, Dr Tasneem and two Discussants, Professors Abdul Salam and Munir Ahmed for their valuable comments to my paper. He is also indebted to Professor Sarfraz Khan Qureshi and Nawab Haider Naqvi for their thoughtful comments from the floor.

“The strategy of inclusive growth proposed in this paper can command broad based support only if growth is seen to demonstrably bridge divides and avoid exclusion or marginalisation of large segments of our population. These divides manifest themselves in various forms: between the haves and the have-nots; between rural and urban areas; between the employed and the under/unemployed; between different states, districts and communities; and finally between genders.” [India (2006)]. The key components of Inclusive Growth Strategy (hereafter IGS) can be listed as follows:

- (1) stepping up investment in rural infrastructure and agriculture;
- (2) increasing credit availability to farmers and offering them remunerative price for their crops;
- (3) increasing rural employment, providing a unique social safety net in the shape of the National Rural Employment Guarantee Programme;
- (4) increasing public spending on education and health care, including strengthening the mid-day meal programme and offering scholarships to the needy;
- (5) investment in urban renewal and improving the quality of life for the urban poor;
- (6) empowering scheduled castes, scheduled tribes, other backward classes, minorities, women and children socially, economically and educationally; and
- (7) ensuring that, through public investment, the growth process spreads to backward regions and districts.

The idea behind IGS is not a new or a novel idea, as Hanumantha Rao points out. According to him, “it stands for ‘equitable development’ or ‘growth with social justice,’ which have always been the watchwords of development planning in India. [Hanumanta (2009)]. In fact, it was already expressed by Jawaharlal Nehru in his speech delivered on the eve of Independence, which was reviewed by A. K. Sen as follows.

“I recall the rousing speech that Jawaharlal Nehru gave on the eve of Independence, on August 14, 1947. If one considers the various things that he described as “tasks ahead”, three commitments that come out quite clearly are, firstly, a focus on the practice of democracy and the guaranteeing of various freedoms of the citizens of India; secondly, the removal of the social inequality and backwardness that characterised British India; and thirdly, achieving economic progress, judged primarily in terms of how it affects conditions of the poor in India.” [Sen (1997)]. According to A. K. Sen, India has been successful in achieving the first goal, but the performance of the second goal has been extremely poor. As for the third goal, the assessment was mixed. Although the GDP growth rate has been moderate around 3.5 percent (so-called Hindu rate of growth) due to excessive bureaucratic control, India has fared pretty well in diversifying her industrial structure towards a full-fledged economy.

In fact, unlike other developing countries, India’s development performance was unique at least in two aspects. One is the very fact that India has assigned an equal weight both to growth and equity in the planning process right from the beginning. The other is that India decided to develop her economy by giving preference to the development of the capital good sector over the consumer good sector. As a result of this unique strategy, India could diversify her industrial structure much faster than other developing countries, many of which are still not successful in developing their industrial structures to the extent

India did. Development of heavy industry demanded the faster development of higher education. Even though this biased allocation of resources to higher education supported the growth of heavy industry and, later IT industry, the slow development of basic education was the cost of this unique development strategy of India. Also it has to be pointed out, that the development of heavy industry in India was achieved without much direct support from the agricultural sector. This is evidenced from the extremely low correlation coefficient between the growth rate of the industrial sector and that of the agricultural sector, albeit the overall GDP growth rate has been influenced substantially by the performance of the agricultural sector. [Hirashima (2008a)].

Indian economic policies had begun to shift gradually in the 1980s towards market economy, and finally in 1991, India declared the departure of the planned economy towards the Indian way of market economy. In his memorable Budget Speech delivered on July 24, 1991, the then Finance Minister Manmohan Singh expressed his expectation towards overcoming inherent social inequality. [India (1991)]. However, in spite of the much faster economic growth and the successful performance in poverty reduction achieved after the reform of 1991, the inherent social inequality and regional disparity have persisted.

The IGS declared in 2006 gives an impression that it is an Indian version of the Poverty Reduction Strategic Paper (PRSP) of the World Bank at a glance. However, it is beyond the PRSP in that it is broad based and explicitly incorporates the social and political dimensions of growth process, not just a strategy towards poverty reduction in economic terms.

#### **GROWTH-POVERTY LINKAGE AND REGIONAL DISPARITY IN MAJOR INDIAN STATES**

India has been successful in getting out of the low growth trap during the post reform period. As Table 1 shows, the growth rate of per capita Gross State Domestic Product (GSDP) increased from 3.1 percent during 1980-81-91-92 to 3.8 during 1993/94-99/00. The accelerated growth process had resulted in the continuous reduction of poverty ratio after the reform. The growth-poverty linkage is evident and it seems to support those who believe in the thesis of trickle-down effect of growth. However, this situation is complicated if we look at the inter-state performance. As demonstrated in the table, the major 15 states of India, representing 85 percent of population, can be classified into four groups: high-income, higher middle-income, lower middle-income and low-income state. There are several important features to be pointed out as follows.

First, during the two reference periods under comparison, the growth performance was impressive in particular the states in the middle-income group except for Rajasthan.

Second, except for all the four states in the low-income group, all other states have improved the relative income position to the highest income of Punjab.

Third, except for the low-income states, income level of all other states has improved measured in terms of all India average. Yet, the ranking order in terms of per capita income level has remained unaffected, with the exception of Maharashtra, who improved the ranking from the third to the second.

Fourth, the growth performance in the post reform period shows the accelerated growth in all the middle-income states (except for Rajasthan) on one hand, and the decelerated growth of all other states (except for Gujarat) on the other.

Table 1

*State GDP per Capita, Growth Rate, Employment Elasticity, and Poverty Ratio  
in Major Indian States: 1980-81–2004-05*

| State                              | GSDP per Capita All<br>India=100) |                     | GSDP per Capita,<br>Punjab=100 |                     | Growth Rate(%):GSDP<br>per Capita |                     | Emp.<br>Elasticity<br>1993-94–<br>1999-00 | Poverty Ratio<br>(Headcount, %) |         |         |
|------------------------------------|-----------------------------------|---------------------|--------------------------------|---------------------|-----------------------------------|---------------------|---|---------------------------------|---------|---------|
|                                    | 1980-81–<br>1982-83               | 1998-99–<br>2000-01 | 1980-81–<br>1982/83            | 1998-99–<br>2000–01 | 1980-81–<br>1991-92               | 1992-93–<br>2004-05 |   | 1983                            | 1993-94 | 2004-05 |
| <b>High Income States</b>          |                                   |                     |                                |                     |                                   |                     |   |                                 |         |         |
| Punjab                             | 165.8                             | 157.3               | 100                            | 100                 | 3.4                               | 2.7                 | 0.43                                      | 14.3                            | 11.7    | 10      |
| Haryana                            | 140.5                             | 144.6               | 84.7                           | 91.9                | 4                                 | 3.5                 | 0.42                                      | 21.9                            | 28.3    | 13.6    |
| Maharashtra                        | 131.9                             | 155.7               | 79.5                           | 99                  | 3.8                               | 3.3                 | 0.22                                      | 45.9                            | 37.9    | 30      |
| Gujarat                            | 130.3                             | 139.2               | 78.6                           | 88.5                | 2.8                               | 3.7                 | 0.32                                      | 28.9                            | 22.2    | 19.4    |
| <b>Higher Middle Income States</b> |                                   |                     |                                |                     |                                   |                     |   |                                 |         |         |
| Tamil Nadu                         | 101.7                             | 130.2               | 61.3                           | 82.6                | 4                                 | 4.1                 | 0.05                                      | 54.8                            | 32.9    | 22.7    |
| Karnataka                          | 94.5                              | 119                 | 57                             | 75.6                | 3.5                               | 5.6                 | 0.19                                      | 36.3                            | 30.1    | 20      |
| Himachal Pradesh                   | 106.4                             | 111.3               | 64.2                           | 70.8                | 3.5                               | 4.7                 | 0.05                                      | 17                              | 30.4    | 10.9    |
| <b>Lower Middle Income States</b>  |                                   |                     |                                |                     |                                   |                     |   |                                 |         |         |
| Kerala                             | 102.3                             | 107.2               | 61.7                           | 68.1                | 2.5                               | 4.7                 | 0.01                                      | 39.6                            | 25.4    | 13.2    |
| Andhra Pradesh                     | 94                                | 100.8               | 56.7                           | 64.1                | 2                                 | 4.7                 | 0.07                                      | 26.8                            | 15.9    | 10.8    |
| West Bengal                        | 88.3                              | 98.4                | 53.3                           | 62.5                | 2.6                               | 5.6                 | 0.06                                      | 63.6                            | 41.2    | 28.5    |
| Rajasthan                          | 79.4                              | 89.5                | 47.9                           | 56.9                | 3.8                               | 2.9                 | 0.1                                       | 35                              | 26.4    | 19      |
| <b>Low Income States</b>           |                                   |                     |                                |                     |                                   |                     |   |                                 |         |         |
| Orissa                             | 73.2                              | 65                  | 44.2                           | 35                  | 2.8                               | 2.7                 | 0.26                                      | 68.5                            | 49.8    | 46.9    |
| Uttar Pradesh                      | 71                                | 59.4                | 42.8                           | 37.9                | 2.6                               | 1.8                 | 0.19                                      | 47.8                            | 43.1    | 33.9    |
| Madhya Pradesh                     | 68.9                              | 58.5                | 41.5                           | 37.2                | 2.1                               | 1.9                 | 0.27                                      | 49                              | 39.2    | 35.8    |
| Bihar                              | 40.5                              | 35.1                | 24.4                           | 22.3                | 2.3                               | 2.2                 | 0.35                                      | 64.7                            | 56.6    | 42.2    |
| All India                          | 100                               | 100                 |                                |                     | 3.1                               | 3.8                 | 0.16                                      | 48.5                            | 37.2    | 28.7    |

Source: Compiled and rearranged from Hirashima (2008a, Table 12.3), Birthal (2009, Table 1) and Himanshu (2007, Table 1).

Fifth, in spite of the different performance in terms of growth rate, the poverty ratio in all states had been reduced, albeit the difference in magnitude.

Sixth, although the growth-poverty linkage is proved to have a trickle-down effect, the regional disparity has not been improved, as we will see soon. The situation surrounding all the four low-income states in terms of growth rate, level of per capita income and the extent of poverty are serious, where 346 million people or roughly 1/3 of the total population reside.

The performance during the post reform period demonstrates the positive linkage between income growth and poverty. At the same time, however, it raises new question in development, namely the increasing disparity in terms of consumption, income and asset holding position. We are going to examine this dilemma in the following sections.

### THE STRUCTURE OF SOCIAL INEQUALITY IN RURAL INDIA

The figures in Table 1 show the mean value of each state in terms of growth rate, in which no distinction is made between agriculture and non-agriculture, and between occupational groups as well as social groups.

If we are serious about the issue of poverty and social inequality in the context of IGS, we have to start recognising the simple socio-economic structure of rural India, which is often ignored in economic analysis. The most striking feature in village communities in India, compared with the Japanese villages, for example, is the co-existence of farm households and non-farm households, and moreover, these two occupational groups are socially distinctive under the social hierarchy system based on the Hindu *Varma* System. To be more specific, traditionally they were integrated part of the socio-economic unit of production through *Jajmani* System (*Seyp* system in Pakistan Punjab). [Weiser (1936); Eglar (1960)] Under the system, the non-farm households used to supply agricultural labour, agricultural implements and other social services in order to support production and livelihood of the farm households. They used to receive the customary determined wages in kind. This customary arrangement has served as a traditional form of social safety net based on the social division of labour, together with endogamy called *Jati* (*Biradari* in Pakistan). However, the important point not to be missed is that the non-farm households have been segregated in terms of status hierarchy system; most of them were born artisans and labourers, and mostly landless in village communities. Even though the *Jajmani* System has been rapidly fading out from the contemporary rural India, the socially inferior position of the non-farm households has not been changed basically even after the acquisition of farmland and other assets by them.

The inferior social position of the non-farm households in the traditional sense is now identified as scheduled caste (SC), scheduled tribe (ST) and a substantial part of OBC (Other Backward Classes: Muslims are categorised in OBC). 'Other' in social group represents the higher Caste Hindu. In the recent National Sample Survey (NSS) data, for example, NSS 59th Round, the total households in rural India are classified into two ways; occupational group and social group. The former is divided into two as 'Cultivator' and 'Non-cultivator,' and the 'Non-Cultivator' is further classified as 'Agricultural Labour', 'Artisan' and 'Other.' The social group is classified as SC, ST, OBC and 'Other.' The proportion of rural people in each sub-group is shown in Table 3.

With this new classification, some of the non-farm households traditionally defined are merged into the category of 'Cultivator,' if they 'operate' own and leased-in land more than 0.002 hectares. By the same token, there is a possibility that some of the farm households with traditional social status who lost land are now classified as either 'Agricultural Labour' or 'Other' in the 'Non-cultivator' category. From the objective of this paper, this new classification has four problems. First, the importance of private ownership of land cannot be identified with the inclusion of leased in land. Second, the exact extent of those who have been handicapped socially has become obscure. Third, concept of 'landlessness' has become obscure as well. Under this classification, artisans, for instance, who cultivate leased-in land of more than 0.002 hectares are now categorised as 'Cultivator', even though they do not own any farmland at all. Likewise, those who own homestead land more than 0.002 hectares are now labeled as 'Cultivator.' Fourth, a comparative analysis became difficult between the state of 1991 and 2002, for the OBC and 'Other' in 2002 were not separately classified in 1991. Admitting that it has become difficult to rigorously examine the state of poverty and social inequality in rural India, it is still possible to discuss the magnitude of the problem by examining the income and asset holding position of the households under the category of 'Non-cultivator' in occupational group, and the SC, ST and OBC in social group.

#### INCOME-ASSET RELATION AND REGIONAL DISPARITY

In the past, few studies analysed the socio-economic position of non-farm households as an independent economic unit in a village community. Overwhelming majority of studies on agriculture has focused on the economics of farm households. However, if the issue were poverty reduction, this approach would crowd out about 40 percent (in Pakistan 50 percent) of the relatively poor rural residents. As we will see soon, the difference between farm-households and non-farm households is most conspicuous in terms of asset holding position, particularly land, than the level of consumption and income.

The importance of asset approach towards poverty reduction strategy or rural development, in fact, is based on our village survey conducted in Pakistan Punjab in 1972. As is clearly shown in Table 5, the difference between *Zamindar* (farm) households and *Kamme* (non-farm) households is most conspicuous not in terms of income per household, but asset holding per household. In fact, the table shows that while the average income per household of *Lohar* (blacksmith), for instance, was 25.5 percent of the income of owner farmer, asset holding was only 3.9 percent. This should also be compared with tenant farmer, where the share was 48.4 percent and 6.9 percent respectively. This finding raised two sets of question to be examined. One is the socio-economic position of non-farm household in village community, and the other is the income-asset relationship between farm-household and non-farm household. Since the main asset being land, the question was to examine the differential of growth rate between income and land value between the two socio-economic groups in rural Pakistan. As discussed elsewhere already, our follow-up study on the land market behaviour in Pakistan confirmed that the land price has been increasing much faster than the gross produce since the land market was born in the mid-19th century up to the present time. Therefore, the rate of return of investment in land has been declining below

the interest rate of the bank loan. Higher land price than the discounted value of rent as against the traditional definition of rent-land price relationship can be explained by several factors. First, the most important factor on the supply side is the increasing scarcity value of land whose extensive margin is limited. Second, demand side has been historically influenced by the higher productivity of the non-agricultural sector in the region, by the need of maintaining extended family, endogamy (*Jati*), power and prestige of landed elites, and by their excess liquidity in the form of accumulated rental income with fewer investment outlet elsewhere. Third, price inelastic demand for land was resulted in the formation of landlordism during the British period and for them the land was regarded as an alternative form of saving, rather than the investment seeking for justifiable return. Under this circumstance, access to the land market for landless and near landless rural population has become remote. [Hirashima (1978, 2008b)].

The importance of income-asset relationship in studying poverty and regional disparity has begun to be recognised in India gradually in recent years. It was Vaidyanathan who for the first time pointed out the importance of asset by using the National Sample Survey (NSS) data from 1961 to 1981. [Vaidyanathan (1990)] Subramanian and Jayaraj extended the reference period up to 2002 and examined the issue in more detail. [Subramanian and Jayaraj (2006)]. However, both studies had to confine their analysis on the consumption-asset relationship, instead of income-asset relationship, since the National Sample Survey Organisation (NSSO) did not collect data on household income. Therefore, the income-asset relationship has to be examined at the micro-level study. In this connection, we have two important village studies; one by Vikas for India, and the other by Kurosaki for Pakistan. Both studies clearly demonstrate the importance of incorporating asset aspect into the study of poverty and social inequality in addition to income analysis. [Vikas (2009); Kurosaki (2006)].

Let us see the change in the state of disparity in terms of consumption, total asset, and land at the state level. From the Figures and Table 8, two important issues emerge. One is the fact that, while the disparity situation in consumption, total asset and land was improved during the pre-reform period, it was aggravated during the post-reform period. The other is the fact that the disparity is observed much more in total asset and land than consumption. Since the poverty line is expressed in terms of income level calculated on the basis of consumption expenditure, it can be interpreted as proxy for income. In this context, Kurosaki confirms the growing consumption disparity during the post-reform period, and we also highlight the linkage between the growing disparity of land ownership and non-agricultural growth during the post-reform period. [Kurosaki (2009); Hirashima and Kubo (forthcoming)].

With respect to the factors accountable for the direction of change in disparity situation before and after the reform, we could not be conclusive with the available data at hand. Nevertheless, we would like to suggest that the answer lies in the differential growth rate between agriculture and non-agriculture during the reference period. In more concrete terms, the growth rate of agriculture during the post-reform period was decelerated substantially in most states. (Table 2). Although this observation has to be verified more rigorously in the future study, it could be hypothesised that, while the higher growth of agriculture has an effect of mitigating the growing regional disparity, the rapid growth of non-agriculture has an effect to intensify the disparity situation in general. The recent study by BIRTHAL, *et al.* shows the evidence of disparity enhancing effect of non-agricultural growth. [BIRTHAL, *et al.* (2010)].

Table 2

*State-wise Growth Rate of Net State Domestic Product of Agriculture and Non-agriculture: 1980-2000*

|                                    | Agriculture         |                     | Non-agriculture     |                     |
|------------------------------------|---------------------|---------------------|---------------------|---------------------|
|                                    | 1980-81–<br>1992-93 | 1993-94–<br>1999-00 | 1980-81–<br>1992-93 | 1993-94–<br>1999-00 |
| <b>High Income States</b>          |                     |                     |                     |                     |
| Punjab                             | 2.2                 | 0.95                | 2.34                | 2.72                |
| Haryana                            | 1.72                | 0.87                | 3                   | 3.33                |
| Maharashtra                        | 1.78                | 5.23                | 2.85                | 2.78                |
| Gujarat                            | 1.17                | 1.02                | 333                 | 3.56                |
| <b>Higher Middle Income States</b> |                     |                     |                     |                     |
| Tamil Nadu                         | 2.02                | 0.54                | 2.31                | 3.21                |
| Karnataka                          | 1.83                | 1.75                | 2.71                | 3.89                |
| Himachal Pradesh                   | 1.28                | -0.02               | 1.91                | 3.68                |
| <b>Lower Middle Income States</b>  |                     |                     |                     |                     |
| Kerala                             | 1.25                | 0.83                | 1.59                | 2.76                |
| Andhra Pradesh                     | 1.24                | 0.65                | 2.99                | 2.97                |
| West Bengal                        | 1.92                | 1.74                | 1.84                | 3.52                |
| Rajasthan                          | 2.41                | 2.11                | 3.18                | 4.01                |
| <b>Low Income States</b>           |                     |                     |                     |                     |
| Orissa                             | -0.38               | -0.99               | 1.94                | 2.94                |
| Uttar Pradesh                      | 1.19                | 1.29                | 2.37                | 2.17                |
| Madhya Pradesh                     | 1.49                | 1.08                | 1.77                | 3.42                |
| Bihar                              | -0.07               | 0.26                | 2.22                | 2.74                |

*Source:* Calculated from the data in NSSO via Indiastat.com.

Figures for 1980-81 and 1992-93 are in 1980-81 prices, and Figures for 1993-94 and 1999-2000 are in 1993-94 prices. For Orissa and Punjab, the figures in the row labelled 1992-93 is for 1990-91.

Let us now look into the structural aspect of growing disparity in terms of asset holding. Table 3 shows the break down of rural households into occupational group and social group. It is shown that the ratio between 'Cultivator' households and 'Non-cultivator' households in rural India was 60:40 in 2002. ST and OBC show the similar pattern with 'Other', but the proportion of 'Non-cultivator' households was more in the case of SC. Since the relationship between occupational group and social group has become so complicated, it does not allow any simple answer to meet both ends.

Table 3

*Classification of Rural Households by Social and Occupational Group, India 2002*

|                | ST   | SC   | OBC  | Other | All India |
|----------------|------|------|------|-------|-----------|
| Cultivator     | 69.3 | 46.7 | 61.3 | 64.2  | 59.7      |
| Non-cultivator | 30.7 | 53.3 | 38.7 | 35.8  | 40.3      |
| Agr. Labourer  | 15.4 | 26.4 | 11.6 | 8.3   | 14.4      |
| Artisan        | 1.9  | 7.2  | 6.4  | 3.2   | 5.2       |
| Other          | 13.5 | 19.8 | 20.7 | 24.3  | 20.7      |
| All India      | 100  | 100  | 100  | 100   | 100       |

*Source:* Compiled from NSS 59th Round, Household Assets Holding, Indebtedness, Current Borrowings and Repayments of Social Groups in India, 2006.

Table 4 shows the structure of asset in rural India. It is shown that in all cases, land is by far the important asset in rural India and its importance increases along with the size of ownership. The table shows also that the almost 90 percent of total assets are held in the form of land, building and livestock. In other words, all other forms of assets together were just 10 percent in 2002; percentage of shares and deposits, etc. was 1.6 only. Moreover, this basic structure of asset holdings was almost the same in 1991.

Table 4

*Component of Assets in 2002: Occupational and Social Groups in Rural India*

| (%)            | Land | Building | Livestock | Total |
|----------------|------|----------|-----------|-------|
| Cultivator     | 68.1 | 20.1     | 2.3       | 90.5  |
| Non-cultivator | 38.2 | 41.4     | 1.3       | 80.9  |
| ST             | 61.3 | 23.8     | 4.5       | 89.6  |
| SC             | 54.4 | 31.6     | 2.5       | 88.5  |
| OBC            | 62.2 | 24.4     | 2.3       | 88.9  |
| Other          | 66.6 | 20.7     | 1.6       | 88.9  |
| India          | 63.2 | 23.5     | 2.1       | 88.8  |

Source: Calculated from NSS 59th Round, 2006, Household Assets Holdings, Indebtedness, Current Borrowings and Repayments of Social Groups in India.

Table 5

*Income and Asset of Zamindars and Kammees in Four Villages in Rural Punjab in Pakistan, 1971-72*

|   | Income per Household (Rs) | Index: Owner Farmer = 100 | Asset per Household (Rs) | Index: Owner Farmer = 100 |
|---|---------------------------|---------------------------|--------------------------|---------------------------|
| Landlords with Self-Cultivation (N=25)    | 7,758                     | 125                       | 160,638                  | 130.5                     |
| Landlords without Self-Cultivation (N=24) | 3,922                     | 63                        | 83,684                   | 68                        |
| Owner Farmers (N=68)                      | 6,206                     | 100                       | 123,157                  | 100                       |
| Owner-cum-Tenant Farmers (N=61)           | 6,829                     | 110                       | 123,181                  | 100                       |
| Tenant Farmers (N=55)                     | 3,001                     | 48.4                      | 8,475                    | 6.9                       |
| Isai (Christian, N=26)                    | 3,025                     | 48.7                      | 2,922                    | 2.4                       |
| Kumhar (Potter, N=16)                     | 1,632                     | 26.3                      | 3,813                    | 3.1                       |
| Julaha (Weaver, N=16)                     | 1,691                     | 27.2                      | 2,451                    | 2                         |
| Nai (Barber, N=11)                        | 1,828                     | 29.5                      | 4,544                    | 3.7                       |
| Mochi (Shoe maker, N=11)                  | 1,617                     | 26.1                      | 3,170                    | 2.6                       |
| Tarkhan (Carpenter, N=6)                  | 1,461                     | 21.5                      | 6,875                    | 5.6                       |
| Lohar (Blacksmith, N=6)                   | 1,582                     | 25.5                      | 4,751                    | 3.5                       |
| Teli (Oil Extractor, N=5)                 | 1,132                     | 18.2                      | 1,737                    | 1.4                       |
| Qasai (Bucher, N=3)                       | 1,227                     | 19.8                      | 2,032                    | 1.6                       |
| Moulvi (Priest, N=2)                      | 2,574                     | 41.5                      | 4,473                    | 3.6                       |

Source: Village Survey (Extracted and compiled from Hirashima, 1978).

Note: Income = gross earnings less gross cost, plus family labour cost and depreciation.  
Asset = present value of land, buildings, livestock, machinerie and implements.

Table 6 shows the distribution of average value of asset (AVA) in the case of occupational group. Three things are clear at a glance.

First, there are substantial variations in AVA across the states, and it is not in the order of SGDP per capita.

Table 6

*State-wise Average Value of Asset (AVA) in Rural India: Occupational Group, 2002*

(Value: Rs 1000, other: %)

|                                    | All India | Cultivator | Cultivator=100 | Non-Cultivator | Agr. Labour | Artisan | Other |
|------------------------------------|-----------|------------|----------------|----------------|-------------|---------|-------|
| <b>High Income States</b>          |           |            |                |                |             |         |       |
| Punjab                             | 340       | 391        | 1462=100       | 18             | 7           | 10      | 24    |
| Haryana                            | 269       | 287        | 1070=100       | 20             | 8           | 6       | 34    |
| Maharashtra                        | 95        | 104        | 388=100        | 22             | 12          | 14      | 35    |
| Gujarat                            | 123       | 128        | 478=100        | 28             | 16          | 26      | 36    |
| <b>Higher Middle Income States</b> |           |            |                |                |             |         |       |
| Tamil Nadu                         | 68        | 89         | 331=100        | 31             | 17          | 21      | 44    |
| Karnataka                          | 93        | 97         | 362=100        | 26             | 19          | 30      | 35    |
| Himachal Pradesh                   | 181       | 151        | 564=100        | 41             | 8           | 20      | 49    |
| <b>Lower Middle Income States</b>  |           |            |                |                |             |         |       |
| Kerala                             | 192       | 209        | 778=100        | 34             | 15          | 22      | 37    |
| Andhra Pradesh                     | 51        | 61         | 226=100        | 25             | 19          | 28      | 38    |
| West Bengal                        | 57        | 57         | 211=100        | 36             | 17          | 31      | 47    |
| Rajasthan                          | 135       | 111        | 413=100        | 48             | 23          | 30      | 60    |
| <b>Low Income States</b>           |           |            |                |                |             |         |       |
| Orissa                             | 37        | 32         | 120=100        | 50             | 22          | 75      | 68    |
| Uttar Pradesh                      | 124       | 107        | 400=100        | 30             | 13          | 22      | 41    |
| Madhya Pradesh                     | 89        | 85         | 317=100        | 26             | 17          | 22      | 42    |
| Bihar                              | 77        | 79         | 294=100        | 24             | 13          | 26      | 39    |
| All India                          | 100       | 100        | 373=100        | 27             | 14          | 23      | 41    |

Source: Calculated from NSS 59th Round, (a).

Second, the difference between 'Cultivator' households and 'Non-cultivator' households is obvious, and among 'Non-cultivator' households, AVA is the highest in 'Other.' Although 'Non-cultivator' households are multi-occupational in general, the households in 'Other' category contain those who are engaged in non-agricultural higher income jobs.

Third, in all states asset disparity measured in terms of Gini-coefficient was more among 'Non-cultivator' households than 'Cultivator' households.

Table 7 shows the similar theme from the point of view of social group. Here also the difference in terms of AVA between 'Other', namely higher Caste Hindu households, and ST/SC households is obvious, but not so conspicuous between 'Other' and OBC. This is because OBC contains many owner farmers with land. From these tables, it is evident that the asset holding position distinguishes rural residents much more than consumption and income, and this is one of the basic causes of disparity in rural India.

Table 7

*State-wise Average Value of Asset (AVA) in Rural India: Social Group, 2002*

(Value: Rs 1000, other: %)

|                                    | All India | Other | Other=100 | ST | SC | OBC |
|------------------------------------|-----------|-------|-----------|----|----|-----|
| <b>High Income States</b>          |           |       |           |    |    |     |
| Punjab                             | 340       | 402   | 1727=100  | 9  | 12 | 31  |
| Haryana                            | 269       | 292   | 1254=100  | 48 | 14 | 44  |
| Maharashtra                        | 95        | 83    | 357=100   | 29 | 35 | 72  |
| Gujarat                            | 123       | 120   | 515=100   | 32 | 29 | 62  |
| <b>Higher Middle Income States</b> |           |       |           |    |    |     |
| Tamil Nadu                         | 68        | 125   | 536=100   | 25 | 15 | 39  |
| Karnataka                          | 93        | 83    | 358=100   | 45 | 32 | 64  |
| Himachal Pradesh                   | 181       | 139   | 599=100   | 63 | 43 | 80  |
| <b>Lower Middle Income States</b>  |           |       |           |    |    |     |
| Kerala                             | 192       | 165   | 709=100   | 15 | 21 | 67  |
| Andhra Pradesh                     | 51        | 58    | 248=100   | 25 | 28 | 53  |
| West Bengal                        | 57        | 40    | 172=100   | 51 | 70 | 107 |
| Rajasthan                          | 135       | 104   | 449=100   | 45 | 42 | 103 |
| <b>Low Income States</b>           |           |       |           |    |    |     |
| Orissa                             | 37        | 38    | 163=100   | 35 | 34 | 78  |
| Uttar Pradesh                      | 124       | 130   | 557=100   | 49 | 28 | 61  |
| Madhya Pradesh                     | 89        | 80    | 393=100   | 34 | 32 | 67  |
| Bihar                              | 77        | 91    | 390=100   | 39 | 21 | 51  |
| All India                          | 100       | 100   | 430=100   | 32 | 28 | 62  |

Source: Calculated from NSS 59th Round (a) (b).

As far as the variation of AVA (or land value to the greatest extent) at the state level is concerned, there are several factors to note. In addition to the general factors accountable for the high land price as discussed already, the region specific factors are important. The higher AVA of Punjab and Haryana can be explained by the high productivity of agriculture and emerging industrial base. Massive influx of remittance from abroad would be the powerful explanatory factor for Kerala. Tourism attraction would be the important factor for hill station such as HP and J&K. The traditional value attached to land may be one of the explanatory variables for UP and Rajasthan. These regional variations of AVA suggest the importance of identifying comparative advantages of each region and trying to develop these region specific advantages in the context of regional development so that the regional disparity could be minimised.

Table 8

*Transition of Inequality in Consumption, Land and Total Asset in Rural India: 1982-2004-05*

|                                    | Consumption Gini |         |         | Land Gini |         | Total Asset Gini |         |         |
|------------------------------------|------------------|---------|---------|-----------|---------|------------------|---------|---------|
|                                    | 1983             | 1993-94 | 2004-05 | 1993-94   | 2004-05 | 1982             | 1992-93 | 2002-03 |
| <b>High Income States</b>          |                  |         |         |           |         |                  |         |         |
| Punjab                             | 0.292            | 0.281   | 0.295   | 0.775     | 0.805   | 0.652            | 0.569   | 0.612   |
| Haryana                            | 0.285            | 0.314   | 0.34    | 0.721     | 0.78    | 0.559            | 0.528   | 0.612   |
| Maharashtra                        | 0.291            | 0.259   | 0.283   | 0.581     | 0.619   | 0.633            | 0.605   | 0.579   |
| Gujarat                            | 0.268            | 0.24    | 0.273   | 0.726     | 0.745   | 0.584            | 0.538   | 0.595   |
| <b>Higher Middle Income States</b> |                  |         |         |           |         |                  |         |         |
| Tamil Nadu                         | 0.367            | 0.312   | 0.322   | 0.828     | 0.856   | 0.667            | 0.651   | 0.631   |
| Karnataka                          | 0.308            | 0.27    | 0.265   | 0.683     | 0.722   | 0.622            | 0.548   | 0.555   |
| Himachal Pradesh                   | na               | 0.284   | 0.311   | 0.541     | 0.537   | na               | 0.458   | 0.493   |
| <b>Lower Middle Income States</b>  |                  |         |         |           |         |                  |         |         |
| Kerala                             | 0.32             | 0.301   | 0.383   | 0.818     | 0.646   | 0.605            | 0.543   | 0.55    |
| Andhra Pradesh                     | 0.297            | 0.29    | 0.294   | 0.671     | 0.805   | 0.661            | 0.642   | 0.618   |
| West Bengal                        | 0.3              | 0.254   | 0.274   | 0.698     | 0.714   | 0.608            | 0.562   | 0.571   |
| Rajasthan                          | 0.347            | 0.265   | 0.251   | 0.562     | 0.624   | 0.526            | 0.54    | 0.511   |
| <b>Low Income States</b>           |                  |         |         |           |         |                  |         |         |
| Orissa                             | 0.27             | 0.246   | 0.285   | 0.66      | 0.689   | 0.603            | 0.551   | 0.578   |
| Uttar Pradesh                      | 0.291            | 0.264   | 0.286   | 0.629     | 0.654   | 0.575            | 0.553   | 0.563   |
| Madhya Pradesh                     | 0.28             | 0.307   | 0.312   | 0.712     | 0.732   | 0.589            | 0.601   | 0.618   |
| Bihar                              | 0.266            | 0.228   | 0.217   | 0.69      | 0.7     | 0.633            | 0.607   | 0.577   |

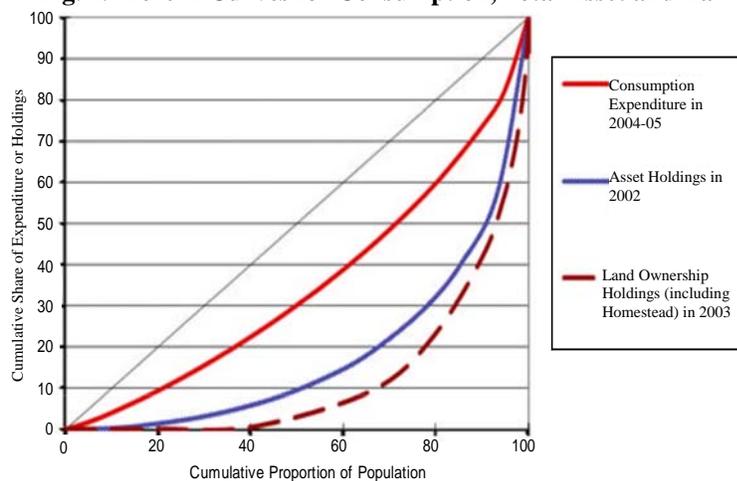
Source: Computed from data in Himanshu (2007) for Consumption, in Subramanian and Jayaraj (2006) for Total Asset and in NSSO (1997) and NSSO (2006) for land.

Table 9

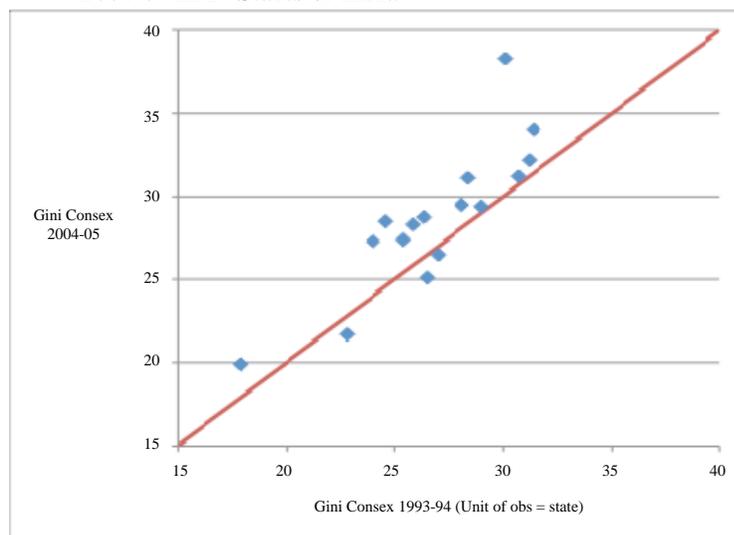
*Indebtedness and Debt-Asset Ratio in Rural India, 2002*

|                           | Average Asset Holding (Rs) | Average Amount of Debt (Rs) | Debt-Asset Ratio |
|---------------------------|----------------------------|-----------------------------|------------------|
| Cultivator Households     | 372,632                    | 9,261                       | 2.49             |
| Non-cultivator Households | 107,230                    | 4,991                       | 4.65             |
| All Rural India           | 265,606                    | 7,539                       | 2.84             |

Source: NSS 59th Round, Report No. 500, Table 3.5.1, 2005.

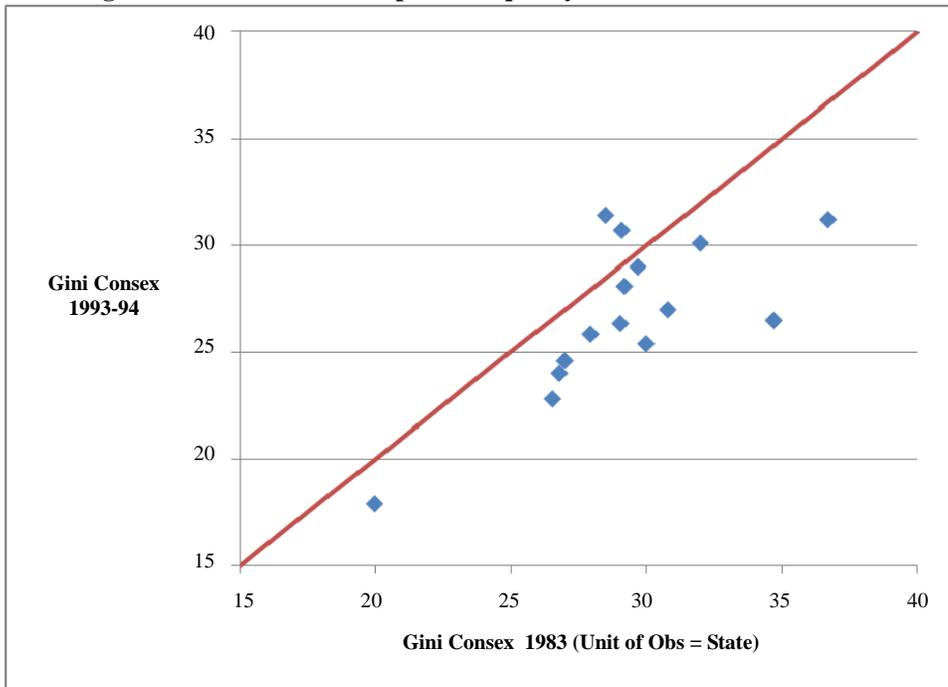
**Fig. 1. Lorenz Curves for Consumption, Total Asset and Land**

Source: Computed from data in NSSO (2005) and NSSO (2006a, 2006b).

**Fig. 2. Transition of Consumption Inequality between 1993-94 and 2004-05 in 15 States of India**

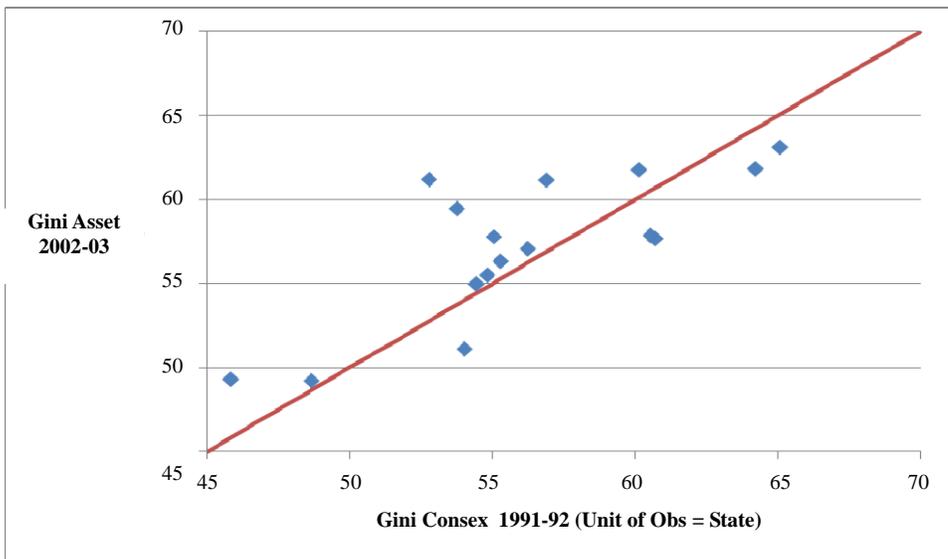
Source: Drawn from data in Table 2.

**Fig.3. Transition of Consumption Inequality between 1983 and 1993-94**

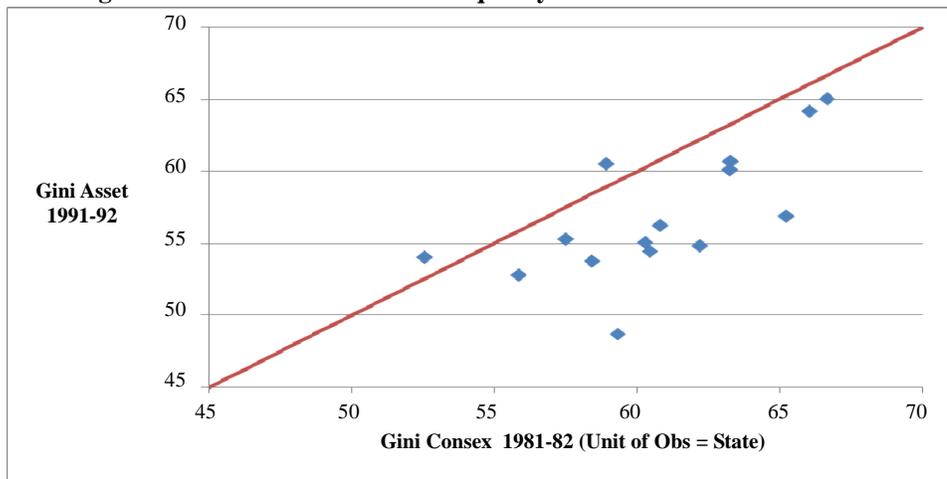


Source: Same as Figure 2.

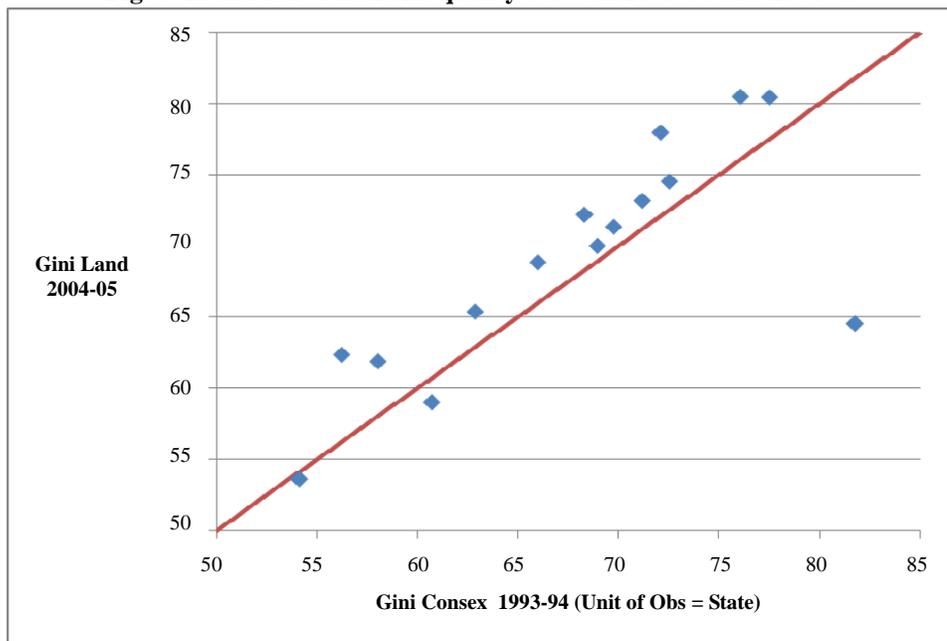
**Fig. 4. Transition of Total Asset Inequality between 1991-92 and 2002-03 in 15 States of India**



Source: Same as Figure 2.

**Fig. 5. Transition of Total Asset Inequality between 1981-82 and 1991-92**

Source: Same as Figure 2.

**Fig. 6. Transition of Land Inequality between 1993-94 and 2004-05**

Source: Same as Figure 2.

### **ACCESSIBILITY TO LAND OWNERSHIP: A PATHWAY TO SOCIAL EQUALITY**

We have so far examined the asset distribution and its relation to consumption, income and poverty. We have come to know that the social inequality is reflected more in terms of asset holding position than the level of consumption and income. Also we could see that land has been by far the most important asset than any other assets in rural India.

Land is not a man-made resource. Therefore, its availability is limited, which is different from man-made assets, such as machineries and buildings, and also from other factors of production such as capital and labour. However, the most decisive factor that demarcates land from other assets is its nature of depreciation. While all other assets depreciate their values over time, land value does not depreciate in a normal circumstance. In many cases, its value appreciates more than its utility value, particularly during the high economic growth period. Because of this characteristic, land is the most important collateral and hedge against risk and uncertainty, in addition to the symbol of prestige and power in rural society. It is quite unfortunate in history that the command over land and its associated underground resources has determined social status, political power and economic wellbeing. Then the issue of overcoming social inequality in its important part is the accessibility to land ownership.

### **1. Land Reform: A Political Solution**

The arguments in this regard are divided sharply. One school of thoughts advocates the important role of land reform, while the other school expects the role to be played by land market and other land related policies other than land reform. However, there seems to be confusion with respect to the definitional difference between land reform and other land policies among researchers.

We do not intend to examine here the history of land reform experience in India, but make a few comments on the debate in the context of IGS. [Appu (1996)]. Those who take the former position strongly support the positive effects land reforms in West Bengal and Kerala have had on improving the socio-economic position of the socially discriminated segment of rural population such as SC, ST and Muslim. [Rawal (2001); Banerjee (1999)]. However, it is important to bear in mind that the experiences of the two states clearly demonstrate the political nature of land reform. In fact, land reform is a non-market solution, whose character as well as its degree of implementation is decisively determined by the social character of the political force in power. [Hirashima (1978)]. In this way, land reform is a political process and thus should not be regarded as if it were one of the 'development programmes' of the government. This point is evident in the post-war land reform in Japan, which was introduced by the occupied Allied Forces under the 'state of unconditional surrender'. The main objective was to terminate the root cause of Japanese military, namely the poverty of rural Japan. The successful implementation was attributable to the prevailing condition of landlordism. In fact, the landlords had lost interest in holding land after a series of tenancy disputes and the discriminately pricing system against landlords on the eve of land reform in 1946. [Hirashima (1982)]. Most recent evidence in India is seen by the decision of the Bihar Government, who refused to accept the recommendations drafted by the Land Reform Committee established by the very government. [Bandyopadhyay (2009)].

### **2. Land Market: An Economic Solution**

Those who belong to the latter school prefer to introduce land policies other than land reform, such as tenancy reform, consolidation of holdings, and the introduction of 'market assisted land reform', which implies the provision of fund with subsidised interest rate in order to facilitate the purchase of land in the land market. [Baksh (2006)].

The land policies of this kind are different from land reform in that they are not aiming at land redistribution. Tenancy reform is for improving and stabilising the contractual status of tenants. It does not interfere the distribution of land ownership. In this sense this is an employment and income enhancing policy. Likewise, consolidation of holding is a measure to improve efficiency of land use by consolidating the subdivided and fragmented plots of land. Again, this is nothing to do with land redistribution, and also with socially deprived landless segment of rural India. Zamindari abolition has been one of the most successfully implemented policies in rural India. However, here again, the main purpose was to terminate the entitlement of *Zamindars* to portion the land revenue collected by them without accompanying the appropriation of their land ownership. This should be regarded as a revenue reform rather than land policy.

'Market friendly land reform,' advocated by the believers of market economy, is a policy to facilitate land transfer through the normal market channels by assisting small and marginal peasants in terms of providing loan with subsidised interest rate. [Baksh (2006); IFAD (2000)]. However, one should know more about the land market behaviour before one can be optimistic about the effectiveness of this approach to overcome poverty and social inequality.

As we have referred earlier, the land price has been increasing much faster than the rent in Pakistan and India since the land began to be transacted in land market in the undivided Punjab. As a result, the rate of return to investment in land expressed in terms of rent-land price (R/LP) ratio has been declining persistently over time since the mid-19th century. [Hirashima (1978, 2008b)]. The divergence between the growth rate of land price and rent have been observed in the United State and Japan as well. [Stephen Clark, *et al.* (1993); Merchal (1979); Hirashima (2008b)]. This historical evidence suggests that it would be difficult for the low-income residents to buy land with the loan whose interest rate is kept higher than the rate of return on land investment.

Attempts at studying the land market behaviour have begun only in recent years in India based on the micro-level survey. [Delinger (2007); Rawal (2008)]. However, none of them has inquired the sources of income of the buyers of land, as well as the land price actually transacted.

Generally speaking, it is presumed that if the buyers are large farmers from the higher caste Hindus, for instance, and the sellers are small and marginal farmers, the Gini-coefficient of land holding would be increasing and the social structure would not be affected. However, if the buyers are from the 'non-cultivator' or less privileged social groups such as SC, ST and Muslim, and the sellers are from the socially superior large farmers /landlords of higher caste origin, it would lead to the situation where both social inequality and distribution of land be improved. Unfortunately this is observed only in W. Bengal at the moment. [Rawal (2009)]. However, even in this case, question was not asked how the buyers could finance the purchase of land. However, this study raises one important point in that the enforcement of Land Ceiling Act has discouraged the landed class to keep on holding land under the expected increase in risk and uncertainty of being a 'rent-receiver'. [Rawal (2009)]. This finding was supported by the case of Japan as we have introduced earlier. Moreover, in our most recent study on land transactions in the market suggests, in general, that the SC in the social group and 'Agricultural Labourers' in the occupational group are unlikely to be a buyer in the land market, except for the

states where land reform was rigorously enforced. There the buyers were often SC, Muslims and agricultural labourers. We found out also that in the states where the non-agriculture sectors has been growing faster, not only agricultural labourers, but also farm households found it difficult to participate in the land market as buyers. This is due to the higher land price, which is the reflection of the higher productivity of the non-agricultural sectors in the region. These findings would suggest that the direction of market transaction has been towards increasing disparity. This is consistent with the argument set forth in our previous section on the growth-poverty linkage, where poverty was being reduced by the high economic growth, but the income and asset disparities increased. Although much should be studied in this area, the study clearly shows also that the number of land transaction in the land market is extremely small and limited. [Hirashima and Kubo (forthcoming)].

The arguments introduced so far on the issue of land redistribution seem to suggest that the magnitude of change through the land market is extremely limited, and that one should not be too simplistic about the possibility of introducing land reform as one might expect, at least in the short-run.

### CONCLUDING DISCUSSION

In this paper, we focused our attention to the important role of asset in discussing the issue of poverty, social inequality and regional disparity in the process of growth. Although it is too early to assess the impact of IGC at this stage, it gives the impression that, with the consistency and continuation of IGS, the pathway towards this novel objective will be opened. Based on our analysis so far made in this paper, let us summarise the major findings and then discuss some areas of policy concern.

First, the performance of the post-reform period is characterised by the higher economic growth and declining poverty ratio on one hand, and the increasing disparity in terms of consumption, income and asset holding on the other.

Second, the disparity at household as well as regional level is much more evident in asset holding, notably land, as compared with consumption and income.

Third, the root cause of social inequality in rural India is inherent in social structure based on the social hierarchy system / Hindu *Varna* system. Statistically, the majority of them are in the category of 'Non-Cultivator' in the occupational group and ST, SC and the substantial portion of OBC in the social group.

Fourth, the disparity between 'Cultivator' and 'Non-Cultivator' in the occupational group, and between 'Other' (higher Caste Hindu) and ST, SC and OBC is distinctive much more in terms of total asset, in particular land ownership than consumption and income.

Fifth, it has become clear that the access to total asset, in particular land is one of the key determinants to overcome social inequality inherent in rural India and Pakistan. In this connection, the prospect is not bright at least in the short-run. Too simplistic assertion for radical land reform is persisted on one hand, and the too high hurdle for the landless and near landless rural households to cross over to reach the prevalent land market is a hard reality on the other.

Based on these findings, our reflection on the future direction of IGS can be set forth in the following way.

First, judging from the post-reform performance in terms of growth-poverty linkage, growth is proved to be a necessary condition, may not be a sufficient one, for poverty reduction. In this connection, a faster growth of agriculture with enhanced investment in infrastructure, advocated in the IGS, should be rigorously pursued. This policy orientation is justified by the disparity-reducing agricultural growth in the 1980s on one hand and the disparity-enhancing non-agricultural growth in the 1990s on the other. However, this evidence should not lead to the argument of discouraging the growth rate of non-agriculture. What seems to be important is to identify and manage the development of disparity-enhancing investment, such as unconditional development of private tube-well, or of private school at early stage of education. [Tsujita (2009)].

Second, for the purpose of overcoming inherent social inequality in the process of growth, most effective means is the introduction of land reform. However, as discussed already, its effectiveness depends upon the strong political will and the prevailing socio-economic structure in rural society. If the solution is sought within the framework of market economy, total household income should grow fast enough to be able to access to land market in due course of time. In this process, the key factors are two, among others. One is to encourage the diversification of total household income, for which the provision of high quality education, particularly in the field of technical education is crucial. [Chadha (1993); Kijima and Lanjouw (2005); Birthal, *et al.* (2010); Kurosaki (2009, 2010); Sawada and Lokshin (2009)]. The other is the strong policy intervention to manage growing land price not accrue to productive investment, but to other factors, notably capital gains. With this intervention, the future income-asset relationship could become friendlier to the landless and near landless rural population.

As long as asset, notably land remains as a powerful means to hedge against risk and uncertainty not only for the people below the poverty line, but also for the vulnerable population just above the poverty line, trend of total household income and asset price has to be monitored carefully. The challenging objective of IGS demands time and patience, but it is in the right track. Therefore, we would like to close this paper by quoting the Para 151 of the Budget Speech delivered by Manmohan Singh in July 24, 1991.

“I was born in a poor family in a chronically drought prone village which is now part of Pakistan. University scholarships and grants made it possible for me to go to college in India as well as in England. This country has honoured me by appointing me to some of the most important public offices of our sovereign Republic. This is a debt which I can never be able to fully repay. The best I can do is to pledge myself to serve our country with utmost sincerity and dedication. This I promise to the House. A Finance Minister has to be hard headed. This I shall endeavour to be.

I shall be firm when it comes to defending the interests of this nation. But I promise that in dealing with the people of India I shall be soft hearted. I shall not in any way renege on our nation’s firm and irrevocable commitment to the pursuit of equity and social justice. I shall never forget that ultimately all economic processes are meant to serve the interests of our people. It is only through a commitment to social justice and the pursuit of excellence that we can mobilise the collective will of our people for development, to give it a high moral purpose and to keep alive the spirit of national solidarity. The massive social and economic reforms needed to remove the scourge of poverty, ignorance and disease can succeed only if backed by a spirit of high idealism, self sacrifice and dedication”. [Manmohan Singh (1991)].

## REFERENCES

- Appu, P. S. (1996) *Land Reforms in India: A Survey of Policy, Legislation and Implementation*. New Delhi: Vikas Publishing House.
- Baksh, Aparajita (2008) Social Inequality in Land Ownership in India: A Study with Reference to West Bengal. In *Social Scientists* 39: September-October, 95–116.
- Bandyopadhyay, D. (2008) Does Land Still Matter? In *Economic and Political Weekly* March, 37–42.
- Bandyopadhyay, D. (2009) Lost Opportunity in Bihar. *Economic and Political Weekly* 44:47, 12–14.
- Benerjee, Abhujit (1999) *Land Reforms: Prospects and Strategies*. (MIT Working Paper 99-24).
- Bhalla, G. S. and Gurmail Singh (2001) *Indian Agriculture: Four Decades of Development*. New Delhi: Sage Publications.
- Birthal, Pratap S., Awadesh Jha, and Dhiraj Singh (2010) *Income Diversification Among Farm Households in India: Pattern, Determinants and Distributional Consequences*. National Centre for Agricultural Economics and Policy Research, Delhi, India.
- Birthal, Pratap S., Harvinder Singh, and Shiv Kumar (2009) Agriculture, Economic Growth and Regional Disparities in India. In *Journal of International Development* 1–17.
- Chadha, G. K. (1993) Non-farm Employment for Rural Households in India: Evidence and Prognosis. *The Indian Journal of Labour Economics*. July-December.
- Chadha, G. K. (2001) Impact of Economic Reforms on Rural Employment: No Smooth Sailing Anticipated. Keynote Address at the Annual Conference of the Indian Society of Agricultural Economics.
- Dantwala, M. L. (1986) Strategy of Agricultural Development Since Independence. In *Indian Agricultural Development Since Independence*. New Delhi: Oxford University Press.
- Datt, Gaurav and Martin Ravallion (2002) Is India's Economic Growth Leaving the Poor Behind? *Journal of Economic Perspectives* 16:3, 89–108.
- Deininger, Klaus and Gershon Feder (2001) Land Institutions and Land Markets. In Gardner, B. and G. Rausser (eds.) *Handbook of Agricultural Economics*. Volume 1. Elsevier Science.
- Dev, Mahendra S. (2007) *Inclusive Growth in India: Agriculture, Poverty, and Human Development*. Oxford University Press.
- Eglar, Zekiye (1960) *A Punjabi Village in Pakistan*. New York: Columbia University Press.
- Himanshu (2007) Recent Trends in Poverty and Inequality: Some Preliminary Results. *Economic and Political Weekly*, February 10, 497–508.
- Hirashima, S. and Kensuke Kubo (2010) Land Distribution Change and Non-agricultural Growth in India. In S. Hirashima, Hisaya Oda, and Yuko Tsujita (eds.) *Approach towards Inclusive Growth: India's Challenge*. (Forthcoming).
- Hirashima, Shigemochi (1979) Zamindars and Kammees in Four Punjab Villages in Pakistan. S. Hirashima (ed.) *Hired Labour in Rural Asia*. Tokyo: Institute of Developing Economies.
- Hirashima, Shigemochi (1978) *The Structure of Disparity in Developing Agriculture*. Tokyo: Institute of Developing Economies.

- Hirashima, Shigemochi (1982) Growth, Equity and Labour Absorption in Japanese Agriculture. In S. Yamada Ishikawa and S. Hirashima *Labour Absorption and Growth in Agriculture: China and Japan*. Bangkok: ILO/ARTEP.
- Hirashima, Shigemochi (2000) Issues in Agricultural Reforms: Public Investment and Land Market Development. *Economic and Political Economy*, October.
- Hirashima, Shigemochi (2001) *Rural Poverty and the Landed Elite: South Asian Experience Revisited*. Department of Applied Economics and Management, Cornell University. (Working Paper 2001-10).
- Hirashima, Shigemochi (2008a) Crucial Role of Agriculture in Indian Development: A Japanese Perspective. In Sankar Baumick (ed.) *Reforming Indian Agriculture: Towards Employment Generation and Poverty Reduction*. Sage Publication, India.
- Hirashima, Shigemochi (2008b) The Land Market in Development: A Case Study of Punjab in Pakistan and India. *Economics and Political Weekly* 43:42.
- India, Government of (1991) *Budget 1991-92*. Speech by Manmohan Singh, Finance Minister, July 24.
- India, Government of (2006) *Towards Faster and More Inclusive Growth: An Approach to 11th Five Year Plan (2007-2012)*. Planning Commission.
- India, Government of (2008) *Economic Survey, 2007-08*. Government of India.
- International Fund for Agricultural Development (2000) *The State of the World Rural Poverty*. IFAD.
- Kijima, Yoko and Peter Lanjouw (2005) Economic Diversification and Poverty in Rural India. *Indian Journal of Labour Economics* 48:2, 349–374.
- Kubo, Kensuke (2009) Poverty and Asset Distribution Inequality in Rural India. In S. Hirashima, and Hisaya Oda (eds.) *Approach Towards Inclusive Growth: India's Challenges*. Tokyo : Institute of Developing Economies 23–47.
- Kumar, Parmod, Basanta K. Pradhan and A. Subramanian (2005) Farmland Prices in Developing Economy: Some Stylised Facts and Determinants. *Journal of International and Area Studies* 12:2, 93–113.
- Kurosaki, Takashi (2006) Consumption Vulnerability to Risk in Rural Pakistan. *Journal of Development Studies* 42:1, 70–89.
- Kurosaki, Takashi (2009) Economic Analysis of Poverty and Vulnerability (in Japanese), Keiso Shobou, Tokyo, Japan.
- Lanjouw, Peter and Abusaleh Shariff (2004) Rural Non-Farm Employment in India: Access, Incomes and Poverty Impact. *Economic and Political Weekly* 39:40, 4429–4446.
- Mearns, Robin (1999) Access to Land in Rural India: Policy Issues and Options. World Bank. (Policy Research Working Paper No. 2123).
- Melichar, Emanuel (1979) Capital Gains Versus Current Income in the Farming Sector. *American Journal of Agricultural Economics* 61, 1085–1092.
- NSSO (2005) *Household Assets and Liabilities in India* (as on 30.06.2002), Report No. 500 (based on data of the 59th Round *All-India Debt and Investment Survey*).
- NSSO (2006a) *Household Ownership Holdings in India, 2003*. (Report No. 491).
- NSSO (2006b) *Level and Pattern of Consumer Expenditure, 2004-05*. (Report No.508). (based on data of the 61st Round *Consumer Expenditure Survey*).

- NSSO (National Sample Survey Organization (1997) Employment and Unemployment Situation among Social Groups in India, 1993-94. (Report No. 425) Employment and Unemployment among Social Groups in India, 2004-05. (Report No. 516).
- Rao, Hamumanta (2009) Inclusive Growth: Recent Experience and Challenges Ahead. In *Economics and Political Weekly* 45:13, 16–21.
- Rawal, Vikas (2001) Agrarian Reform and Land Markets: A Study of Land Transactions in Two Villages of West Bengal, 1977-1995. *Economic Development and Cultural Change* 49:3, 611–629.
- Rawal, Vikas (2008) Ownership Holdings of Land in Rural India: Putting the Record Straight. *Economic and Political Weekly* 43:10, 43–47.
- Sawada, Yasuyuki, and Michael Lokshin (2009) Obstacles to School Progression in Rural Pakistan: An Analysis of Gender and Sibling Rivalry Using Field Survey Data. *Journal of Development Economics* 88:2, 335–347.
- Sen, A. K. (1997) How India has Fared. In *Frontline* 14:16.
- Subramanian, S. and D. Jayaraj (2006) The Distribution of Household Wealth in India. (UNU-WIDER Research Paper No. 2006-116).
- Tsujita, Yuko (2009) An Overview of Inequality in Primary School Education in Bihar. In S. Hirashima, and Naoya Oda (eds.) *Approach Towards Inclusive Growth: India's Challenge*. Tokyo: Institute of Developing Economies 49–81.
- Vaidyanathan, A. (1900) Asset Holdings and Consumption of Rural Households in India: A Study of Spatial and Temporal Variations. In Indian Society of Agricultural Economics, *Agricultural Development Policy: Adjustments and Reorientation*. India: Oxford & IBH Publishing Co.
- Wiser, W. H. (1936) *Hindu Jajmani System*. The World Bank, Lucknow Publishing House.
- Wiser, W. H. (1963) *Behind the Mud Wall, 1930-60*. University of California Press.
- Wiser, W. H. (2007) *India: Land Policies for Growth and Poverty Reduction*.
- World Bank (2001) *World Development Report 2000-2001: Attacking Poverty*. Washington, DC.

## Comments

I am extremely grateful to the Pakistan Society of Development Economists (PSDE) for inviting me to participate in their annual meeting and discuss a very interesting paper, delivered by an old friend of Pakistan.

According to the author, objective of the paper is to highlight the importance of including asset holding and its distribution into the study of growth poverty-linkage and inherent social inequality in rural Pakistan and India. Subject of the study, given the high incidence of poverty and concentration of poor in south Asia, is not only of interest to the academia but also to the policy planners. I would like to compliment Professor Hirashima Shigomochi for his in depth analysis of the issues, thoughtful articulation of his arguments and excellent presentation.

The motivation for the study seems to have been provided by the Inclusive Growth Strategy (IGS), introduced by the Union Government of India in 2006. The principal components of IGS were:

- Step up investment in rural infrastructure and agriculture;
- Increase credit availability to farmers and offer them remunerative prices for their crops;
- Increase rural employment, providing a unique social safety net in the shape of National Rural Employment Guarantee programme;
- Increase public spending on education and health care including strengthening the mid day meal programme and offering scholarship to the needy;
- Invest in urban renewal, improving quality of life for the urban poor;
- Socially, economically and educationally empower Scheduled Castes (SC), Scheduled Tribes (ST), other backward classes (OBC), minorities, women children and others;
- Ensure that through public investment the growth process spreads to backward regions and districts.

The inclusive growth is equated here with equitable development or growth with social justice. I am glad to note that the IGS approach is based on growth, which I believe to be a necessary condition for the development process. I wish Professor Hirashima Shigomochi had used some space in the paper to highlight the steps taken by the Indian government to implement the IGS as well.

Professor Hirashima in his paper recalls the speech of Mr Jawaharlal Nehru, on the eve of Independence in August 1947. According to A. K. Sen, Mr Nehru had succinctly highlighted/outlined the three “tasks ahead”:

- Practice of democracy and guaranteeing of various freedoms of the citizens of India;
- Removal of social inequality; and
- Achieving economic progress.

Professor Hirashima, relying on the observations of Nobel Laureate, A. K. Sen, leads us to believe that India has been quite successful in achieving the first tasks i. e practicing of democracy, moderately successful in achieving economic growth but has fared poorly in removing social inequality. Professor Hirashima also notes that India has done well to strike a balance between growth and equity, and giving priority to the development of capital goods sector over consumer goods, unlike many other developing countries. India is now better placed, compared to Pakistan, to diversify its industrial structure. Development of heavy industry, inter alia, led to the development of higher education but slow development of basic education in India. However, the 1980s saw the shift in economic policies towards market economy and 1991 was witness to departure of the planned economy towards market based economy. The post 1991 period is characterised by high economic growth and reduction in the poverty but also persistence of social inequality.

### **Growth Poverty Linkage in Major Indian States**

In the post reform period India has successfully emerged from the situation of low growth, averaging 3.1 percent per year in 1981-92 to record average growth rate of 3.8 percent during 1994-2000. This acceleration in the growth has been accompanied with poverty reduction, supporting the trickle down effect of growth thesis. It is to be noted however that this progress has not been uniform across various states. Generally states with relatively higher incomes achieved modest growth while those in the middle income groups achieved impressive growth rates. Moreover, save the low income states, 4 in all and accounting for 33 percent of the population, other states improved their relative income position as well. Another important feature of the inter state comparison is the deceleration experienced in the growth rates, in 8 of the 15 states covered in the analysis. Taken together these account for 53 percent of the total Indian population. Three of these states (not 2 as mentioned in paper) belong to the high income category, one to the low middle income category and all four of the low income group. An interesting feature of the states experiencing deceleration in growth is the dominance of agriculture in their economy (except Maharashtra). All the states have also experienced structural transformation of their economy as relative shares of agriculture have declined overtime.

All the states in the wake of economic reforms have made impressive progress in poverty reduction; overall poverty ratio fell from 44.5 percent in 1983 to 26 percent in 1999-00, impressive achievement indeed. However, inter state disparity has aggravated. The situation in all low income states, also witnessing deceleration in their growth rate, having lower per capita incomes and higher incidence of poverty is serious. Accounting for 33 percent of the total population these states are predominantly agricultural, having much higher proportion of labour engaged in agricultural pursuits than the national average and also depending more on agriculture for GDP. But interestingly Gini coefficients of their rural assets distribution are less than the national average. An interesting question emerging in the context of these low income states is the impressive reduction in poverty in spite of deceleration in the growth rates. At the same time the growth rate in agriculture has been characterised by instability. Rapid industrialisation, urbanisation, remittances and land reforms, Professor Hirashima points out, have helped in poverty reduction efforts.

Agriculture remains an important sector of the Indian economy, notwithstanding sharp decline in its share of GDP, from 37.2 percent in 1980-82 to 21.3 percent in 2003-05; as a preponderant source of employment for 58.2 percent of the labour in 2001. This however, also reflects lower productivity of agricultural labour and sector at large. This also applies to Pakistan where share of agriculture in GDP in 2009 has declined to 21.8 percent while 44.65 percent of employed labour force is engaged therein (*Pakistan Economic Survey 2008-09*). Looking at the lower than industrial growth rate in agriculture and its instability, had agriculture's performance been stable, not marred by instability and comparable to industrial sector, the results in terms of poverty reduction would have been much better. An important question then is how to reduce instability and improve sustainability in growth rate of agriculture. To the students of development economics, this is an important challenge that warrants examination. We in Pakistan have also suffered from the poor and erratic performance of agriculture, growth rate in agriculture during 2001 to 2009 varying from (-) 2.2 to 6.3 percent. Root causes of these phenomena, not known precisely, needs to be understood and remedial measures undertaken.

### **Rural Scene—Farm and Non-Farm Households**

Explaining the features of Rural India-Pakistan, where farm as well non-farm households earn their livelihood and have depended on each other's supporting role, Professor Hirashima rightly points out to the fading out of *Jajmani* system ('Sep' system). No doubt many of the artisan households, in the wake of increasing mechanisation in agriculture and other changes in the rural landscape have migrated to urban areas and Gulf countries. In the process they may or may not have changed their ancestral occupations but have definitely improved their economic status. But their social position in the rural social set up and hierarchy remains inferior. However, this may not necessarily hold in the urban settings.

Professor Hirashima argues that if we have to address the issue of poverty in the rural areas the focus has to be on non-farm households. If I follow him correctly, 50 percent of the rural poor belong to this group. What about the other 50 percent? Their cause also needs the attention of those who matter. Farm households also vary in their access to land and other factors. Many of the farm households are poor because of inadequate access to land, water, credit and other inputs as well poor functioning of commodity markets and a host of other factors which need to be examined and understood. No doubt adequate access to income earning assets and more so to land is important for the success of poverty reduction efforts. Professor Hirashima has also emphasised this aspect in his paper. But is so much land available? And if yes at what price? In this context distribution of state land amongst the marginal farm households and landless non-farm households should receive priority. The provincial governments in Pakistan are known to making some progress in this direction. The need for transparency and speed in such operations is of utmost importance.

Another aspect and issue of considerable importance is the low rate of return to land investment. But given the inelastic supply of arable land in the short run and increasing competition from non-farm uses, like industrial development, housing, infrastructure and burgeoning population per capita availability of land is declining.

Consequently, prices of land have risen very high. Given the low productivity and deteriorating terms of trade it is no wonder that land investment is not an attractive economic proposition. However, in view of the appreciation in its value and social status which goes with increase in its holding land remains a preferred asset in the rural settings. In view of this situation, I submit a better proposition may be the establishment of institutions providing marketable skills rather than the focusing on provision of land to non-farm households. At the same time we have to look for ways and means that rural population does not fall behind in the development of human resources as the current system of education with its class oriented structure is not going to help in this context.

Disparity in terms of assets, which is dominated by land in rural areas, is higher than consumption. But this phenomenon is well known in the literature on poverty. The consumption especially at the lower rungs may be supported by distress selling of assets, dissaving, borrowing etc. However, worsening of disparities in consumption, total assets and land, in spite of economic growth and reduction in poverty, is rather astonishing and needs further examination and analysis through continuous monitoring of the socio economic, political and institutional developments in the rural landscape. Asset holding position particularly ownership of land distinguishes rural residents much more than income and remains one of basic causes of disparities in rural areas of the subcontinent. However, I was struck by the relatively lower values of the assets dominated by land in India as compared to Pakistan. In Pakistan average value of land hovering around Rs 800,000 to 1,000,000 per acre in irrigated regions is much higher as compared to value in India hovering around Rs 400,000. But inter state as well as intra state disparity cannot be explained by simply appealing to factors impacting on farm productivity and income alone and needs a detailed examination.

No doubt there is a nexus between poverty and access to land which is reinforced through lack of collateral in the credit market. Thus, those who are born poor are likely to remain poor unless they are provided access to education, marketable skills which will unlock the access to employment and or assured access to credit. The high average debt-asset ratio (4.65) for non-cultivator households as compared to cultivators (2.4) reflects the lower capacity and handicaps of non-cultivators in credit market. Thus, the author rightly concludes that a poor asset base is both a cause and consequence of poverty. I fully endorse the author's proposal that for poor people state must improve the pathways towards empowerment. These, I submit will, inter alia, include enhanced opportunities for education, improvement in law and order and governance at all levels but especially at lower levels, ensuring justice and fair play. A pathway to social equality in the rural areas is through accessibility in land ownership. Nevertheless, given its inelastic supply and other imperatives of agricultural development one has to look for other pathways. In this context the recent initiatives of the Punjab government in Pakistan to highlight the achievements of position holders in various examinations and other academic competitions and provision of scholarships are steps in the right direction. Similarly, Higher Education Commission's endeavours to promote the cause of education in Pakistan by providing scholarships are good beginning and steps in the right direction. But their scope needs to be broadened so that the talented but poor people do not lag behind for want of resources. In this context, I would also request the need for more vocational and training institutes and for having a uniform educational system up to

matriculation, at least, in the country. Issues of governance, merit based appointments, abolition of political parties quotas in employment are some of the other pathways to empowerment of the poor. Need for reducing instability in agricultural growth rate, raising farm productivity through enhanced R and D efforts, upgrading the marketing intelligence and infrastructure to improve the functioning of both factor and product markets and arresting resource hemorrhage from agriculture are some of the key areas which need urgent attention of the policy-makers to reduce the incidence of poverty.

Hirashima rightly concludes issue of social inequality does not lend to short cuts and pathways will come with consistency and continuation of IGS. To overcome social inequality, predominantly land based total household income must be increased to the extent they could participate in land market in due course. However, with deteriorating land man ratio enhancing total household incomes will not come from agriculture. Need for highest priority for reforms and investment in the education. Achieving 4-5 percent annual growth rate the agriculture and sustaining it would be predicated on raising its productivity and enhancing labour absorptive capacity. Here there is also a need for increasing technical support at the grass root level, improving the functioning of factor input and product markets and arresting resource transfers from agriculture. At the same time there is an urgent need for strengthening the processing and marketing infrastructure for agriculture so as to enhance value addition and opening up employment opportunities.

I tend to agree with Professor Hirashima's views on the land reform being a political process rather than being a development programme. This has become more so over time as the inverse relationship between farm size and land productivity a hall mark of traditional agriculture is no more tenable under transitional and commercial agriculture. But that does not mean no more tenancy reforms, implying regulation of tenurial contracts and consolidation of holdings either. There is also an urgent need for studying and analysing the evolving land market so as to develop an understanding of the formation of prices and the sources of financing the transactions and related issues in land markets.

In closing, I would like to commend Professor Hirashima for his scholarly work on growth poverty linkage. Most of the discussion in the paper is however based on Indian data and Pakistan figures marginally at best. Notwithstanding certain similarities in all developing countries all of them have unique features requiring attention and distinct approach. Accordingly, I have not been pleased with the less than equal approach to Pakistan which featured ahead of India in the title.

I thank you for your patience and attention.

**Abdul Salam**

Federal Urdu University of Arts, Science and Technology,  
Islamabad.

## Comments

1. I am honoured to have the privilege of commenting the paper by Professor Hirashima. It is a very interesting and a comprehensive paper. It touches various dimensions like growth-poverty linkages, inter- and intra-state disparities, income-asset relations, poverty-asset linkages, social inequality citing evidences both from Pakistan and India.
2. Though the paper is mainly based on Indian data, it provides useful insights to follow development route in case of Pakistan as well. Nonetheless, the paper does not justify Pakistan's case as it has been highlighted in the title. The discussion revolves mainly around the Inclusive Growth Strategy (IGS) adapted buy the Indian government in 2006 as a development strategy to alleviate poverty on the one hand and sustained rapid economic growth on the other.
3. Professor Hirashima rightly highlights the fact that the foundation of India's development performance has been her major emphasis on sustained growth with equity since the independence. Therefore, the inclusive growth concept for India is not really new. This strategy resulted into fast track and diversified industrial structure. The paper further argues that the asset holding disparities are also high within and across social groups, and the growth rates in agriculture decelerated almost in all major States. However, the World Development Report 2008 on agriculture shows that India has fairly low income inequality.
4. Interestingly, despite all these weaknesses rural poverty in India generally declined. The author argues that poverty reduction could have been much more significant if the agricultural sector had kept pace with the industrial sector.
5. Regarding the agriculture, the growth rates not only declined but show a much more variation among states during the recent period. The data shows a complete disconnect of agriculture from the other sectors since the correlation coefficients (though very crude) between growth in agriculture and the other sectors before and after the reforms period are 0.51 and 0.15, respectively. The cause of low performance of agricultural growth has been due mainly to lack of focus on this sector in recent reforms.
6. Despite this the declining rural poverty highlights the facts that how mature and broad based is the Indian economy that absorbed the shocks of low growth rates in agriculture sector. The forces behind this success of India have been the very strong and reliable infrastructure of safety nets in place as well as world's largest food procurement and distribution system in the country. Moreover, these trends also point out that agriculture alone cannot reduce

rural poverty, the role of rural non-farm employment and equity in land distribution is important [World Bank (2008)].

7. The declining trends in poverty may not sustain in India because asset holdings particularly the land per farm is continuously on the decline that constrains individuals' access to credit markets, education and health facilities that further limits their access to remunerative jobs. It has also been argued in the literature that lack of minimum asset endowments push the households in long-term poverty trap that further perpetuates when such households cannot secure productive off-farm employment due to their low human capital. Therefore, the asset base of the poor has become a major challenge for the policy-makers to implement agriculture-for-development strategy [World Bank (2008), p. 84]. This has to be rather more true for Pakistan.
8. These facts imply that it is responsibility of the State to provide equal access to quality education and health. If we consider the case of Pakistan, our health and education policies are totally misplaced and further widening the disparity between haves and have nots closing the doors of remunerative job opportunities for those who cannot afford to acquire quality education. Access to health services in rural Pakistan is dismal as well. There are strong empirical evidences available in literature that poor health and education depress agricultural productivity. The dynamics in agriculture technological evolutions further urges strengthening of rural educational and health infrastructure the truth is that we are loosing the existing one also.
9. An important point raised by Professor Hirashima is on rapidly increasing land prices; the land value surpassing the marginal returns to land use. I think the major factor behind this in Pakistan is greater pressure on land because of low absorption of surplus rural labour force in non-agricultural sectors, unplanned urban expansions and lower alternative investment opportunities particularly for those working abroad.
10. The paper emphasises on land ownership as pathway to social equality because access to economic opportunities are attached to this factor of production. If I am not wrong Professor Hirashima is not in favour of land reform *per se* rather he is inclined towards agrarian reforms, tenancy reforms, consolidation of holdings and market assisted land reforms with provision of low cost institutional credit. I find myself completely aligned with Professor Hirashima's argument. Nonetheless, the policy of land reforms has been successfully implemented in India, while Pakistan has failed to do so despite various efforts. Now it seems Pakistan has missed the train and may not be able to take up the land reforms at all because of political reasons.
11. The distribution of land I believe is much less unequally distributed in India than in Pakistan, and the pure tenancy is even less than 1 percent, while in Pakistan this figure is 19 percent. The figure of pure tenancy is worse in Sindh province where it accounts for nearly 40 percent. The asset holdings inequality in rural Pakistan is worsening further due to continued capture of

public services by the rural elites and above all the impact of policy biases. There are intergenerational poverty transfers through lack of quality education and health, and poor nutrition in rural societies [World Bank (2008)].

12. One of the viable options is to go for well thought market based land reforms. It is however important to mention here that the famous inverse farm-size and productivity relationship does not hold any more in many cases and has even reversed particularly in some areas of Pakistan. My own research supports that the inverse relationship does not hold any more in Pakistan. However, there is need to analyse this issue in detail using a fairly representative data set.

**Munir Ahmed**

Pakistan Institute of Development Economics,  
Islamabad.

#### **REFERENCE**

World Bank (2008) *World Development Report 2008: Agriculture for Development*.  
Washington, DC.

*The Mahbub Ul Haq Memorial Lecture*

**Demographic Transition and Unwanted Fertility:  
A Fresh Assessment**

JOHN B. CASTERLINE

The distinction between wanted and unwanted fertility has been crucial in many of the more intense debates in recent decades over the nature of contemporary fertility declines and, in particular, the potential impact of expanded provision of family planning services. In a much-debated article published in 1994, Pritchett argues that decline in desired fertility is overwhelmingly the principal source of fertility decline, with the implication that family planning programmes are of little consequence. I revisit this debate drawing on a far larger body of survey data and, more importantly, an alternative fertility specification which relies on a non-conventional definition of wanted and unwanted fertility rates and which distinguishes rates and composition. Decompositions of fertility decline in the period from the mid-1970s to the present are carried out for 44 countries. The decomposition results indicate that declines in unwanted fertility rates have been at least as important, if not more important, than declines in wanted fertility rates. Surprisingly, shifts in the proportion of women wanting to stop childbearing—i.e., changes in preference composition—has contributed very little to fertility change in this period. Further, decline in wanted fertility and increases in non-marital exposure (due largely to delayed entry into first marriage) have also made substantial contributions, although on average they fall short of the contribution of declines in unwanted fertility rates. That declines in unwanted fertility have been an essential feature of contemporary fertility decline is the main conclusion from this research. This in turn opens the door to new perspectives on fertility pre-, mid-, and post-transition which recognises the inter-dependencies between fertility demand and unwanted fertility rates in the determination of the overall level of fertility.

*JEL classification:* J11, J13, R11

*Keywords:* Demography, Fertility, Family Planning, Regional Economics

**I. INTRODUCTION**

The two decades after the conclusion of World War II witnessed substantial declines in mortality in every region of the world. In those countries where fertility remained high (five or more births per woman during the reproductive career), demographers could easily demonstrate that the combination of sharp mortality decline and stable high fertility would lead to unprecedented population growth, i.e. population doublings in less than thirty years. Accordingly, fertility reduction was adopted as formal population policy in many countries (including Pakistan), and simultaneously scholars addressed the inter-related questions of what factors accounted for high levels of fertility

John B. Casterline <casterline.10@sociology.osu.edu> is Lazarus Professor in Population Studies, Ohio State University, Columbus, Ohio, USA.

*Author's Note:* Paper for presentation at the annual conference of the Pakistan Society of Development Economists, Islamabad, 16 – 18 March 2010. Partial support for this research was provided by a grant from the Hewlett Foundation. The author acknowledges the collaboration of Dr Ahmed Monem, Manager, the Pan Arab Project for Family Health [PAPFAM]. Dr Laila el-Zeini, Cairo University, provided substantial technical advice on the decomposition methodology.

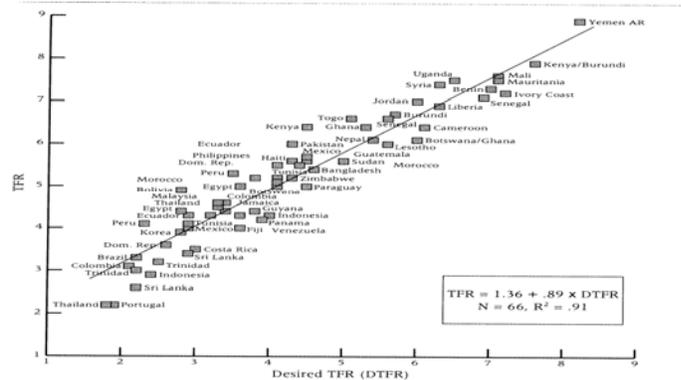
and what factors were most likely to nurture fertility decline. Perhaps no questions received more attention in the demographic literature during the three decades from the mid-1960s to the mid-1990s. An underlying motivation, and the rationale for the relative abundance of research funding, was the acute salience of the public policy choices, in particular whether investment in the provision of family planning services could be expected to lower fertility to a meaningful extent.

These questions are still urgent in those regions where population growth rates remain relatively high, in particular some portions of South Asia and most of sub-Saharan Africa. Public policy choices in those regions can benefit from the accumulated global experience of the past four decades. Influential scholarship from the past can be re-evaluated in light of a more expansive empirical record and alternative analytical strategies. An excellent example of how new assessment can lead to revision of the extant wisdom about fertility decline and its determinants is Bryant's (2007) examination of the explanatory power of macro-level development indicators (income, schooling). Bryant concludes that the explanatory power of such indicators was seriously underestimated in influential research published during the 1990s.

In this paper I reconsider another topic that has received scholarly attention over the years and that has major implications for public policy, namely whether reduction in unwanted fertility is a common—and perhaps even necessary—ingredient of fertility decline. Pritchett (1994) concluded otherwise in an article that prompted a fierce debate in the mid-1990s. In arguing that fertility decline is driven almost entirely by reduced demand for children, Pritchett leaves almost no room for family planning services to make a contribution that justifies their financial cost. The article is relatively lengthy and Pritchett's argument has multiple strands, but his linchpin evidence is the strong association between the total fertility rate (TFR, the most common aggregate fertility indicator) and alternative measures of desired fertility (Pritchett considers three such measures). Figure 1 reprints this linchpin evidence: over ninety percent of the variation in the TFR among 66 countries is explained by the most widely-used measure of desired fertility. The slope near 1.0 (slope = .89) suggests that declines in desired fertility are matched nearly one-to-one by declines in overall fertility. Given this cross-country association between fertility and desired fertility, Pritchett argues that unwanted fertility and closely-related entities such as unmet need for contraception are incidental players in the larger drama of fertility decline.

Note that this is *not* a claim that unwanted fertility and unmet need are invalid concepts that lack empirical reality, a stance taken by some social scientists. More specifically, Pritchett acknowledges that the regression intercept is in excess of one birth (intercept = 1.36 in Figure 1). The regression intercept is the estimated level of fertility when desired fertility equals zero, and therefore can be regarded as an estimate of unwanted fertility. Given the slope near 1.0, the implication is that the unwanted fertility rate is on the order of 1.36 births per woman in all settings. Rather, Pritchett's stance is that fertility decline is not dependent on reduction in unwanted fertility, a conclusion supported by the fact that unwanted fertility evidently does not co-vary with fertility (note in Figure 1 the close adherence to the regression line throughout the range from TFR=8.0 to TFR=2.5).

**Fig. 1. Relationship between Actual Fertility and Three Measures of Fertility Desires in Less Developed Countries**



In this research I accept Pritchett's premise that the empirical contribution of unwanted fertility to fertility decline is highly relevant to the public policy debate about the potential payoff from investments in expanded provision of family planning services. To be sure, family planning programmes, not to mention other deliberate tools of population policy (e.g. mass media activities), could influence fertility desires by direct or indirect means. But there is little solid empirical evidence that this effect exists [Freedman (1997)], and hence effects on unwanted fertility stand as the principal mechanism through which family planning programmes can reduce fertility. My quarrel here is not with Pritchett's premise, but rather with his models and his measures. I will present empirical analysis that leads to a different conclusion. My research improves on Pritchett's much-debated 1994 article in three respects: (1) The measures of fertility desires are more valid; (2) Change is explicitly analysed rather than inferred on the basis of cross-sectional associations; (3) A more appropriate fertility model is employed.

## II. DATA

My aim is to examine the contours of fertility decline in the period since World War II across the maximum number of middle- and low-income countries. Because the distinction between wanted and unwanted fertility is central to this research, measures of fertility attitudes are required, and this in turn means reliance on survey data. The first surveys containing the required measures were conducted in the 1960s, but these surveys are, regrettably, not easily accessed for a large number of countries in diverse settings. Hence the dissection of fertility decline must begin in the 1970s with the first major multi-region multi-country programme of demographic surveys, the World Fertility Survey [WFS], which coordinated the fielding of surveys in 43 countries between 1974 and 1983. The WFS was succeeded by the Demographic and Health Survey [DHS] project, which has conducted surveys from 1985 to the present. In Latin America, the U.S. Center for Disease Control has coordinated Reproductive Health Surveys [RHS] from the early 1990s to the present, and in the Arab region the Arab League has supported demographic surveys under the Pan Arab Project for Family Health [PAPFAM]. This research draws on surveys from all four of these data collection programmes, as follows:

| Survey Programme                   | Number of Surveys | Historical Range |
|------------------------------------|-------------------|------------------|
| World Fertility Survey             | 41                | 1974 – 1983      |
| Demographic and Health Surveys     | 175               | 1985 – 2008      |
| Reproductive Health Surveys        | 14                | 1992 – 2006      |
| Pan Arab Project for Family Health | 6                 | 2001 – 2004      |
| Else                               | 2                 | 2003 – 2006      |
| <i>Total</i>                       | 238               | 1974 – 2006      |

As noted above, the distinction between wanted and unwanted fertility is central to this research, adhering to the terms of debate set by Pritchett in his 1994 article. Hence the incidence of wanted and unwanted fertility must be estimated from the survey data, and this is intrinsically a challenging task. At issue are couples' desires at the time conceptions occurred, but it is not practical to design data collection for national populations that ensures that interviews are conducted proximate in time to all (or even most) conceptions. Hence classification of births as wanted or unwanted will unavoidably depend on fertility desires measured prospectively or retrospectively, with the risk that the desires are not stable or, in the case of retrospective recall, incorrectly remembered. Adding to the challenge is the emotional sensitivity of the topic: respondents may feel that declaring a child "unwanted" is a violation of social or religious norms.

There are two widely-used methodologies for estimating the level of unwanted fertility, another method that has received little use, and the recently developed methodology of Casterline and el-Zeini that is applied in this paper [see discussion in Casterline and el-Zeini (2007)]. All methods permit direct estimation of either a "wanted TFR" [wTFR] or an "unwanted TFR" [uTFR], with the other obtained from the TFR by simple subtraction (i.e.  $TFR = wTFR + uTFR$ ). The Casterline and el-Zeini method is an aggregate method: it does not classify individual births as unwanted or wanted, rather generates birth-order-specific estimates of the proportions unwanted, with an estimate of the overall incidence of unwanted births calculated as a weighted average of the order-specific estimates. This method relies on the fertility attitude item that has been shown to have higher test-retest reliability and higher validity (by several criteria) than other standard fertility attitudinal items [see studies cited in Casterline and el-Zeini (2007)], namely the prospective preference item:

"Would you like to have (a/another) child, or would you prefer not to have any (more) children?"

This is a different method for estimating unwanted fertility than the method used by the DHS, which is the source of most commonly-cited estimates of unwanted fertility. The DHS uses the method popularised by Lightbourne (1985). The crux of this method is a comparison of the respondent's ideal number of children and the number of living children at the time of conception. The DHS wording of the key item is,

"If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?"

If this ideal number is equal to or less than the number of living children at the time of conception of the birth in question, the birth is classified as unwanted. This method has serious shortcomings that are well-recognised by demographers. For one

thing, it relies on a survey item that is known to have low test-retest reliability [see studies cited in Casterline and el-Zeini (2007), including the PES following the 1990-91 Pakistan DHS]. Secondly, two response patterns undermine the method: the tendency to report an ideal that is no lower than the number of living children (so-called “rationalization”), and the tendency in some societies to give a non-numeric answer (“up to God”). These two response patterns both lead to downwardly-biased estimates of unwanted fertility. Finally, there are valid reasons for the preference to have (or not have) more children to be inconsistent with the ideal number of children [Bongaarts (1990)]; this can occur, for example, if the household is economically stressed or if sex preferences have not been satisfied after the first few children.

Hence it is not surprising that the DHS method typically generates *lower* estimates of unwanted fertility than the Casterline and el-Zeini method that is employed in the present research. It would be extreme to claim that, among available estimators, the Casterline and el-Zeini estimator yields the most valid results in all instances; like any method of estimation, it is vulnerable to certain types of data deficiencies. But there are sound reasons for assuming that this estimator has the highest validity across a large set of surveys.

The analysis presented here also requires allocation of exposure time to wanted vs. unwanted states. This is based on the current status distribution at the survey (i.e., age-specific proportions wanting another child). The assumption is that this distribution characterises all months in the reference period (in this analysis, the 36 months preceding the survey).

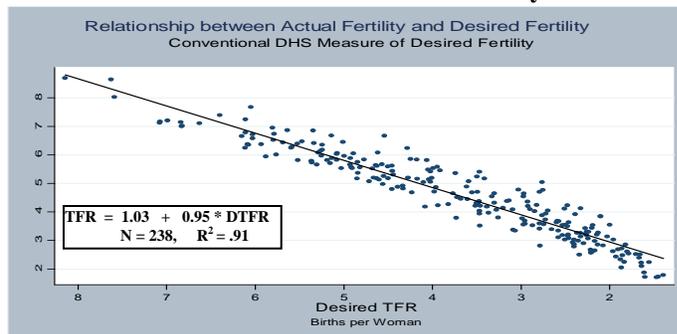
### III. EMPIRICAL RESULTS

#### III.a. A Replication of Pritchett

I begin with a replication of Pritchett’s key analysis, using a far larger number of surveys ( $n=238$ , as against  $n=66$  in Pritchett’s analysis) with greater historical range (a further fifteen years).

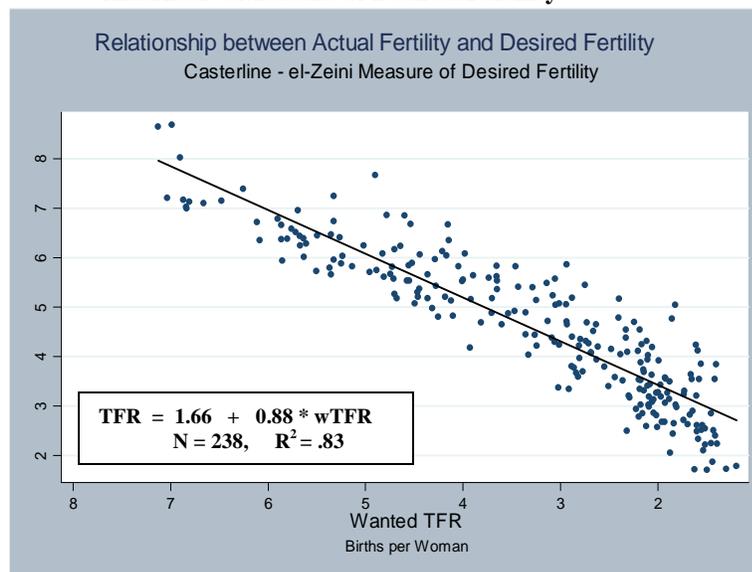
A replication with Pritchett’s preferred measure of desired fertility—the conventional DHS measure of the wanted TFR—is presented in Figure 2a. The result is entirely consistent with Pritchett’s, indeed if anything the outcome is more supportive of his conclusion: the slope is closer to 1.0, and the explained variance is identical despite the larger number of observations.

**Fig. 2a. Relationship between Actual Fertility and Desired Fertility  
Conventional Measure of Desired Fertility**



But reliance on the conventional measure of desired fertility raises some concerns. As noted above, it is generally agreed that these are upwardly biased estimates of the true desired number of children. Moreover, the construction of the conventional (DHS) measure builds in a correlation with the TFR, as demonstrated by Knowles, *et al.* (1994). The Casterline and el-Zeini estimates are less susceptible to both shortcomings. An analogous regression using these estimates is presented in Figure 2b. This regression result does not depart radically from Pritchett's but offers somewhat less convincing evidence that overall fertility and desired fertility go hand-in-hand: (i) the slope declines from 0.95 to 0.88, and the  $R^2$  declines from 0.91 to 0.83; (ii) visually there is far more dispersion around the regression line than in Figure 2a; (iii) a non-linearity is now evident—when the wanted TFR is below 2.5 births per woman, the TFR is lower than a linear regression would predict, which suggests that unwanted fertility falls more rapidly in the latter stages of fertility decline (an interpretation confirmed in further analysis presented below).

**Fig. 2b. Relationship between Actual Fertility and Desired Fertility  
Alternative Measure of Desired Fertility**



### III.b. Explicit Analysis of Change

Pritchett draws conclusions about the nature of fertility decline from cross-sectional associations (e.g. as shown in Figure 1). Clearly this violates basic principles of research design. In his defense, at the time he carried out this research only a few countries offered two or more surveys spaced some distance apart (e.g. ten or more years).

In the subsequent fifteen years the set of countries with successive demographic surveys spanning a decade or more has greatly enlarged. For this research I examine change between two surveys in 44 countries, as listed in Appendix A (by region). The dates of the two surveys are also shown in Appendix A. The criteria for selecting these 44 countries, conditional on the availability of at least two surveys, are:

- Surveys spaced at least eight years apart.
- Annual rate of decline between surveys of at least 0.05 births/annum (i.e., 0.5 births per decade).

Nine of the inter-survey intervals are at least 30 years, and a further eighteen of the intervals are at least 20 years. The briefest inter-survey interval considered is 9 years (Honduras).

Given estimates of the TFR, wanted fertility (wTFR), and unwanted fertility (uTFR) for two dates, a straightforward decomposition of fertility decline consistent with Pritchett's analysis in Figure 1 (and the replications in Figures 2a and 2b) can be carried out based on the identity:

$$\text{TFR} = \text{wTFR} + \text{uTFR} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1a)$$

which implies the following formula for change:

$$\text{TFR}_1 - \text{TFR}_2 = (\text{wTFR}_1 - \text{wTFR}_2) + (\text{uTFR}_1 - \text{uTFR}_2) \quad \dots \quad \dots \quad (1b)$$

from which a percentage decomposition is easily obtained. This is a two-element decomposition; there are contributions to fertility change of changes in wanted fertility and changes in unwanted fertility.

A summary of the results from such a simple decomposition exercise are shown in the upper panel of Table 1.<sup>1</sup> The decomposition is carried out country-by-country—44 decompositions in total. Table 1 shows the median values from these 44 decomposition, and also the 1st and 3rd quartiles. The Pakistan decomposition is shown in the lower panel.<sup>2</sup>

Table 1

*Decomposition of Fertility Change:  
Conventional Decomposition<sup>a</sup>*

Percentage Contribution to Inter-Survey Fertility Change

| Multi-Country (n = 44)    | Median           | 1st Quartile     | 3rd Quartile     |
|---------------------------|------------------|------------------|------------------|
| Due to Wanted Fertility   | 74               | 50               | 104              |
| Due to Unwanted Fertility | 26               | -4               | 50               |
| <b>Pakistan</b>           | <b>1975–2006</b> | <b>1975–1991</b> | <b>1991–2006</b> |
| Due to Wanted Fertility   | 55               | 20               | 94               |
| Due to Unwanted Fertility | 45               | 80               | 6                |
| Total                     | 100              | 100              | 100              |

a. Based on:  $\text{TFR} = \text{wTFR} + \text{uTFR}$ .

where TFR is conventional period TFR.

wTFR is wanted TFR.

uTFR is unwanted TFR.

<sup>1</sup>Note that this analysis, and all subsequent analysis in this paper, uses the Casterline and el-Zeini method to estimate unwanted fertility.

<sup>2</sup>Results are shown for two inter-survey intervals in Pakistan—1975-1991, and 1991-2006. In the multi-country analysis in the top panel, only the interval 1975-2006 is included.

The decomposition results in Table 1 support Pritchett's argument that declines in desired fertility are the main engine of fertility decline, but the picture is far more mixed than his analysis suggests: while the median contribution of the decline in the wanted TFR is 73 percent, in one-quarter of countries it is 47 percent or less, and it is in excess of 103 percent in another one-quarter of countries. Pakistan is a case in point that fails to verify an assertion that fertility decline occurs almost entirely as a result of the decline in desired fertility: over the three-decade period from 1975–2006, the contribution of declines in wanted and unwanted fertility are roughly equal in magnitude (55 percent and 44 percent, respectively).

### III.c. An Alternative Specification

One could regard the decomposition of Equation (1b), despite its simplicity, as a sufficient basis for addressing Pritchett's research questions in an explicit analysis of change. The structure of this model appears to correspond to the terms of the debate—fertility change is attributed to changes in either wanted or unwanted fertility. With these results in hand, one might explore patterns of cross-national variation, in particular associations between the decomposition results and various socioeconomic and programmatic country characteristics.

But as a behavioural model, Equation (1) is seriously flawed. Note that wTFR and uTFR are the simple sum of age-specific rates. In calculating the age-specific wanted rate, the numerator is wanted births and the denominator is woman-years of exposure in the appropriate age interval; similarly, for the age-specific unwanted rate, the numerator is unwanted births and the denominator is woman-years of exposure in the appropriate age interval. The denominator for both rates is *all women* rather than *women at risk* of wanted or unwanted births. This has been the custom for several decades, presumably because of uncertainty about how to allocate exposure in the reference period to risk of wanted vs. unwanted births. But in so doing, standard demographic and epidemiological practice has been violated: incidence rates are usually constructed with events in the numerator and persons at risk in the denominator. It is as if, for example, age-specific rates were calculated using events at age  $a$  in the numerator and persons of all ages in the denominator. Or regional rates were calculated using events in region  $r$  in the numerator and persons of all regions in the denominator.

This shortcoming has been noted by other scholars, most notably Bongaarts (1997) who posits that the uTFR should rise in the early stages of fertility decline due to growth in the fraction of all women who wish to terminate childbearing. Bongaarts is not describing a true behavioural change (i.e., change in the rate of childbearing among those at risk of unwanted births), rather simply a compositional change in the denominator (i.e., the distribution of all women according to their fertility preferences).

A deeper and more revealing investigation of the nature of fertility change would consider true incidence rates, i.e., events per woman at risk. Define

$$\begin{array}{ll}
 b_w & \text{wanted births} \\
 e_w & \text{woman-years of "want another birth"} \\
 r_w = & b_w / e_w \text{ wanted fertility rate, } \textit{conditional} \text{ on risk of wanted birth}
 \end{array}$$

and the same can be defined for unwanted fertility (subscripted  $u$ ). Further, define

$p_w$  proportion of women who “want another birth”

$p_u$  proportion of women who “do not want another birth”

Noting that ( $p_u + p_w = 1$ ), we have the following expression for the age-specific fertility rate  $f$

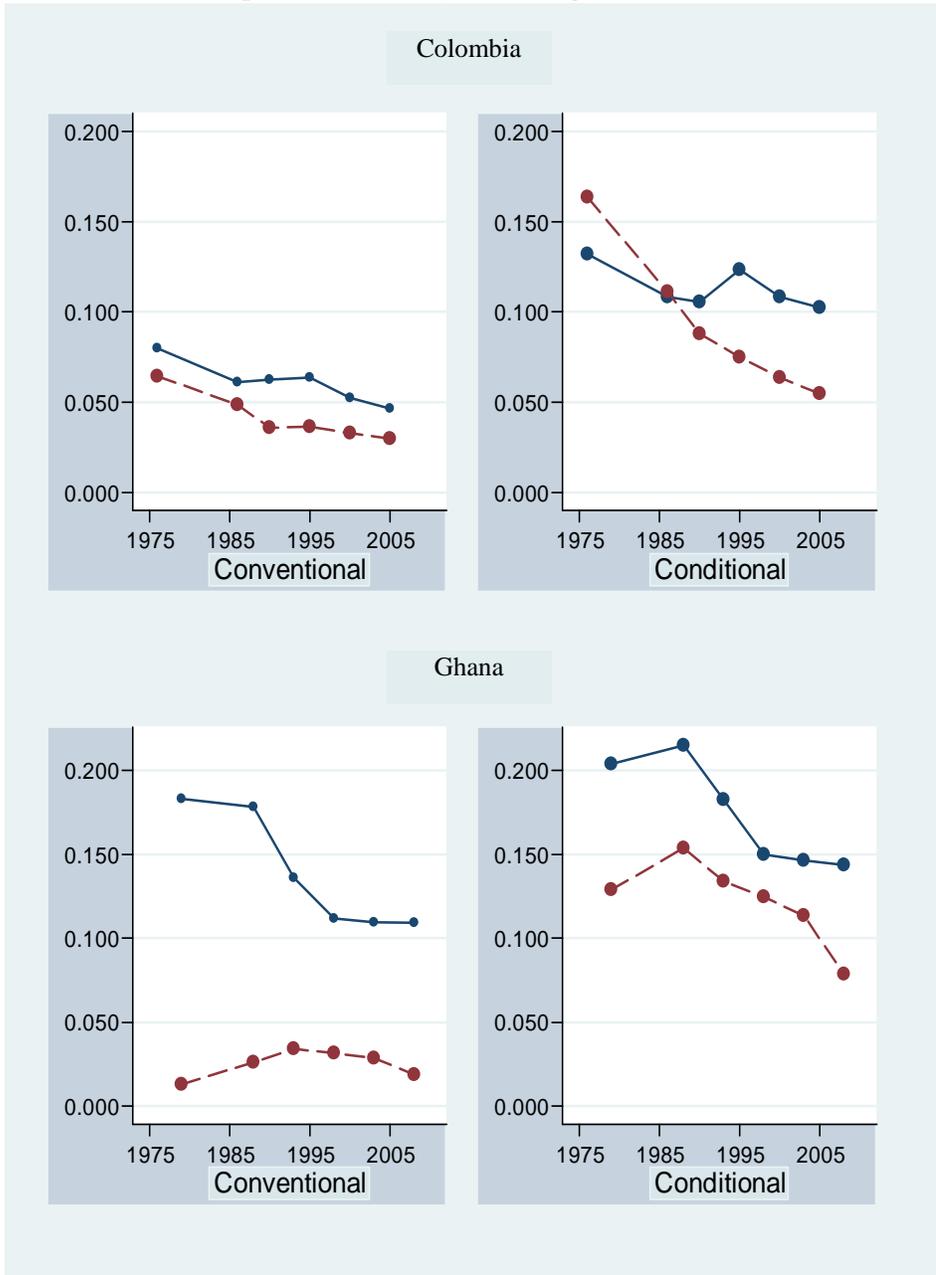
$$f = r_w * p_w + r_u * (1 - p_w) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

The key feature of Equation (2) is that the component rates are constructed for those women at risk of the event in question (wanted birth or unwanted birth, respectively). I therefore term these “conditional rates” — conditional on preference status. The construction of these two rates is consistent with the logic of most comparable indicators in demography and epidemiology. There is good reason for this logic to hold sway: most social and economic theory is preoccupied with the choices of those persons at risk of an event, and such persons are also the targets of policy interventions. To be sure, the composition of the population is a further concern of both basic science and public policy. For example, from economic theory one might derive hypotheses about which women are more or less likely to desire another child conditional on their age or parity; and reducing the demand for children might be a public policy goal. In this vein, note that Equation (2) also explicitly recognises the contribution of composition (the  $p_w$  term). In short, Equation (2) is far more precise about the components of a fertility rate: the fertility rate is a somewhat complex outcome of summing two preference-specific entities, with each of the latter consisting of the product of rate and composition.

One might ask whether the conditional rates provide a portrait of fertility decline that differs from that provided by the conventional wanted and unwanted rates (wTFR and uTFR). To address this question, I select four countries for illustration: Colombia, Ghana, Egypt and Pakistan. The first three countries each have six or more surveys. The rates of interest are listed in Appendix C. The two pairs of fertility rates—conventional and conditional, wanted and unwanted—are displayed in Figures 3a and 3b. (Note that these rates are births per woman-year of exposure, all women ages 15-49, and not standardised for age.) It is immediately obvious that the conditional rates are much higher in value, as they must be because their denominators are a sub-set of woman-years rather than all woman-years of exposure as in the conventional rates. In the most general sense, the two pairs of rates—conventional on the left, conditional on the right—offer similar portraits of fertility change in these four countries. But there are substantial differences in the steepness of slopes, and even a few differences in the direction of slope (i.e. unwanted fertility in Ghana, wanted fertility in Pakistan). The most important difference is that the steepness of the decline in unwanted fertility, *relative to the decline in wanted fertility*, is greater according to the conditional rates. As a consequence, while the conventional rates tend to converge as decline progresses, the conditional wanted and unwanted rates tend to diverge. But these are patterns in only four out of forty-four countries analysed, and thus generalisations cannot be drawn. The purpose of Appendix C and Figure 3 is simply to give the reader a feel for the two types of rates.

**Fig. 3a. Illustration of Trends in Fertility Rates: Conventional Rates and Conditional Rates**

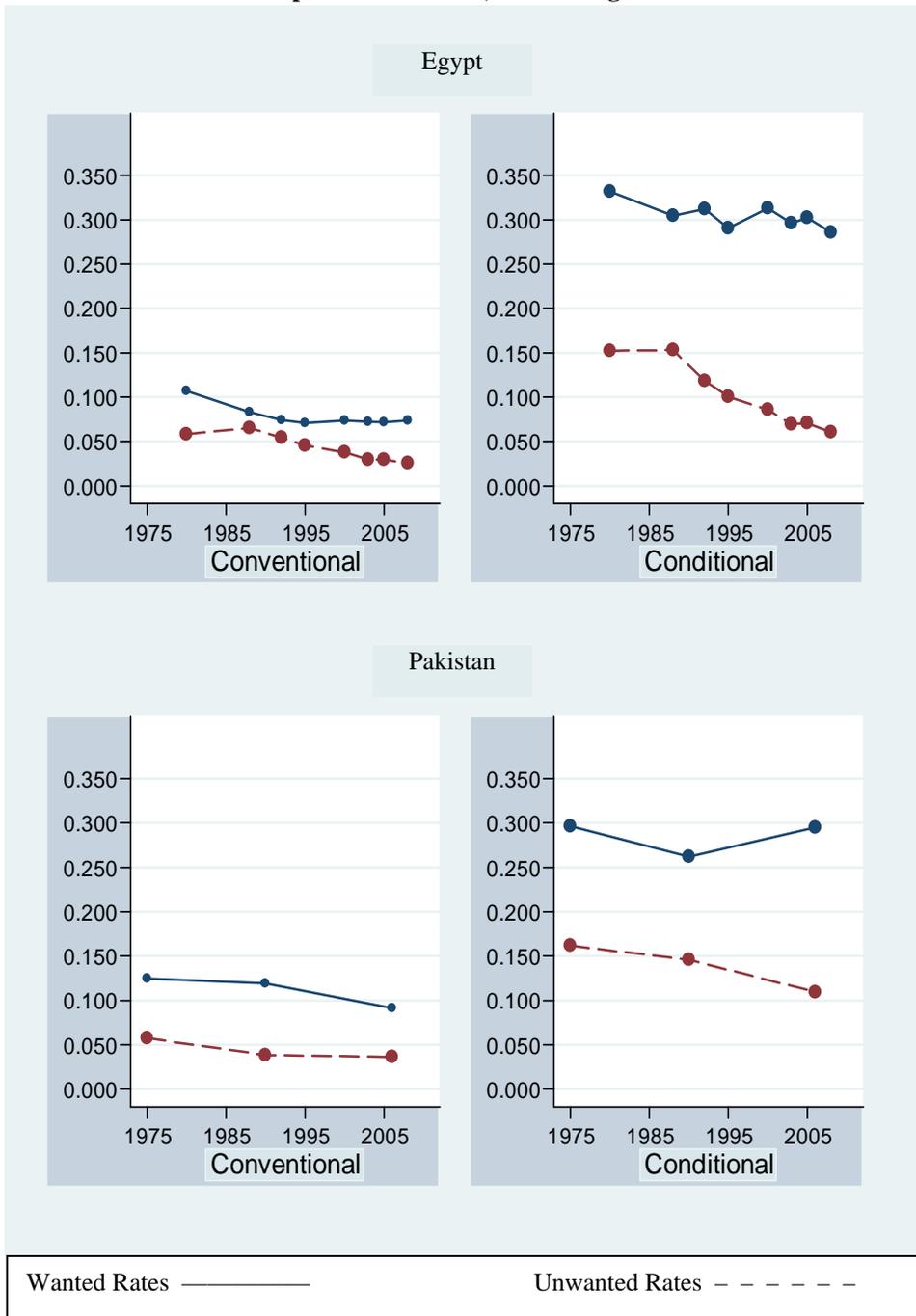
**Births per Woman-Year, Women Aged 15-49**



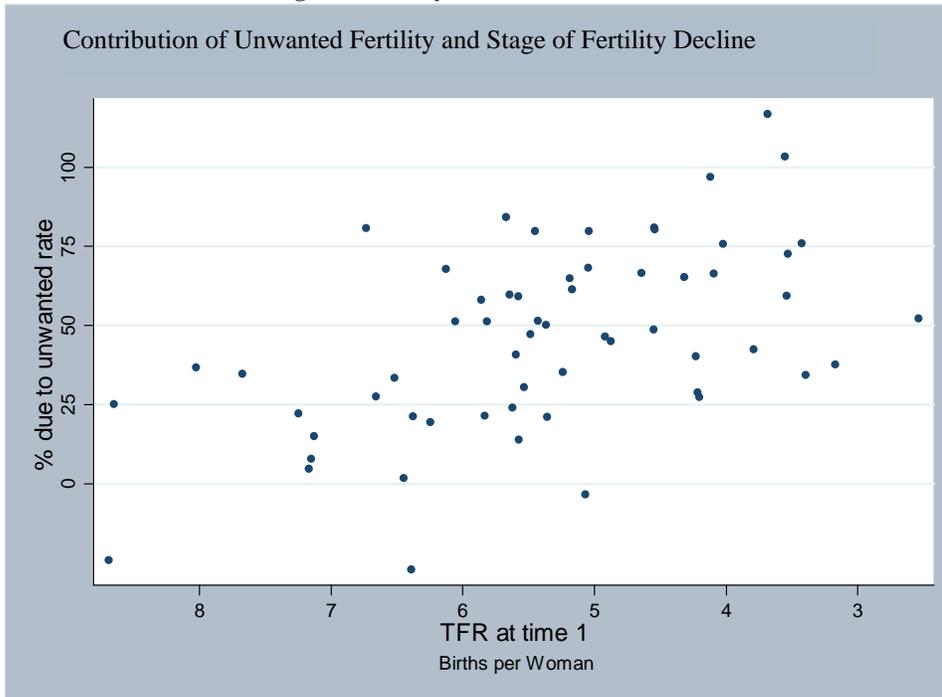
Wanted Rates ——— Unwanted Rates - - - - -

**Fig. 3b. Illustration of Trends in Fertility Rates: Conventional Rates and Conditional Rates**

**Births per Woman-Year, Women Aged 15-49**



**Fig. 4. Association between Contribution of Unwanted Fertility and Stage of Fertility Decline**



Equation (2) is the basis for an alternative decomposition that consists of three elements:

- changes in the “conditional” wanted fertility rate (conditional on being at risk of having a wanted birth)  $r_w$
- changes in the “conditional” unwanted fertility rate  $r_u$
- changes in the composition of the population with respect to fertility preferences  $p_w$

The algebra of a decomposition based on Equation (2) is presented in Appendix B.1. The formulae for the three elements just specified are relatively simple:

$$\begin{aligned} \text{Wanted rate:} & \quad (r_1^w - r_2^w) \bar{p}^w \\ \text{Unwanted rate:} & \quad (r_1^u - r_2^u) (1 - \bar{p}^w) \\ \text{Preference composition:} & \quad (p_1^w - p_2^w) (\bar{r}^w - \bar{r}^u) \end{aligned}$$

with the subscripts denoting first and second survey and the over-score bar denoting a mean (of the first and second survey values). A key feature of these formulae is that changes in rates are weighted by average composition, and the change in composition is weighted by the average difference in rates. This is entirely sensible. For example, consider the consequence of a change in the wanted rate, which under the formula above is a function of the proportion of the population that “want another child”. If one imagines a setting where the proportion wanting another child is very low, then clearly it

is of little import that the wanted rate declines; and the opposite conclusion applies in a setting where the proportion wanting another child is very high. That is, all three elements contain an inter-dependency between rates and composition. This is a very important point to which I return in the final section of this paper.

Empirical results from the application to the 44 countries of the decomposition based on Equation (2) are presented in Table 2. The findings are striking. Whereas the average (median) percentage point contribution of declines in wanted fertility was 73 percent under the decomposition based on the conventional Equation (1b) (Table 1), the average contribution of declines in wanted fertility is 56 percent under the alternative specification of Equation (2). The contribution of declines in unwanted fertility is of almost the same magnitude, an average contribution of 43 percent. That is, under this alternative specification, which I believe conforms more closely to a sensible reproductive model, the empirical experience of the past three decades provides no grounds for attributing fertility decline predominantly and overwhelmingly to declines in fertility demand. Note that the results for Pakistan 1975–2006 resemble the average for the 44 countries—60 percent of the decline is due to the decline in wanted fertility.

Table 2

*Decomposition of Fertility Change:  
Three-Element Decomposition<sup>a</sup>*

| Percentage Contribution to Inter-Survey Fertility Change |                  |                  |                  |
|--|------------------|------------------|------------------|
| Multi-Country (n = 44)                                   | Median           | 1st Quartile     | 3rd Quartile     |
| Due to Wanted Rate <sup>b</sup>                          | 56               | 40               | 70               |
| Due to Unwanted Rate <sup>c</sup>                        | 40               | 23               | 62               |
| Due to Composition <sup>d</sup>                          | 1                | -2               | 7                |
| <b>Pakistan</b>  | <b>1975–2006</b> | <b>1975–1991</b> | <b>1991–2006</b> |
| Due to Wanted Rate <sup>b</sup>                          | 60               | 85               | 41               |
| Due to Unwanted Rate <sup>c</sup>                        | 39               | 21               | 46               |
| Due to Composition <sup>d</sup>                          | 1                | -6               | 13               |
| Total  | 100              | 100              | 100              |

<sup>a</sup> See text and Appendix B.1.

<sup>b</sup> Births per woman-years at risk of wanted birth.

<sup>c</sup> Births per woman-years at risk of unwanted birth.

<sup>d</sup> Distribution of woman-years between wanting another birth and wanting no more births.

A final interesting, and unexpected, result in Table 2 is the trivial contribution of changes in preference composition. How can this be? Is it not the case that fertility desires fall over the course of fertility transition, with the result that the composition of reproductive-age women shifts from “want another child” to “do not want another child”? This is how Bongaarts (1997), among others, portrays fertility transition. There are two explanations for this puzzling outcome, each of which has some validity (based on my scrutiny of the data). First, note that shifts in preference composition only affect the fertility rate to the extent that wanted and unwanted fertility rates (the conditional rates  $r_w$  and  $r_u$ ) differ from each other. As argued above, it is sensible to weight the

compositional change by the difference  $r_w - r_u$ , and the algebra in Appendix B.1 makes this explicit. As it happens, the age-specific values for  $r_w$  and  $r_u$  in many countries do not differ as much as one might assume.<sup>3</sup> Second, most never married women are classified as “want another birth”. In some countries such as Pakistan this is assumed rather than directly ascertained, because never married women are not directly asked about their fertility desires. As a consequence, historical trends towards older age at first marriage and larger fractions never marrying exert upward pressure on the proportion “want another birth”, everything else being equal. The upshot is that the preference composition of reproductive-age women changes far less over the course of fertility transition than has been assumed in the demographic literature. This is an unexpected empirical finding from this fresh assessment of the components of fertility decline.

The possibility that countervailing nuptiality changes account in part for the surprisingly trivial contributions of compositional change in the decompositions presented in Table 2 motivates a further specification that separates out the nuptiality component. I elaborate Equation (2) by distinguishing women by marital status (never married and ever married) among those women who “want another child”. Fertility rates and composition specific to both groups can be defined.

$$\begin{aligned} r_n & \text{ wanted fertility rate among the never married} \\ r_n & \text{ proportion never married among those who “want another child”} \end{aligned}$$

Then we have

$$f = r_u * p_u + r_n * p_n * (1 - p_u) + r_w * (1 - p_n) * (1 - p_u) \quad \dots \quad \dots \quad (3)$$

Note a change in the definitions  $r_w$  and  $p_w$  terms from Equation (2) to Equation (3):  $r_w$  now refers to the rate of fertility among those who “want another child” *and* are married. And  $p_w$  refers to the proportion of women who both “want another child” *and* are married *among those who “want another child”*. That is, this is a nested specification: the first level distinguishes those who want and do not want another child, and the second level breaks the first group (“want another child”) into two sub-groups (never and ever married). The algebra for employing Equation (3) in a decomposition of fertility change is presented in Appendix B.2. This is a five-element decomposition, but for presentational purposes the contributions of the two wanted fertility rates—among the never married and the married, respectively—are combined.

Empirical results are presented in Table 3. As is necessarily the case given the nested specification, the contributions of the unwanted fertility rate and of preference composition are unchanged from the three-element decomposition of Table 2. What has changed in taking into account marriage composition (nuptiality) is the contribution to overall fertility decline of the decline in wanted fertility—the median value of this contribution has declined from 56 percent in the three-element decomposition of Table 2 to 34 percent in the more elaborate decomposition of Table 3. Evidently a substantial proportion of the change attributed to wanted fertility in the simpler decomposition is actually due to nuptiality change. Whether the nuptiality change, in turn, is motivated in part by reduced demand for children is an important question about which the research literature is undecided. My own view is that nuptiality change is primarily driven by

<sup>3</sup>Undoubtedly this is due in part to higher fecundability among those at risk of an unwanted birth.

factors other than falling demand for children; at the same time, the counter-factual of substantial first-marriage postponement while fertility desires remain stable and high may be far-fetched. In any case, there is no decisive evidence for one position or another on this question. If the change in nuptiality is treated as conceptually distinct from changes in wanted fertility, as in Table 3, then one concludes that the leading source of fertility decline has been declines in unwanted fertility. This interpretation is sharply at odds with the account of Pritchett and others who regard declining demand for children as the primary driver.

Table 3

*Decomposition of Fertility Change:  
Four-Element Decomposition<sup>a</sup>*

| Percentage Contribution to Inter-Survey Fertility Change |                  |                  |                  |
|--|------------------|------------------|------------------|
| Multi-Country (n = 44)                                   | Median           | 1st Quartile     | 3rd Quartile     |
| Due to Wanted Rate <sup>b</sup>                          | 35               | 20               | 50               |
| Due to Unwanted Rate <sup>c</sup>                        | 40               | 23               | 62               |
| Due to Composition: preferences <sup>d</sup>             | 1                | -2               | 7                |
| Due to Composition: marriage <sup>e</sup>                | 15               | 0                | 43               |
| <b>Pakistan</b>  | <b>1975–2006</b> | <b>1975–1991</b> | <b>1991–2006</b> |
| Due to Wanted Rate <sup>b</sup>                          | 30               | -11              | -50              |
| Due to Unwanted Rate <sup>c</sup>                        | 52               | 38               | 54               |
| Due to Composition: preferences <sup>d</sup>             | 4                | 59               | 26               |
| Due to Composition: marriage <sup>e</sup>                | 14               | 14               | 70               |
| Total  | 100              | 100              | 100              |

<sup>a</sup> See text and Appendix B.2. This is a five-element decomposition; for presentation, the two contributions of the wanted rate among the never married and ever married, respectively, are combined in “due to wanted rate”.

<sup>b</sup> Births per woman-years at risk of wanted birth.

<sup>c</sup> Births per woman-years at risk of unwanted birth.

<sup>d</sup> Distribution of woman-years between wanting another birth and wanting no more births.

<sup>e</sup> Among those women wanting another birth, distribution of woman-years between never and ever married states.

The Table 3 decomposition also reveals meaningful contributions of change in marriage composition (nuptiality) that also happen to be highly variable across countries. The median contribution is 15 percent. Pakistan is among the countries where the credit attributed to marriage composition is especially large –62 percent for the period 1975–2006, and evidently the main reason for the Pakistan fertility decline during this thirty-year period. Declines in unwanted fertility rank second and have also made a major contribution to the Pakistan decline to date –39 percent during the period 1975–2006. Equally notable results for Pakistan are the complete absence of contributions of declines in wanted fertility and in preference composition, the two components of the decomposition that are most closely linked to demand theories of fertility decline.

Returning to the upper panel of Table 3, while a decline in unwanted fertility is the leading source of fertility decline according to this decomposition, the inter-quartile range

suggests considerable across-country heterogeneity in this effect. To get a feeling for the types of settings (demographic and otherwise) in which the contribution of declines in unwanted fertility is relatively low or high, the decomposition results for the countries with low and high unwanted fertility contributions are shown in Table 4. The five countries with low contribution (upper panel) are primarily in the early stage of fertility decline—the initial TFR exceeds 7.00 in four of the five countries—and they are marked by relatively large contributions of marriage composition. This suggests a tradeoff between nuptiality and unwanted fertility rates as sources of fertility decline, with an indication that the former dominates in the early stage of transition in some countries. The four countries with relatively large unwanted fertility contributions (lower panel of Table 4) are in the middle stage of fertility transition (with the exception of Malawi, which presents results that raise concerns about consistency of measurement across surveys). The decompositions in these four countries differ considerably, with the only commonality other than the large contribution of unwanted fertility being the absence of a contribution of marriage composition (and, in the case of Bolivia and Colombia, nuptiality trends that work *against* fertility decline). The two Latin American countries also show large contributions of declines in *both* wanted and unwanted rates.

Table 4

*Countries with Low and High Contribution of  
Declines in Unwanted Fertility Rate  
Results from Four-Element Decomposition<sup>a</sup>*

**4.a Low Contribution**

|                   | Jordan<br>1975 –<br>2007 | Togo<br>1988 –<br>1998 | Benin<br>1981 –<br>2006 | Yemen<br>1979 –<br>2003 | Senegal<br>1978 –<br>2005 |
|-------------------|--------------------------|------------------------|-------------------------|-------------------------|---------------------------|
| TFRs              | 7.09 – 3.59              | 6.44 – 5.20            | 7.16 – 5.74             | 8.69 – 5.81             | 7.15 – 5.26               |
| Due to:           |                          |                        |                         |                         |                           |
| Wanted Rate       | 69                       | 75                     | 16                      | 28                      | 39                        |
| Unwanted Rate     | -11                      | 1                      | 5                       | 10                      | 10                        |
| Composition: pref | -10                      | 0                      | 30                      | 0                       | 4                         |
| Composition: marr | 52                       | 24                     | 49                      | 62                      | 47                        |
| Total             | 100                      | 100                    | 100                     | 100                     | 100                       |

**4.b High Contribution**

|                   | Bolivia<br>1989–2003 | Colombia<br>1976–2005 | Malawi<br>1992–2004 | Sri Lanka<br>1975–1987 |
|-------------------|----------------------|-----------------------|---------------------|------------------------|
| TFRs              | 5.04 – 3.84          | 4.54 – 2.39           | 6.73 – 6.04         | 3.55 – 2.67            |
| Due to:           |                      |                       |                     |                        |
| Wanted Rate       | 71                   | 41                    | -54                 | 1                      |
| Unwanted Rate     | 80                   | 80                    | 80                  | 103                    |
| Composition: pref | -8                   | -4                    | 62                  | -2                     |
| Composition: marr | -43                  | -17                   | 12                  | -2                     |
| Total             | 100                  | 100                   | 100                 | 100                    |

a. See text and Appendix B.2.

The decompositions of Tables 2 and 3—which are, to my knowledge, new to the literature—provide a basis for much further exploration of the nature of contemporary fertility declines. One might ask, for example, whether the substantial contribution of the decline in unwanted fertility revealed by this decomposition varies according to pace of decline, stage of fertility transition, or region. Differentials according to each of these three factors are examined in Table 5, which reveals some clear and even surprising findings. First, the most rapid declines are characterised by larger contributions of declines in the wanted rate and in marriage composition (top panel). Declines in the unwanted rate contribute most to the medium-paced fertility declines. Judging from the empirical experience represented by these countries, then, it is not the case achieving a fertility decline more rapid than the average is dependent *per se* on relatively large reduction in the rate of unwanted fertility. Second, the relative contributions of the four elements differ markedly by stage of decline (middle panel): declines above TFR=4.5 are characterised by a rather balanced contribution of all four elements (somewhat less contribution of preference composition), whereas declines below TFR=4.5 are overwhelmingly due to declines in the unwanted fertility rate. This point is also shown graphically in Figure 3, which plots the percentage point contribution of declines in unwanted fertility against the TFR at the start of the historical interval. The association in Figure 3 is rather weak but visible nevertheless—in Table 5, unwanted fertility’s contribution is greater in the later stages of fertility decline. There is a clear message here: completing the fertility decline—i.e. progressing downward beyond a TFR of around four births per woman—hinges on successful reduction in unwanted fertility. Finally, regional differentials are presented in the bottom panel in Table 5. Evidently declines in unwanted fertility have made a relatively larger contribution to the Latin American and Asian fertility declines, whereas marriage composition has been crucial in the fertility declines in West Asia and North Africa (and to a lesser extent in the declines to date in sub-Saharan Africa as well).

Table 5

*Differentials in the Relative Contributions  
to Declines in Fertility  
Results from Four-Element Decomposition<sup>a</sup>  
Median Percentage Contributions*

**5.a Pace of Decline<sup>b</sup>**

|                   | Slow<br>[< 0.075] | Medium<br>[0.075 – 0.100] | Rapid<br>[>0.100] |
|-------------------|-------------------|---------------------------|-------------------|
| Due to:           |                   |                           |                   |
| Wanted Rate       | 22                | 37                        | 34                |
| Unwanted Rate     | 39                | 55                        | 24                |
| Composition: pref | 3                 | 2                         | 0                 |
| Composition: marr | 24                | 3                         | 35                |
| ( n countries)    | (14)              | (15)                      | (15)              |

**5.b Stage of Decline**

|                   | Early<br>TFR <sub>2</sub> > 4.5 | Later<br>TFR <sub>1</sub> < 4.5 |
|-------------------|---------------------------------|---------------------------------|
| Due to:           |                                 |                                 |
| Wanted Rate       | 33                              | 33                              |
| Unwanted Rate     | 21                              | 61                              |
| Composition: pref | 10                              | 0                               |
| Composition: marr | 35                              | 6                               |
| (n countries)     | (20)                            | (20)                            |

**5.c Region**

|                   | Sub-Saharan<br>Africa | Latin<br>America | West Asia<br>and<br>North Africa | South and<br>Southeast<br>Asia |
|-------------------|-----------------------|------------------|----------------------------------|--------------------------------|
| Due to:           |                       |                  |                                  |                                |
| Wanted Rate       | 35                    | 48               | 28                               | 15                             |
| Unwanted Rate     | 27                    | 61               | 21                               | 57                             |
| Composition: pref | 10                    | 1                | 0                                | 1                              |
| Composition: marr | 24                    | -2               | 50                               | 15                             |
| (n countries)     | (15)                  | (13)             | (8)                              | (8)                            |

<sup>a</sup>See text and Appendix B.2.

<sup>b</sup>Births/woman/annum decline.

A caution about the differentials presented in Table 5, this analysis does not adjust for associations among the three factors (pace of decline, stage of decline, region). Suppose, for example, that there are intrinsic differences amongst the regions in the nature of fertility decline, possibly due to regional differences in structural factors such as kinship system and economy. If so, the fact that Asian and Latin American declines are relatively advanced whereas African declines are at an early stage will affect the sharp differential according to stage of decline evident in the middle panel of Table 5, it could be that later-stage fertility declines appear to be driven mainly by declines in unwanted fertility because in the period under observation Latin American and Asian countries predominate in the "Later" category. Or, instead, it could be that the regional differentials evident in the bottom panel of Table 5 are due in part to effects of stage of decline (with the African countries being at an earlier stage). These and other possible confoundings will be addressed in multivariate analysis yet to be conducted.

#### IV. A NEW AND MORE BALANCED UNDERSTANDING OF FERTILITY DECLINE

This is a study of reproductive change that takes advantage of the large number of national demographic surveys conducted during the past three decades in Asia, Latin America, and Africa. I use this empirical record to address questions that have been hotly debated for decades and that remain salient because fertility decline is by no means complete throughout the globe. The particular focus of this exercise has been the relative contribution of declines in wanted and unwanted fertility to the overall decline of fertility.

Pritchett's influential 1994 article concluded that almost all credit should be attributed to declines in wanted fertility. From this he infers that there is little potential for expanded provision of family planning services to have an impact that justifies their cost.

A revisiting of this argument on Pritchett's own terms indicates that his argument is over-sold: explicit analysis of change (Table 1) reveals a larger contribution of declines in unwanted fertility than his research suggested.

But my departure from this previous literature is sharper and more profound. In my view much of the existing research literature has employed a flawed fertility model. I have proposed an alternative model that I believe is sounder conceptually if evaluated according to demographic or epidemiological logic. This is the model of Equation (2), and elaborated in Equation (3). A decomposition based on this model comes to an entirely different conclusion than Pritchett and others who have been dismissive of the view that reduction in unwanted fertility is usually essential if fertility is to fall to low levels (i.e. near replacement level). In contrast to their dismissive stance, the clear conclusion from the results in Tables 2 and 3 is that declines in unwanted fertility have been, if anything, the single largest source of contemporary fertility declines.

It is important to understand that this conclusion is founded on far more than application of different technical approach. Equations (2) and (3), and the resulting decompositions, express an alternative understanding of the sources of variation in the level of fertility. According to Equation (1), fertility is the sum of a wanted and unwanted component, and either may increase or decrease independently of the other. This equation allows for a fertility decline due overwhelmingly to a decline in wanted fertility—the demand-driven decline perceived by Pritchett and others.

Equations (2) and (3) explicitly acknowledge preference composition, and this transforms the terms of the discussion. Consider again Equation (2):

$$f = r_w * p_w + r_u * (1 - p_w) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

If family size desires decline over time, then *ceteris paribus* the proportion of reproductive age women (or couples) who wish to stop childbearing —  $(1 - p_w)$  — should increase. That is, the expectation is that due to the emergence of small family desires an increasingly larger fraction of the reproductive years are spent in the “do not want another child” state. Now note that  $(1 - p_w)$  serves as a weight in Equation (2) for the (conditional) unwanted fertility rate  $r_u$ . *The implication is that declines in fertility demand have the effect of increasing the potential importance of unwanted fertility as a component of overall fertility.* And therefore fertility decline to low levels will follow from falling demand for children only to the extent that unwanted births can be avoided. Put otherwise, in those reproductive regimes in which a small number of children are desired, it is especially critical that unwanted fertility rates are low. In most societies achieving this condition depends on a reduction in the unwanted fertility rate because, according to the survey data of the past three decades, the (conditional) unwanted rate is moderate or high in the pre- and early-transition period.

The upshot is that more effective birth control is an essential ingredient in a demand-driven fertility decline. This is hardly a new insight, but it has been lost sight of in much of the debate of the past two decades. Separating out wanted fertility is an artificial exercise that ignores the inter-dependencies among fertility desires and unwanted fertility in the determination of overall fertility. To the extent that declines in

the desired number of children results in a decline in  $p_w$  (and a corresponding increase in  $(1 - p_w)$ ), such a change if anything confers more importance on rates of unwanted fertility. For this reason it is entirely misleading to argue, as Pritchett and others have over the years, that an empirical demonstration that declining demand for children is the primary force underlying fertility decline serves to undermine the rationale for explicit population policy and, in particular, provision of family planning services. If anything the correct conclusion is just the opposite.

But according to Equation (2), fertility decline can also occur due to declines in the two conditional rates  $r_w$  and  $r_u$ . How are these to be viewed from the standpoint of the debate about the nature of fertility decline and the potential contribution of public policy?

Beginning with the wanted rate  $r_w$ , note that the decomposition results in Tables 2 and 3 indicate that declines in  $r_w$  have made a meaningful contribution; that is, the intensity of childbearing among those women who want another child has declined. Matter-of-factly, this may reflect greater birth-spacing, which is one type of improved birth control. But this is a description, not an explanation—why less intensity of wanted fertility? Might this indirectly reflect a decline in desired fertility? This is related to the above discussion of uncertainty about how to interpret nuptiality change and whether there are deliberate and self-conscious links between fertility goals and marriage timing. Just as we lack rigorous empirical assessments of whether reduced demand for children is one reason for later marriage, we lack empirical evidence of whether reduced demand for children underlies the apparent declines in wanted fertility rates.

Finally, and perhaps most critically from the standpoint of the debates about population policy (and family planning programmes in particular), how to interpret the dominant contribution of declines in unwanted fertility rates  $r_u$ ? The empirical finding is that more effective avoidance of unwanted births among those at risk of such births is the leading source of fertility decline in the observation period. It is beyond the bounds of this paper to account for the reductions in unwanted fertility rates, but the leading explanations can be concisely summarised. Reduction in unwanted fertility could reflect widespread adoption of more effective contraceptive technology, which in turn might be due to the improved access and affordability of such technology. This has been the goal of publicly financed family planning programmes, and the impact of these programmes has been the subject of a large body of empirical research. At the same time it should be noted that adoption of more effective contraception may have been facilitated by reductions in non-access barriers (psychic, social, cultural). Alternatively, the reductions in unwanted fertility rates might be due primarily to more effective use of existing technology, itself a result of improved knowledge (e.g. various kinds of social learning) and/or more determination to avoid unwanted births. The latter could itself reflect reduced demand for children—by this reasoning, the large contributions of declines in unwanted fertility are not necessarily in contradiction to theories that feature change in fertility demand. This again reveals the false terms of much of the recent debate.

A final point is speculative in nature and concerns the nature of pre-transition reproductive regimes, in particular the possibility that African reproductive regimes differ from Western and Asian reproductive regimes in fundamental ways. A common assumption is that fertility in the past in all societies was almost entirely desired. But in fact the earliest fertility surveys in Asia (including the National Impact Survey in Pakistan) and more qualitative materials (diaries, fiction) from the pre-transition period in

Europe the existence of high unwanted fertility of moderately high incidence. The evidence is incomplete and hardly conclusive, but what is available does not suggest there was a time in Asian and European societies of the past when “every child a wanted child” applied. Hence it may be that some unwanted childbearing was a fixed feature of these societies; why this was so requires further thought and investigation. If this is a correct characterisation of these societies, then from the outset a reduction in unwanted fertility was a necessary component of their fertility declines.

African societies, by contrast, show extraordinarily low levels of unwanted fertility in the pre-transition period, if the fertility surveys of the past three decades are to be trusted. As compared to Asian and European societies, the demand for children in pre-transition African reproductive regimes appears to be high. If this too is a correct characterisation, then declines in unwanted fertility will prove to be a far less central feature of fertility decline in this region.

## Appendix A

*Countries and Surveys in Trend Analysis*  
(*n = 44 countries*)

| Region and Country                          | Dates of Surveys |            |
|---|------------------|------------|
|   | 1st Survey       | 2nd Survey |
| <b>South Asia [n = 5]</b>                   |                  |            |
| Bangladesh                                  | 1975             | 2007       |
| India                                       | 1992             | 2005       |
| Nepal                                       | 1976             | 2006       |
| Pakistan                                    | 1975             | 2006       |
| Sri_Lanka                                   | 1975             | 1987       |
| <b>Southeast Asia [n = 3]</b>               |                  |            |
| Indonesia                                   | 1976             | 2007       |
| Philippines                                 | 1978             | 2008       |
| Thailand                                    | 1975             | 1987       |
| <b>West Asia and North Africa [n = 8]</b>   |                  |            |
| Egypt                                       | 1980             | 2008       |
| Jordan                                      | 1976             | 2007       |
| Morocco                                     | 1980             | 2003       |
| Sudan                                       | 1978             | 1989       |
| Syria                                       | 1978             | 2001       |
| Tunisia                                     | 1978             | 2001       |
| Turkey                                      | 1978             | 2003       |
| Yemen                                       | 1979             | 2003       |
| <b>Latin America and Caribbean [n = 13]</b> |                  |            |
| Bolivia                                     | 1989             | 2003       |
| Brazil                                      | 1986             | 2006       |
| Colombia                                    | 1976             | 2005       |
| Dominican_Republic                          | 1975             | 2007       |
| Ecuador                                     | 1979             | 2004       |
| El_Salvador                                 | 1985             | 2003       |
| Guatemala                                   | 1987             | 2002       |
| Haiti                                       | 1977             | 2005       |
| Honduras                                    | 1996             | 2005       |
| Mexico                                      | 1976             | 2003       |
| Nicaragua                                   | 1992             | 2006       |
| Paraguay                                    | 1979             | 2004       |
| Peru  | 1977             | 2004       |
| <b>Sub-Saharan Africa [n = 15]</b>          |                  |            |
| Benin                                       | 1981             | 2006       |
| Burkina_Faso                                | 1992             | 2003       |
| Cameroon                                    | 1978             | 2004       |
| Cote_dIvoire                                | 1980             | 1998       |
| Ghana                                       | 1979             | 2008       |
| Kenya                                       | 1978             | 2003       |
| Lesotho                                     | 1977             | 2004       |
| Liberia                                     | 1986             | 2007       |
| Madagascar                                  | 1992             | 2003       |
| Malawi                                      | 1992             | 2004       |
| Namibia                                     | 1992             | 2006       |
| Rwanda                                      | 1983             | 2005       |
| Senegal                                     | 1978             | 2005       |
| Togo  | 1988             | 1998       |
| Zimbabwe                                    | 1988             | 2005       |

## Appendix B

## Decomposition Formulae

The expressions below are for effects on age-specific fertility rates (ages 15-19, ..., 45-49). Effects on the total fertility rate [TFR] are obtained by simple (unweighted) summation of the age-specific effects.

Let f fertility rate  
 r fertility rate conditional on exposure to wanted or unwanted birth  
 p proportion  
 w want  
 u do not want  
 n never married  
 1,2 first, second survey  
 s "simulated"

**B.1. Three-element decomposition of TFR**

$$f_1 = r_1^w p_1^w + r_1^u (1 - p_1^w)$$

$$f_2 = r_2^w p_2^w + r_2^u (1 - p_2^w)$$

$$f_1 - f_2 = (r_1^w p_1^w - r_2^w p_2^w) + (r_1^u - r_2^u) - (r_1^u p_1^w - r_2^u p_2^w)$$

Let  $\bar{p}^w = \frac{p_1^w + p_2^w}{2}$ ,  $\bar{r}^w = \frac{r_1^w + r_2^w}{2}$  and  $\bar{r}^u = \frac{r_1^u + r_2^u}{2}$

$$f_{sw1} = r_1^w \bar{p}^w + \bar{r}^u (1 - \bar{p}^w)$$

$$f_{sw2} = r_2^w \bar{p}^w + \bar{r}^u (1 - \bar{p}^w)$$

**Effect of change in wanted fertility rate:**

$$f_{sw1} - f_{sw2} = (r_1^w \bar{p}^w - r_2^w \bar{p}^w) = (r_1^w - r_2^w) \bar{p}^w$$

$$f_{su1} = r_1^w \bar{p}^w + r_1^u (1 - \bar{p}^w)$$

$$f_{su2} = r_2^w \bar{p}^w + r_2^u (1 - \bar{p}^w)$$

**Effect of change in unwanted fertility rate:**

$$f_{su1} - f_{su2} = (r_1^u - r_2^u) - (r_1^u \bar{p}^w - r_2^u \bar{p}^w) = (r_1^u - r_2^u)(1 - \bar{p}^w)$$

$$f_{sp1} = \bar{r}^w p_1^w + \bar{r}^u (1 - p_1^w)$$

$$f_{sp2} = \bar{r}^w p_2^w + \bar{r}^u (1 - p_2^w)$$

**Effect of change in composition:**

$$f_{sp1} - f_{sp2} = (\bar{r}^w p_1^w - \bar{r}^w p_2^w) - (\bar{r}^u p_1^w - \bar{r}^u p_2^w) = (p_1^w - p_2^w)(\bar{r}^w - \bar{r}^u)$$

**And confirming that components sum to overall difference:**

$$\begin{aligned}
 & (f_{sw1} - f_{sw2}) + (f_{su1} - f_{su2}) + (f_{sp1} - f_{sp2}) \\
 &= r_1^w \frac{p_1^w}{2} + r_1^w \frac{p_2^w}{2} - r_2^w \frac{p_1^w}{2} - r_2^w \frac{p_2^w}{2} + r_1^u - r_2^u - r_1^u \frac{p_1^w}{2} - r_2^u \frac{p_2^w}{2} - r_2^u \frac{p_1^w}{2} \\
 &+ r_2^u \frac{p_2^w}{2} + \frac{r_1^w}{2} p_1^w + \frac{r_2^w}{2} p_1^w - \frac{r_1^w}{2} p_2^w - \frac{r_2^w}{2} p_2^w - \frac{r_1^u}{2} p_1^w - \frac{r_2^u}{2} p_1^w + \frac{r_1^u}{2} p_2^w \\
 &+ \frac{r_2^u}{2} p_2^w = r_1^w p_1^w - r_2^w p_2^w + r_1^u - r_2^u - r_1^u p_1^w + r_2^u p_2^w = f_1 - f_2
 \end{aligned}$$

## B.2. Five-element decomposition of TFR

$$\begin{aligned}
 f_1 &= r_1^u p_1^u + r_1^n p_1^n (1 - p_1^u) + r_1^w (1 - p_1^n)(1 - p_1^u) \\
 f_2 &= r_2^u p_2^u + r_2^n p_2^n (1 - p_2^u) + r_2^w (1 - p_2^n)(1 - p_2^u)
 \end{aligned}$$

$$\begin{aligned}
 f_{sw1} &= \bar{r}^u \bar{p}^u + r_1^n \bar{p}^n (1 - \bar{p}^u) + \bar{r}^w (1 - \bar{p}^n)(1 - \bar{p}^u) \\
 f_{sw2} &= \bar{r}^u \bar{p}^u + r_2^n \bar{p}^n (1 - \bar{p}^u) + \bar{r}^w (1 - \bar{p}^n)(1 - \bar{p}^u)
 \end{aligned}$$

**Effect of change in non-marital wanted fertility rate:**

$$\begin{aligned}
 f_{sw1} - f_{sw2} &= (r_1^n - r_2^n) \bar{p}^n (1 - \bar{p}^u) \\
 f_{sw1} &= \bar{r}^u \bar{p}^u + \bar{r}^n \bar{p}^n (1 - \bar{p}^u) + r_1^w (1 - \bar{p}^n)(1 - \bar{p}^u) \\
 f_{sw2} &= \bar{r}^u \bar{p}^u + \bar{r}^n \bar{p}^n (1 - \bar{p}^u) + r_2^w (1 - \bar{p}^n)(1 - \bar{p}^u)
 \end{aligned}$$

**Effect of change in marital wanted fertility rate:**

$$\begin{aligned}
 f_{sw1} - f_{sw2} &= (r_1^w - r_2^w) \bar{p}^n (1 - \bar{p}^n)(1 - \bar{p}^u) \\
 f_{su1} &= r_1^u \bar{p}^u + \bar{r}^n \bar{p}^n (1 - \bar{p}^u) + \bar{r}^w (1 - \bar{p}^n)(1 - \bar{p}^u) \\
 f_{su2} &= r_2^u \bar{p}^u + \bar{r}^n \bar{p}^n (1 - \bar{p}^u) + \bar{r}^w (1 - \bar{p}^n)(1 - \bar{p}^u)
 \end{aligned}$$

**Effect of change in unwanted fertility rate:**

$$\begin{aligned}
 f_{su1} - f_{su2} &= (r_1^u - r_2^u) \bar{p}^n \\
 f_{spu1} &= \bar{r}^u \bar{p}_1^u + \bar{r}^n \bar{p}^n (1 - \bar{p}_1^u) + \bar{r}^w (1 - \bar{p}^n)(1 - p_1^u) \\
 f_{spu2} &= \bar{r}^u \bar{p}_2^u + \bar{r}^n \bar{p}^n (1 - \bar{p}_2^u) + \bar{r}^w (1 - \bar{p}^n)(1 - p_2^u)
 \end{aligned}$$

**Effect of change in proportion wanting no more children (preference composition):**

$$f_{spu1} - f_{spu2} = (p_1^u - p_2^u)(\bar{r}^u - \bar{r}^n - \bar{r}^w (1 - \bar{p}^n))$$

$$f_{spn1} = \bar{r}^u \bar{p}^u + \bar{r}^n p_1^n (1 - \bar{p}^u) + \bar{r}^w (1 - p_1^n) (1 - \bar{p}^u)$$

$$f_{spn2} = \bar{r}^u \bar{p}^u + \bar{r}^n p_2^n (1 - \bar{p}^u) + \bar{r}^w (1 - p_2^n) (1 - \bar{p}^u)$$

**Effect of change in proportion never-married among women wanting more (marriage composition):**

$$f_{spn1} - f_{spn2} = (p_1^n - p_2^n)(\bar{r}^n - \bar{r}^w)(1 - \bar{p}^u)$$

**The residual (interaction term)**

$$= (p_1^u - \bar{p}^u)(p_1^n - \bar{p}^n)[(r_1^n - r_2^n) - (r_a^w - r_2^w)]$$

### Appendix C

*Illustration of Trends in Fertility Rates:  
Conventional Rates and Conditional Rates  
Births per Woman, Women Aged 15-49*

| Country         | Survey Year | Total Fertility |                   | Conventional Rates <sup>b</sup> |          | Conditional Rates <sup>c</sup> |          | % Not Wanting Another Child |
|-----------------|-------------|-----------------|-------------------|---------------------------------|----------|--------------------------------|----------|-----------------------------|
|                 |             | TFR             | Rate <sup>a</sup> | Wanted                          | Unwanted | Wanted                         | Unwanted |                             |
| <b>Colombia</b> | 1976        | 4.54            | 0.144             | 0.080                           | 0.064    | 0.178                          | 0.164    | 39                          |
|                 | 1986        | 3.20            | 0.110             | 0.061                           | 0.049    | 0.144                          | 0.111    | 44                          |
|                 | 1990        | 2.82            | 0.098             | 0.063                           | 0.036    | 0.122                          | 0.088    | 41                          |
|                 | 1995        | 2.97            | 0.100             | 0.064                           | 0.036    | 0.102                          | 0.075    | 49                          |
|                 | 2000        | 2.61            | 0.085             | 0.052                           | 0.033    | 0.089                          | 0.064    | 52                          |
|                 | 2005        | 2.39            | 0.076             | 0.047                           | 0.030    | 0.080                          | 0.055    | 55                          |
| <b>Ghana</b>    | 1979        | 6.24            | 0.196             | 0.183                           | 0.013    | 0.204                          | 0.129    | 10                          |
|                 | 1988        | 6.41            | 0.204             | 0.178                           | 0.026    | 0.215                          | 0.154    | 17                          |
|                 | 1993        | 5.16            | 0.170             | 0.136                           | 0.034    | 0.183                          | 0.134    | 26                          |
|                 | 1998        | 4.44            | 0.143             | 0.112                           | 0.032    | 0.150                          | 0.125    | 25                          |
|                 | 2003        | 4.45            | 0.138             | 0.110                           | 0.029    | 0.146                          | 0.113    | 25                          |
|                 | 2008        | 4.03            | 0.128             | 0.109                           | 0.019    | 0.144                          | 0.079    | 24                          |
| <b>Egypt</b>    | 1980        | 5.07            | 0.165             | 0.107                           | 0.058    | 0.332                          | 0.153    | 38                          |
|                 | 1988        | 4.54            | 0.148             | 0.083                           | 0.065    | 0.304                          | 0.153    | 43                          |
|                 | 1992        | 3.93            | 0.129             | 0.074                           | 0.055    | 0.312                          | 0.118    | 46                          |
|                 | 1995        | 3.63            | 0.117             | 0.071                           | 0.046    | 0.290                          | 0.101    | 45                          |
|                 | 2000        | 3.53            | 0.111             | 0.074                           | 0.038    | 0.313                          | 0.086    | 44                          |
|                 | 2003        | 3.18            | 0.102             | 0.072                           | 0.030    | 0.296                          | 0.070    | 43                          |
|                 | 2005        | 3.13            | 0.101             | 0.072                           | 0.030    | 0.302                          | 0.071    | 42                          |
|                 | 2008        | 3.02            | 0.099             | 0.074                           | 0.026    | 0.286                          | 0.060    | 42                          |
| <b>Pakistan</b> | 1975        | 5.83            | 0.182             | 0.125                           | 0.058    | 0.296                          | 0.162    | 36                          |
|                 | 1990        | 4.91            | 0.158             | 0.119                           | 0.039    | 0.262                          | 0.146    | 26                          |
|                 | 2006        | 4.08            | 0.128             | 0.092                           | 0.036    | 0.295                          | 0.109    | 33                          |

<sup>a</sup>Births per woman, all ages 15-49 (not standardised for age).

<sup>b</sup>Wanted and unwanted births per woman, all ages 15-49 (not standardised for age).

<sup>c</sup>Wanted births per ever married woman wanting more, unwanted births per woman not wanting more, age ages 15-49 (not standardised for age).

**REFERENCES**

- Bongaarts, John (1990) The Measurement of Wanted Fertility. *Population and Development Review* 16:3, 487–506.
- Bongaarts, John (1997) Trends in Unwanted Childbearing in the Developing World. *Studies in Family Planning* 28:4, 267–277.
- Bryant, John (2007) Theories of Fertility Decline and the Evidence from Development Indicators. *Population and Development Review* 33:1, 101–127.
- Casterline, John B. and Laila O. el-Zeini (2007) Estimation of Unwanted Fertility. *Demography* 44:4, 729–745.
- Freedman, Ronald (1997) Do Family Planning Programmes Affect Fertility Preferences? A Literature Review. *Studies in Family Planning* 28:1, 1–13.
- Knowles, James C., John S. Akin, and David K. Guilkey (1994) The Impact of Population Policies: Comment. *Population and Development Review* 20:3, 611–615.
- Lightbourne, Robert E. (1985) Individual Preferences and Fertility Behaviour. In John Cleland and John Hobcraft (eds.) *Reproductive Change in Developing Countries: Insights from the World Fertility Survey*. 165–198. Oxford: Oxford University Press.
- Pritchett, Lant H. (1994) Desired Fertility and the Impact of Population Policies. *Population and Development Review* 20:1, 1–55.

## Comments

### Brief

Pakistan is experiencing rapid population growth despite the fact that it was one of the first countries in the world to initiate an organised family planning programme back in 1965. The underlying causes for the limited success of the programme are many, however, the most obvious ones the limited and wavering political and bureaucratic support, very low literacy levels, nearly non-existent in females, and strong religious opposition. In this context, John Casterline's contention that family planning programmes affect fertility through influencing the unwanted fertility is very appealing, though apparently it may not look very desirable.

The decomposition of fertility into wanted and unwanted fertility shows that about 43 percent decline in fertility was attributable to unwanted pregnancy. Interestingly, the result shows a very trivial contribution of changes in composition of preference. Casterline attributes this to possible changes in age of marriage, which might have a countervailing effect on the compositional change.

The net contribution of changes in age of marriage, though they may vary considerably across countries, is not trivial; the median being 15 percent. However, for Pakistan, this is especially large –62 percent for the period 1975–2006. Surprisingly, the analysis shows no contribution of decline in wanted fertility during this period. Casterline raised the question whether this is true or is it a fallacy of the way the analytical model is set up? Dr Zeba Sattar elaborated further using Pakistan-specific data and concluded that the contribution of unwanted fertility is roughly half of the total fertility decline.

### Discussant's Comments

I enjoyed reading the paper. As a firm believer in the merits of family planning programmes and their contribution to demographic transition, I have always believed that organised efforts to change people's perception about the virtues of small family size have played a major role in the worldwide fertility revolution and Casterline's analysis has further confirmed my belief.

What I failed to fully appreciate is that the past programmatic efforts had no impact on wanted fertility in Pakistan. Is it because the programme efforts were meager or is it because the Pakistani society is so rigid that no efforts are likely to succeed in changing its attitudes and behaviour.

Either way, this is a bleak scenario for the reproductive health/family planning programme, which needs to be carefully evaluated. We have a tendency to quickly embark on new surveys and studies without fully exhausting already existing data sources. In my view, time has come when we should immediately start looking more

closely at all the evidence we have gathered over the years, through surveys, operational studies, qualitative studies, etc. in a holistic manner, before we undertake any more studies to find out the underlying causes for this behaviour.

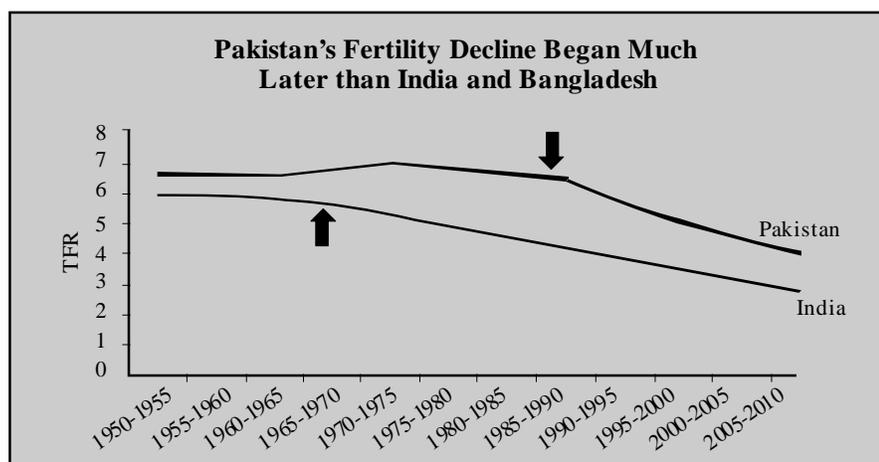
**Mohammad Nizamuddin**

University of Gujrat,  
Gujrat.

## Comments

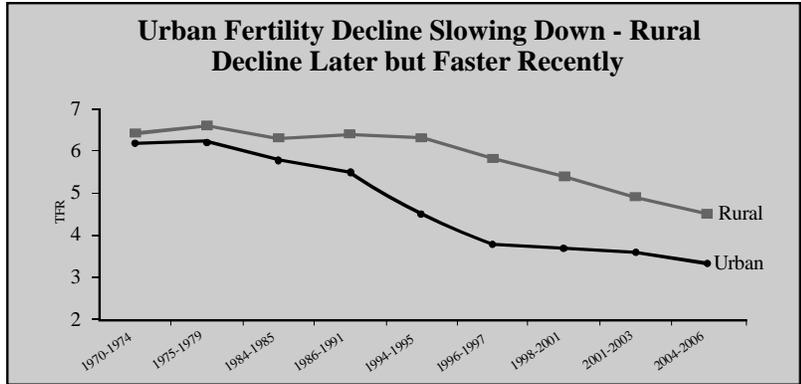
I want to begin by thanking PSDE for giving me the privilege of discussing the Mahbub ul Haq Memorial lecture by John Casterline. This is especially so because of my long friendship, with John Casterline since 1980. We have worked together in the 90s and continue to plan a future project on unmet need in Pakistan. John Casterline's lecture is in his classic style: it is *Illuminating, Enticing, Engaging* and plain challenging for any reader. He never fails to surprise us with his insights and novel thinking, matched with a complete analysis and a grasp of the data.

I would like to restrict my comments on highlighting the relevance and usefulness of his work for Pakistan's current scenario where we are seeking answers to our own Demographic Transition and preparing the 10th Five Year People's Plan 2010-15. The demographic transition in Pakistan started late—it sped along initially and is now stagnating or slowing down and many questions remain unanswered about why. Why was the transition late? Why rapid and then slow later? I will not try to amplify some of points he has already made, but mainly raise points about applicability of the model to answer these questions.



Source: UN World Population Prospects, 2008 Revision. Medium Variant.

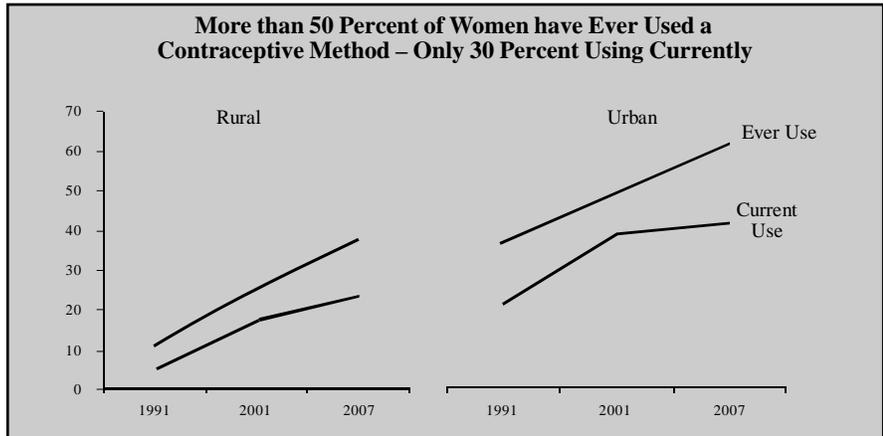
When trying to make sense of country wide transition, which has reached a total fertility rate of 4, we need to look at urban rural fertility trends. On first glance we can see that urban-rural differentials started small, with both rural and urban areas having a fertility rate of more than 6 births per woman. During the 1990s the differential grew bigger, with urban fertility declining at a more rapid rate. Since the turn of the century, the gap in urban-rural fertility levels has been narrowing, reflecting a slowdown in urban fertility decline coupled with a continuing decline in rural fertility.



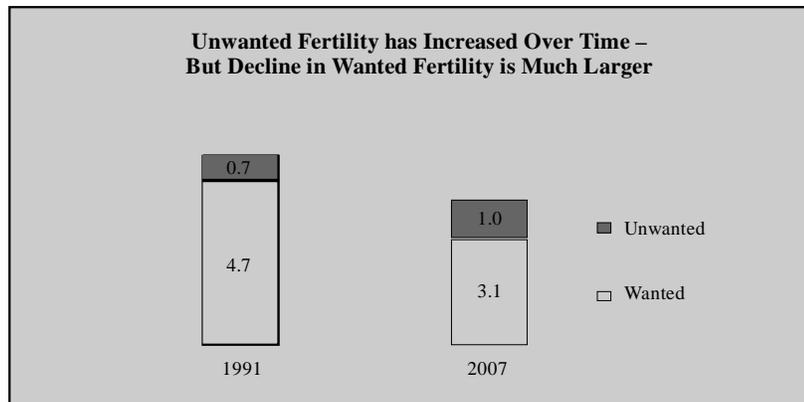
Source: PDS 1985 till 2005; PCPS 1984-85; PDHS 1990-91; PCPS 1994; PFFPS 1997; PRHFPS 2001; SWRHFPs 2003; PDHS 2006-07.

While ever use of contraception remains higher in urban areas, there is “catching up” in rural areas. For current use there is a leveling off in urban areas and a slight slowdown in the rate of increase in rural areas.

The decomposition technique utilised by Casterline becomes really very important in understanding transitions generally and in Pakistan particularly. A common assumption is that increased supply of services will ensure a reduction of fertility. Contraceptive use affects fertility but Professor Casterline argues that its contribution is really broken down into wanted vs. unwanted fertility with very different dimensions.



In this context, it is important to look at differentials over the 1991-2006 time period. A decline in total fertility of 1.3 children resulting from a 1.6 decline in wanted fertility but an increase of 0.3 in unwanted fertility. That means the impact of a reduction in wanted fertility is being undermined by the increase in unwanted fertility. The decomposition by regions (urban-rural) is as important. Unwanted fertility declined in urban and rose in rural areas. A further comparison with 1975 data would be instructive.



Turning to methodological issues, I can only say that I am curious as to how further analysis can take place using this model.

### Methodological Questions

1. How robust is the method to inconsistencies in reporting of wanted and unwanted fertility?

The wanted or unwanted fertility as the main driver of trends has different proponents. Pritchett and Bongaarts belong to different sides of the debate. Pritchett argues strongly for wanted fertility as the main driver, while Bongaarts claims it is unwanted fertility. Both do point out that preferences can be fragile, and there are variations in reporting in by men and women, etc. Can we trust responses given by individuals?

2. This is the role of marriage—is it fair to treat unmarried women as part of the group at exposure to wanted fertility?

Marriage behaviour brought in by Casterline in his model is very important. Firstly, marriage prospects are such a powerful part of fertility desire and presumably WANTED fertility in a country like Pakistan. Casterline assumes that years of non-marriage, are years of wanted fertility and not unwanted fertility. Non-marriage being a period of non-exposure, it would affect the impact of wanted fertility on overall trends and is very significant in the case of Pakistan. Perhaps Casterline could elaborate on the justification of this assumption. How is this factored in and how would you interpret this huge contribution? How and why has age at marriage risen so significantly, is an interesting and challenging question in itself?

3. How would you use the method's predictive powers?

How can we use the model to project forward? Bongaarts in his decomposition of unmet need and momentum is doing something similar. What are the methodological differentials and differences in interpretation?

4. How would this pan out for largely heterogeneous populations and sub groups e.g. India and China. Could one large group's behaviour change the story for rationally? How would the model work in disaggregated populations? Urban-rural or provincial in the case of a country as large as Pakistan, or let's say India or China? Is there robustness in the model or is aggregation help an integral part of the model?

## RESULTS

I would like to use this opportunity to discuss the results for Pakistan.

The importance of this research is huge—changes in Pakistan are explained here as I read and reread this paper. In this decomposition Pakistan is similar to average trends but it is also quite different—differences across the two periods are especially interesting. For instance, wanted fertility declines in 1975-1991 are higher than unwanted fertility decline (30 percent vs. 21 percent) but in 1991-2000 unwanted declines are 26 percent larger and much higher (46 percent). Much more interpretation is required to determine the factors behind this. It is important to point out, that the largest contribution to fertility decline is of marriage—much less of wanted fertility and even less of unwanted fertility. This too requires us to do much more careful interpretation.

### *Decomposition of Fertility Change: Four-Element Decomposition*

| <b>Percentage Contribution to Inter-Survey Fertility Change</b> |           |           |           |        |
|---|-----------|-----------|-----------|--------|
| Pakistan  | 1975-1991 | 1991-2006 | 1975-2006 | Median |
| Due to Wanted Rate  | 30        | -27       | -2        | 35     |
| Due to Unwanted Rate  | 21        | 46        | 39        | 40     |
| Due to Composition: Preferences                                 | -6        | 13        | 1         | 1      |
| Due to Composition: Marriage                                    | 55        | 68        | 62        | 15     |
| Total   | 100       | 100       | 100       | 91     |

In the end, I can make two points safely.

Firstly, both wanted and unwanted fertility are important components of total fertility. Wanted and unwanted fertility both contribute differentially at different points in transition. It is important to remember the theme of today—wanted fertility is determined by human characteristics, particularly education. Investing in people, Pritchett too lays importance to girls schooling as a lever emphasised by Larry Summers in 1992—Investing in all people means not leaving girls behind!

Secondly, good quality Family Planning services—that highlighting birth spacing rather than limiting—that are equitable, cheap, and accessible for all women are a must. CPR—the means to the end has to rise for fertility to fall. Marriage is unlikely to contribute endlessly to fertility decline. Therefore, contraceptive use has to increase, for reducing population growth, for lowering child mortality and maternal mortality and as a fundamental right to achieve desired fertility.

### CONCLUSIONS

It appears that Pakistan has untapped potential in terms of reducing wanted fertility.

The role of increased schooling for girls, employment, poverty reduction in further decline in wanted fertility and therefore in overall fertility is huge.

High levels and rises in unwanted fertility imply even greater opportunities lost for fertility decline.

The importance of widely/easily available, low cost, and high quality family planning services is compelling when addressing high unwanted fertility.

**Zeba A. Sathar**

The Population Council,  
Islamabad.

## Comments

According to the author, the distinction between wanted and unwanted fertility has been crucial in many of the more intense debates in recent decades, particularly the potential contribution to expansion of the provision of family planning. The decomposition of fertility decline in 44 countries indicates that the contribution of unwanted fertility had been as important, if not more, to decline in wanted fertility. He concludes that decline in unwanted fertility has been an essential feature of contemporary fertility decline and therefore, an in-depth understanding of Pakistan's ongoing fertility transition could best be understood if one could fully understand the trends in wanted and unwanted fertility in Pakistan over the last 45.

The ongoing demographic transition in Pakistan is not fully understood and in many ways remains a mystery. If therefore, the trends in wanted and unwanted fertility could shed some light; it will be a real contribution to our ongoing family planning programme debate. This debate however, is not a new one. It was furiously debated and argued in 1970s and 1980s, when East and South-East Asian countries started their rapid fertility transitions. Lot was written about the role of unwanted fertility in these declines. A better understanding however, of what women mean when they respond to questions on topics such as wanted and unwanted births, ideal/preferred number of children, and what factors (environmental and psychological) influences their responses, lead researchers to conclude that responses to such questions are highly conditioned to the respondent immediate environment/exposure, such as recent exposure to mass media messages, to discussions at parental clubs (South Korea) or to other similar situations and therefore, responses are very subjected and have questionable validity. (For further elaboration see Ronald Freedman (1997) and references quoted there in. Also see KIHASA reports).

The topic of the lecture is very timely. Pakistan is at the verge of revamping its RH/FP programme. The programme is being drastically modified/changed. Surprising though, these changes are being implemented with very limited understanding of underlying causes for past failures. A thorough understanding will require considerable efforts, time and resources and should have been done in a systematic way over the years. Most of the past efforts were directed to address specific programme's operational and implementation issues and did not address the broader societal level issues working against the acceptance of small family norms by the population at large. Even where data were available very limited efforts were directed to analyse the data beyond the survey objectives. Professor Casterline's provocative presentation on fertility transition using secondary data sources has provided us an opportunity to rethink our future demographic data analysis priorities. We are not short of raw data, but we are short of commitment and

patience and institutional capacities. No other institution in Pakistan is better equipped than Pakistan Institute of Development Economics undertake this challenge and as student of demography I will humbly urge the Institute to lead an effort to undertake a series of studies to document last 60+years of demographic changes and the lesson learned.

**Iqbal Alam**

University of Gujrat,  
Gujrat

#### **REFERENCE**

Freedman, R. (1997) Do Family Planning Programmes Affect Fertility Preferences? A Literature Review. *Studies in Family Planning* 28:1, 1–13.

## **Sustainable Incubator Management— A Case Study for Pakistan**

ANEEL SALMAN and ATIF ABDUL MAJEED

### **1. INCUBATORS**

#### **1.1. Historical Background**

“There is broad recognition today that entrepreneurial, knowledge-based enterprises are prime creators of economic growth and that such ventures need special business development services” [Lalkaka (2000)]. Yet, about 80 percent of all start-up firms fail within the first five years of their genesis. This highlights a strong need of effective incubation facilities which compress the learning curves of the start-ups and provide them with necessary initial support in order to improve their survivability.

Incubators are considered as a means of providing special business development services. “A business incubator may be defined as an organisation which offers a range of business development services and access to small space on flexible terms, to meet the needs of new firms. The package of services offered by a business incubator is designed to enhance the success and growth rates of new enterprises thus maximising their impact on economic development” [Duff (1998), p. 11]. Although the idea of incubators was conceived in the 1950s, it did not see widespread acceptance until the 1980s. The mushroom growth of incubators, initiated in 1980s has resulted in over 1,400 incubators today in North America, with 1,115 in United States, 191 in Mexico and 120 in Canada [Knopp (2007)]. In 2005 alone, North American incubation programmes assisted more than 27,000 companies that provided employment for more than 100,000 workers and generated annual revenues of \$17 billion (Ibid.). Because of the number of incubators and studies carried out on their performances, this background overview is predominantly based upon the US experiences with incubators and their best practices.

#### **1.2. Types of Incubators**

Incubators can be classified based on their main sponsoring agency, which in turn determines their main goals and objectives (Table 1).

Aneel Salman <salmaa@rpi.edu> is affiliated with the Department of Economics, Rensselaer Polytechnic Institute, New York, USA. Atif Abdul Majeed <atifmajeed83@gmail.com> is associated with the Lally School of Management and Technology, Rensselaer Polytechnic Institute, New York, USA.

*Authors' Note:* The authors would like to thank Dr P. A. Abetti for his support during the conceptualisation of the proposed model, as well as Ms Sarah Siddiq for her editorial inputs.

Table 1

*Types of Incubators and their Main Objectives*

| Sponsor               | Objectives  |
|-----------------------|---|
| Technical University  | Innovation, Faculty/ Student involvement                |
| Research Institutions | Research Commercialisation                              |
| Government            | Regional development, poverty alleviation, job creation |
| Private Sector        | Profits, patents, spin-offs, image                      |

Source: Lalkaka (2000).

Often incubators have multiple sponsors which leads to the convergence of multiple strengths but at the same time, diverse goals.

### 1.3. Incubator Services

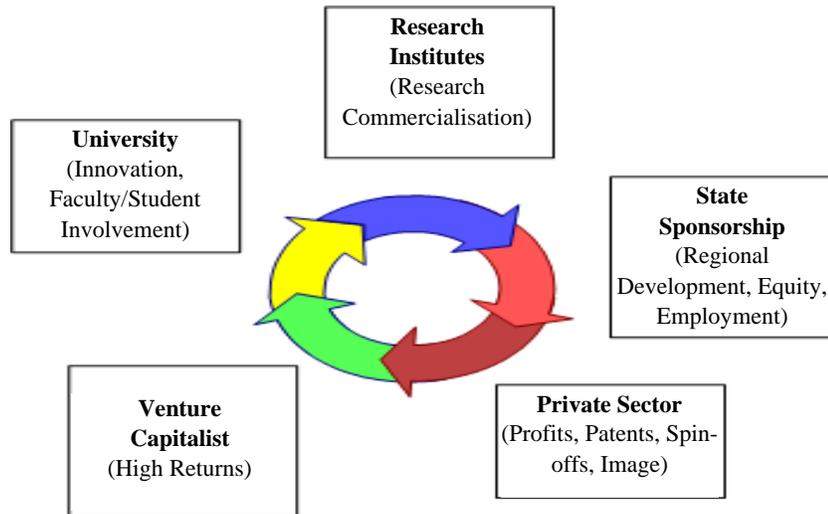
Incubators can offer their clients a diverse range of services and guidance such as human resource management (team identification; capacity building and comprehensive business training programmes; basic presentation skills); day to day functional services (business ethics and etiquette; business basics like accounting/financial management); infrastructure provision (high speed internet access; computers), as well as external guidance in areas such as networking/lobbying (with other firms; higher education resources; strategic partners; advisory boards and mentors; brand marketing) and even in accessing funds (bank loans; guarantee programmes; angel investors or venture capital); and technology commercialisation assistance [Knopp (2007)]. These generic services offered by incubators are an indication of the specialised services which Academic Incubators (AIs) specifically offer as explained below:

### 1.4. Real-Estate Focused Phase of Development

At the most basic level, AIs are expected to provide low-rent office space, internet/communication facilities, tax breaks and other similar incentives to start-up companies. The responsibilities of the incubator management teams are, therefore, restricted to rent collection, building maintenance and refurbishment of tenant services. However, the level of cooperation between the incubator management and the start-up company is expected to evolve to the much deeper and broader level of enterprise development so that the real benefit of the incubation process can be reaped.

### 1.5. Enterprise Development

The incubator management team is expected to provide enterprise development services to start-up companies. This includes creating a business consultancy value network, fully utilising resources and tremendous opportunities by the sponsors and the wide spectrum of skills available in the academic institutions in the form of faculty, students and lab resources. AIs should become a central node of this symbiotic value network, creating and maintaining an entrepreneurial synergy, and hence integrating the start-ups in this ecology-suppressing their learning curves and facilitating their graduation as full-fledged sustainable firms. This level of involvement could be depicted in the following Figure 1.

**Fig. 1. Central Integrator Role of Academic Incubators**

The figure shows the central role that AIs could play in bringing together different stakeholders with diverse goals and aligning their goals in such a fashion that a true entrepreneurial synergy could be formed—Extending Entrepreneurship to Intrapreneurship, fully capitalising the resources and aligning objectives of all the stakeholders so that not an “Intrapreneurial Value Network” can be formed. A network that would eventually be a reliable infrastructure that could provide the start-ups a buffer from initial mistakes, market vicissitudes, tough competition, and misjudged assumptions—ensuring a better survival rate of the start-ups which presently stands at merely 20 percent [Abetti (2004); Knopp (2007)].

## 2. WHY DO ACADEMIC INCUBATORS FAIL?

Most of the incubator facilities in the USA are public-private partnerships, with initial support coming from the federal, state and local government bodies. About 80 percent of these facilities operate as not-for-profit entities. Approximately half of these total facilities are affiliated with universities [Knopp (2006); NBIA (2009)].

Although most of the academic incubators (AIs) are reluctant to share their performance record openly, their success rate could be analysed independently based upon a number of parameters including:

- (1) Number of enterprises created
- (2) Survival rate of these incubated enterprises
- (3) Jobs created
- (4) Research commercialised
- (5) Overall profitability of the incubator
- (6) Improvement in the university-business links
- (7) Faculty/student involvement
- (8) Refinement of the entrepreneurial skills of the start-ups' management.

These performance parameters can help measure the effectiveness of the AI, their role as business laboratories, bridging the gap between universities and the industry. Unfortunately, most AIs fail to achieve their desired goals. Today, they rely incessantly on subsidies to survive. It is ironic that facilities created to improve start-ups' sustainability today struggle for their own survival, hence representing a poor model for the tenants. They continue to exist in isolation, not establishing any meaningful association with the academia. They have not been able to commercialise research on a broad scale. Neither have they been able to fully engage with the faculty or the students. As a result, the government and the universities are increasingly becoming frustrated and gradually withdrawing the subsidies which has placed the basic concept of AIs under question.

“On average, nearly 75 percent of incubator managers' time is spent on non-incubator responsibilities and incubator real estate issues such as rent collection, maintenance and the management of refit or refurbishment of tenant spaces. A median of only 10 percent of incubator managers' time is spent working with tenants” [Duff (1998), p.12].

Given below are some of the reasons for the failure of academic incubators, especially in the USA. While no quantitative study of incubators in Pakistan could be conducted for this paper, personal communications and interviews with a handful of incubators housed in Pakistani universities, lead us to infer that these AIs face similar problems and cite the same reasons for failure.

### **2.1. Lack of Planning and Clear Vision**

Factors contributing towards poor performance are mainly flaws in planning and operating AIs. The planning flaws include lack of a proper business plan. In many instances, universities start incubators without a proper need assessment and market analysis, or merely because other universities are doing it. It becomes a conventional symbol for a university to have an incubator. These incubators were later used as a means of boosting strong relationships with the industry whereas in reality, industries were never analysed or involved in the decision making process while taking these initiatives. It was not realised that there are certain environmental conditions which need to be satisfied before a successful academic incubator can be built in any area.

### **2.2. Poor Tenant Selection**

As a result AIs ended up with companies which were not supposed to be there. Because of incubators' cash flow requirements, early tenants are likely to be chosen on their capacity to pay rent rather than their growth potential. Moreover, virtually no attention is paid to the alignment of companies' objectives and universities' vision. It is not unusual to find a company in an AI with a completely different scope, locating itself in the incubator only to avail low rent space and hence restricting the role of the incubator to a first tier, real-estate based association.

### **2.3. Inadequate Entrepreneurs**

An inadequate pool of entrepreneurs also contributes towards poor performance. Incubators are often run by people who are never involved or have observed the process through which the start-ups have to go. As a result the companies locating themselves in

the incubators do not consult the incubator management as the experience of ‘academic incubator managers’ is seen as insufficient or irrelevant to them. The condition is further worsened due to the absence of an active board and a committed champion. Thus, incubator managers have to continuously struggle to muster political and financial support for their programmes.

#### **2.4. Cultural Gap**

The root cause of poor governance is lack of the appreciation of the culture gap between academia and the industry. Incubators are supposed to bridge the industry and the academia. Therefore, the management needs to include people from both of these segments; segments which are so much dependent on each other yet so distant culturally. While, AIs have to be affiliated with universities, they need not be administered by them. University administered incubators result in dormant, static, isolated buildings which try to call themselves incubators. The students interviewed at one of the top engineering universities in the USA called their incubator programme a ‘cemetery of projects’.

#### **2.5. Lack of Networking Opportunities**

Another factor is the lack of proper networking opportunities. The universities have resources using which they could frequently hold seminars, exhibitions, training programmes, career fairs, and talks. All these events attract industry personnel to the universities and could be used to allow the incubated start-ups an access to industry leaders. Unfortunately, very little is thought and done regarding utilisation of these networking resources.

#### **2.6. Undercapitalisation of In-house Resources**

The most serious factor is the undercapitalisation of universities internal resources. These resources include: Faculty, Students and Laboratories.

Faculty members’ experience could be of immense value to the entrepreneurs. Engineering and sciences’ faculty have a remarkable knowledge base and ideas. Business faculty studies hundreds of start-up companies through case studies and has a philosophical knowledge about the process through which these companies have to go through. Unfortunately, the faculty does not get involved with the companies in the AIs.

#### **2.7. Faculty-lack of Incentives**

Faculty’s lack of involvement is due to the lack of incentives—as they are expected to get involved voluntarily. This involvement is besides their teaching assignments. Therefore, it is taken as a burden by many of the faculty members and they prefer to stick to their teaching jobs. The result is a complacent faculty, settled in a comfort zone of academic environment, distant from the outside world activity, and preparing the workforce for industry which it has very little knowledge about.

#### **2.8. Underutilised Student Workforce**

Students are another resource which remains underutilised and undercapitalised by the incubated businesses. Students could bring creative energy which is a pivotal element

of entrepreneurial environment and that too at a lower cost than the external help. Yet no significant student internship initiative was found in majority of the academic incubators. As a result, the AIs end up losing this opportunity and the student graduates end up with the tag of ‘fresh graduates’, meaning graduates coming out directly from the universities, or to be more precise, graduates lacking any real or relevant industry experience. As a result either the industry feels reluctant to hire the ‘fresh graduates’ or else these highly talented, motivated and energetic engineers and scientists end up being exploited, accepting jobs at wages far less than what is a true reflection of their skill set.

### **2.9. Underutilised Laboratories**

Finally, the expensive and valuable equipment available in universities also often remains inaccessible to the incubated companies. This is another serious undercapitalisation. Start-ups’ main concern is lack of financial resources. Access to the labs in the universities could help the start-ups significantly keep down their costs. Moreover, it could result in a better utilisation of this equipment in the labs themselves. In many instances, equipment worth millions of dollars is either underutilised or not utilised at all in the labs. Mutual projects which could benefit both the start-ups in the incubators and the students in the universities are never carried out. As a result the labs remain unreachable to the incubators and continue to house rusting valuable equipment.

## **3. GOVERNMENT OF PAKISTAN’S HUMAN RESOURCE DEVELOPMENT INITIATIVE**

At the beginning of this millennium, the Government of Pakistan (GoP) embarked on the arduous yet promising journey to make Pakistan’s economy a knowledge-based economy. The idea was to embark on the same path as did Japan, Korea and China by focusing on human centred development. Many strategic measures were taken, including the establishment of the Higher Education Commission (HEC), major policy changes, manifold increases in the education budget, creation of a necessary infrastructure; all actions geared towards the design of a favourable environment for the birth and nourishment of a globally competitive industry and workforce. Major policy changes were made to attract foreign direct investment (FDI) in information technology (IT) and Telecom industry. This included giving a tax holiday to the IT industry until 2016, opening all sectors to FDI, allowing 100 percent foreign equity, waving any sorts of government sanctions for FDI in IT sector, fully protecting foreign investment and allowing 100 percent repatriation of profits to IT companies.

### **3.1. Positive Results**

These measures coupled with the changing geo-economics of the region have shown positive results. Pakistan’s young yet thriving 2 billion US\$ IT industry has shown an average growth rate of 50 percent in the past five years. Pakistan’s cellular industry has become one of the world’s fastest growing cellular industries with an annual growth rate of 150 percent and telecom revenue growth of 20 percent. The annual IT human capital requirement increased more than 250 percent in five years, from 90,000 to 235,000 [PSEB (n.d)]. These achievements have been recognised internationally as well. Lehman Brothers described Pakistan as a country with the “best IT fundamentals of any

offshore outsourcing industry.” And the strong growth prospects in this area are expected to attract further FDI in the coming years. “The software industry in Pakistan has enormous potential to grow from its current size. The worldwide IT services market is growing at the rate of eight percent in real terms and expected to reach about US\$ 910 billion by 2010. Of this, about 54 percent will consist of hardware maintenance, IT management and other services” [Rahman, *et al.* (2005), p. 26].

### **3.2. Human Resource—Foreign Faculty Development Programme**

The primary driver of these results is human capital. Recognizing the need for the improvement of the quality of our human capital, Higher Education Commission (HEC) started an ambitious foreign faculty development programme (FFDP), signing agreements with 28 technologically advanced countries and sending Pakistani scholars to those countries for a period of 2-5 years to pursue higher education in strategically selected fields and then requiring them to return back to Pakistan for a period of 3-5 years at least, to share and transfer their knowledge in Pakistani universities. The programme is running successfully and there is almost 80 percent return rate of these scholars who are showing impressive performances in the universities.

### **3.3. Next Step—Establishing Industry Links**

The next phase of this human centric development requires the alignment of this highly qualified and motivated academic human capital with the industry. This involves “training professionals and workers in line with market demand; creating effective linkages among academic institutions, research centres, and industry; providing incentives to the private sector to invest in human resource development as well as to carry out research and development; and establishing technology incubators and specialised technology parks” [Rahman, *et al.* (2005)]. Thus, in order to fully utilise foreign qualified human resource and to effectively capitalise upon the investments made in higher education, incubators are needed which could weave together academia and the industry. “HEC should build on its very successful programmes in higher education and possibly expand its efforts over the next five years through capacity building projects, including centres of excellence, research centres” [USAID (2008)].

### **3.4. Academic Incubators—Hubs of Technological Entrepreneurship**

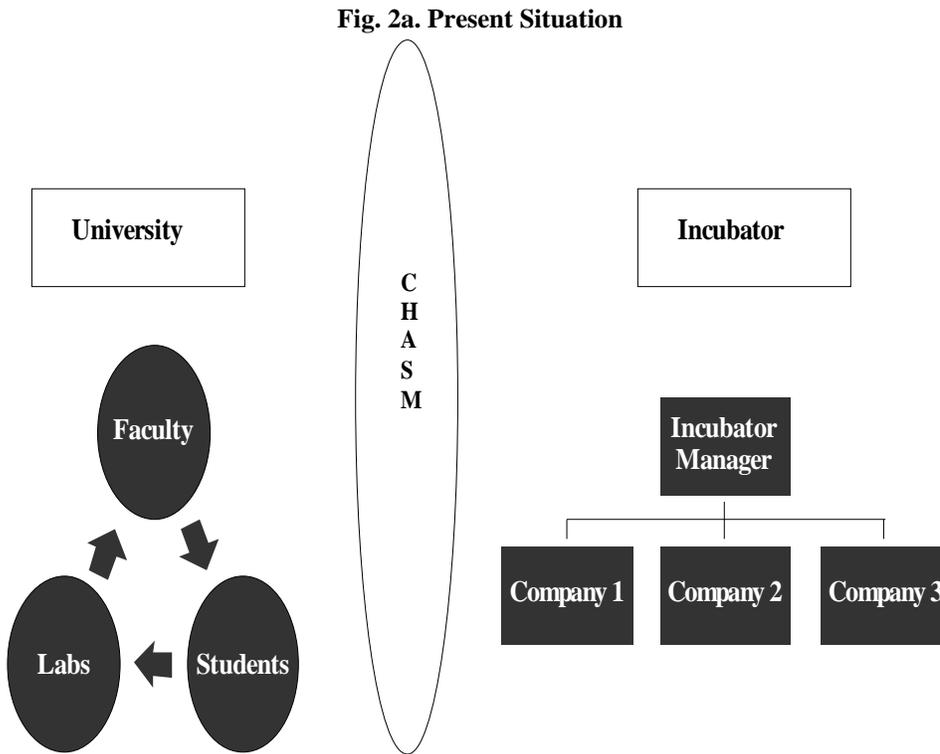
In this paper, a business model which not only assures the successful management of incubators, but also aligns the objectives and incentives of the highly motivated and qualified young scholars who are returning under the foreign faculty development programme with the IT/engineering industry has been proposed. The main focus in the development of this model is FFDP scholars. Using this model, academic incubators can be transformed into central hubs of technological entrepreneurship. An average IT job costs \$ 58,598 in the USA, \$ 35,562 in India and \$27,000 in Pakistan [PSEB (2006, 2007)]. This model promises to bring the costs further down by utilising universities’ in-house resources such as faculty, students, and infrastructure such as labs.

#### 4. PROACTIVE INCUBATOR MANAGEMENT

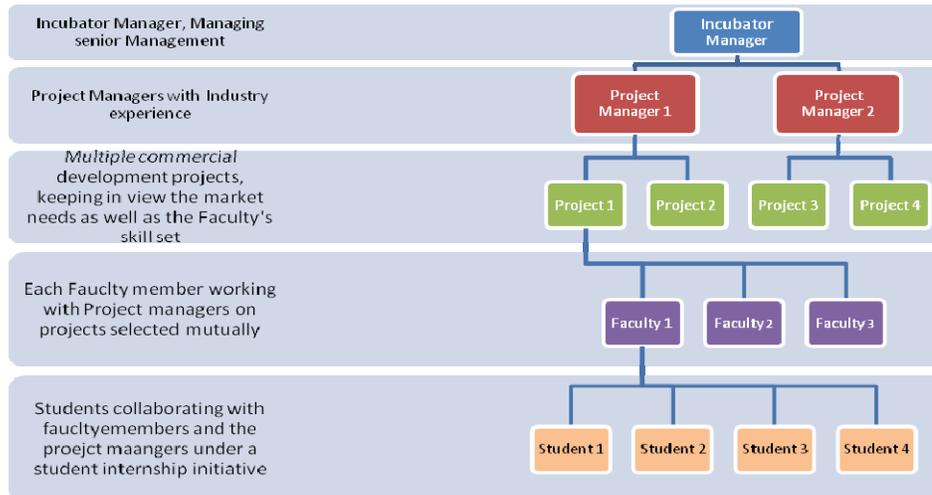
In this paper, a new approach titled 'Proactive Incubator Management' which involves diversification of income resources of academic incubators by introducing project management teams, fully utilising in-house resources such as faculty, student interns, and laboratories offering financial incentives, and doing commercial development projects ensuring professional standards to address some of the major issues faced by the AIs today, is proposed. Although this idea is designed for an engineering/IT university environment, it could be implemented with minor changes to any universities offering natural sciences degrees.

##### 4.1. Basic Idea

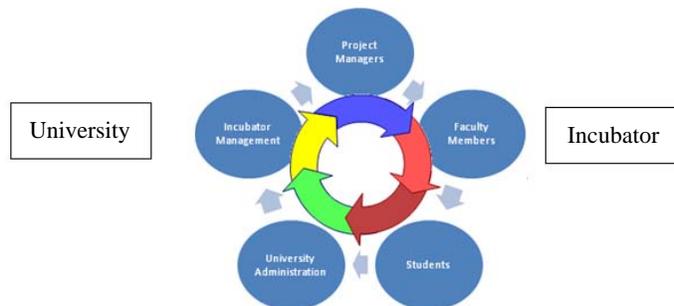
The present situation discussed above could be depicted in the Figure (2a) below which indicates that majority of the AIs exist in isolation from each other despite being located in same premises.



For the success of AIs, a new management layer is proposed in the incubator administration. This management team would report directly to the incubator manager, and manage multiple projects, involving the faculty as well as students. This organisational structure is depicted in the Figure (2b).

**Fig. 2b. The Organisational Structure Depicting the Proposed Model**

This approach would result in the integration of the underutilised resources mentioned in the beginning of discussion; faculty, students and the labs. The project managers would be able to connect these academic resources with the incubator managers, hence filling the chasm that currently exists between academic incubators and their academic institutions leading to what is called 'intrapreneurial synergy' (Figure 2c).

**Fig. 2c. Intrapreneurial Synergy**

## 4.2. Alignment of Academic Resources—University

### 4.2.1. Mode of Engagement

It is encouraged that universities become a share holder in these companies. The joint venture model would ensure active participation, interest and diversification of risks for both the incubation companies as well as the universities. But the companies should

not be administered directly by the universities for the sake of entrepreneurial element. The universities should recognise their traditional bureaucratic culture and the adverse effects it could have on the companies. The university should provide the companies with space, resources, assistance and access to its in-house resources including faculty, laboratories and students and then only monitor the performance of this whole activity, without indulging into day-to-day management of these companies.

#### **4.2.2. Benefits for the Universities**

Even with highly qualified faculty and considerable resources provided by the public sector, the IT/Engineering universities in Pakistan might lag behind in the areas of creativity and innovation. This model would bring the industry closer to the university and add academic creativity to it. The success of the companies would result in additional revenue streams for the universities as well. The spin-offs from the incubator would improve the IT/Engineering universities image as hubs of entrepreneurial activity. Moreover, the university would grow more aware as an organisation. "We reject majority of the commercial projects because we have only 80 percent of the skill set available in-house," remarks the Dean of the Institute of Space and Technology in Pakistan. Through this model, in-house resources can be fully utilised and complemented by hiring professionals from the market whenever and wherever required. It would be the job of the Project Managers (PMs) to hire and engage those professionals. Furthermore, an additional revenue stream would enable universities to become more independent, autonomous and market oriented, thus reducing their reliance upon government subsidies and grants. Universities would have a further advantage of having a very competitive faculty and incubating graduates with a very desirable skill set for the market. This would improve university's ratings and potential graduate candidates would be more attracted towards the participating universities.

### **4.3. Aligning Faculty's Incentives**

#### **4.3.1. Mode of Engagement**

The faculty would submit its resumes and areas of interest along with its skill set to the PMs. The PMs would then look for compatible projects, plan their execution keeping the concerned faculty in the loop. The faculty members would also be required to submit their time availability details. Once the project execution begins, the faculty would be expected to participate in the process actively, taking leadership role, encouraging student involvement. The faculty's performance and activity level would be directly monitored by the PMs and the monetary payments would be made during and/or at the end of project. Despite being the intellectual leaders in the project, the faculty members would have to recognise the importance of market awareness and client satisfaction for the project success and thus would be expected to work in accordance with the instructions from the PMs.

#### **4.3.2. Benefits**

The primary concerns of the foreign qualified faculty returning to Pakistan include possible low pays and corrosion of their skill set due to the current stagnant cultures of

Pakistani universities and absence of an innovative domestic market. This model addresses both of these issues by first providing an extra revenue stream for the faculty members, and secondly, promising projects from competitive markets that would allow the participating faculty to continually update their skills and to have an awareness of the latest market activity. This would have a direct impact on the quality of research that they carry out.

#### **4.4. Aligning Students Objectives**

##### **4.4.1. Mode of Engagement**

Initially only final year students are expected to be involved in this model. During their final year projects/thesis, they would be expected to choose the projects going on in the incubators, in consultation with their project supervisors. Although the students are not expected to hold the equivalent skill set of professional engineers, they would be able to provide intermediate level skills. They would be paid for their work and at the end of the projects, would receive certifications/ recommendations for their involvement.

##### **4.4.2. Benefits**

Market is usually reluctant to hire fresh graduates due to the fear of irrelevant skill set and thus additional costs associated with hiring them. This model addresses those concerns by making sure that the graduates have competitive skills, would have worked on professional projects during their degrees and would have been taught by the faculty with an updated skill set. The participating students would be paid and would also receive certifications/recommendations of intermediate skill set. This would provide the students with an additional revenue stream, improving their access to higher education. Moreover, it would improve their employment chances.

By and large this apprenticeship programme would improve the quality of Pakistani IT workforce, leading to lower unemployment rates. Many developed countries, such as Germany owe their AI success stories partly to similar nationwide apprenticeship programmes. If implemented successfully, this model would turn the incubators into vocational laboratories for the students.

#### **4.5. Aligning Incubators' Objectives**

##### **4.5.1. Modes of Operation**

The incubators would be university-affiliated but not university-administered. They would be located inside the university premises, either as a separate building or having a completely independent space, such as a few floors in one of the university buildings. Their organisational structure has been depicted in the Figure 2b. The incubator would be primarily managed by the incubator manager (IM). IM would be responsible for senior level management, selecting incubating companies, matching their objectives with the university's vision, garnering political support for the incubator, hiring and monitoring Project Managers (PMs), and making sure that the incubator does not fall into the trap of mere real-estate management.

The second layer of management would be comprised of Project Managers (PMs) hired from the market, based upon their sales, marketing and project management skills. This is a people-intensive activity therefore would require a thorough appreciation of the 'human element' in the success of the projects by the PMs. The university culture is very different from the market and even though academia prepares the future professionals and leaders for the market, a huge chasm exists between these two entities. This model intends to bridge this gap, and the building elements of this bridge would be these PMs. They will recognise the differences and the opportunities existing in both environments and then construct an ecology where a mutual compromise is achieved, ensuring maximum gain for all the stakeholders.

One of the main reasons behind Pakistani universities' stagnation is the employment structure where it is virtually impossible to fire any worker. This stagnation would be addressed by the continual evaluation of the PMs whose incentives would be based upon the performance of their projects and the revenue generated from them. Therefore, it is the sole responsibility of the PMs to make sure that projects are successfully, ensuring quality, timely completion and budget constraints. Any PM who fails to assimilate into this environment would be let go.

#### **4.5.2. Benefits**

Currently, many AIs in the United States (and even in Pakistan) are facing problems due to financial constraints and their inability to integrate with university culture. The sources of revenue are either the rent from the tenants or the grants from their parent organisation. This results in their inability to sift through the list of companies which desire to locate themselves in the incubator, and thus end up choosing companies based upon their ability to pay rents rather than their growth potential or the relevancy of those companies with the university's objectives. Moreover, the reliance on grants results in requirement of political support and political compromises. All these factors result in a dormant, real-estate focused incubator, becoming a poor model for the incubating companies.

The model proposed in this study promises alternative revenue streams for the incubators, by making incubators active partners in the incubating companies. Incubator management is to be actively involved in the selection, execution and completion of the projects that would be carried out in the incubators, thus eliminating the gaps and the lack of interest between incubator managers and the incubating companies. Moreover, the incentives of the incubator managers would be based upon the success of these projects, thus aligning the incubator sustainability with the manager's retention and promotion.

Furthermore, the incubators would be selecting the projects that are aligned with the universities, their faculty's skill set, student objectives, and lab resources. Thus, the projects that would be brought in would be closely aligned with the areas where university is working, thus automatically resulting in political support for the incubator and hence saving incubator manager's valuable time for enterprise development activities.

## **5. CONCLUSION**

Knowledge Process Outsourcing (KPO) is an emerging trend in which intensive information-related, knowledge-related, or judgment-related business services demanding

advanced technical and analytical skills and judgments, are outsourced by major companies to individuals in a different company or in a subsidiary of the same company, located in the same country or in another country in order to save money. This is considered high-value work carried out by extremely specialised experts and hence different from the business process outsourcing (BPO) industry in that the subsidiary or contracted companies are part of the value chain [Aggrawal (2007)].

BPO began in the 1990s and focused on relatively elementary and standardised processes. KPO on the other hand, focuses on highly skilled activities which were traditionally considered part of a company's competitive advantage or core activities. The defining difference between BPO and KPO is that KPO is usually focused on knowledge-intensive business processes that require significant domain expertise. The global KPO market is expected to grow at a cumulative annual growth rate (CAGR) of 46 percent, to \$17 billion in 2010. Some of the growing areas of KPO include engineering designs, pharmaceutical, biotechnology research, analytical services such as equity research and financing research, and market research. Most of the KPO service providers are located in countries such as India, Russia, Israel and China and employee professionals like lawyers, MBA graduates, scientists and engineers.

Because of the presence of such highly qualified faculty in the Pakistani universities, an opportunity exists for Pakistan to explore and attempt to claim its due share in this emerging market and the academic incubator model being proposed could be a means to this endeavour. Since the main driver of the KPO industry is highly qualified human resource, Pakistani faculty could be connected with this industry through incubators. As there is presently a shortage of venture capitalists in Pakistan, an access to KPO industry could provide start-up companies in the incubators with the necessary financing as well as market which is growing very fast and faces a shortage on the supply side.

The recent efforts by the Pakistani government to encourage FDI in IT sector have started to show positive results. Pakistan has become the 20th most attractive outsourcing destination [PSEB (2007, 2009)]. An increasing number of IT universities, their active incubators, growing local IT industry and an emerging trend could be merged together to improve the exports, employment and knowledge-base of the country.

## REFERENCES

- Abetti, P. A. (2004) Government-Supported Incubators in the Helsinki Region, Finland: Infrastructure, Results, and Best Practices. *Journal of Technology Transfer* 29:1, 19–40.
- Aggrawal, A. (2007) The Next Big Opportunity: Moving-up the Value Chain from BPO to KPO, Knowledge Process Outsourcing (KPO): Origin, Current State and Future Directions. EVS Article, CA, pp. 4–15.
- Duff, A. (1998) Best Practice in Incubator Management. AUSTEP Strategic Partnering Private Limited, Western Australia.
- Knopp, L. (2007) 2006 State of Business Incubation Industry. National Business Incubator Association Publications, Ohio, USA.
- Lalkaka, R. (2000) Assessing the Performance and Sustainability of Technology Based Incubators. *New Economy and Entrepreneurial Business Creation in Mediterranean Countries*. Trieste, Italy.

- NBIA (2009) National Business Incubator Association, USA: <http://www.nbia.org/> (accessed 7 September 2009)
- PSEB (2006) Pakistan's IT Industry and Profile. Pakistan Software Export Bureau: <http://www.docstoc.com/docs/27476877/pakistan-industry-profile> (accessed 7 September 2009)
- PSEB (2007) Pakistan: Destination Next. Pakistan Software Export Bureau: [www.pseb.org.pk/UserFiles/documents/Destination\\_Next.ppt](http://www.pseb.org.pk/UserFiles/documents/Destination_Next.ppt) (accessed 7 September 2009)
- PSEB (2009) Pakistan Software Export Bureau. [www.pseb.org.pk](http://www.pseb.org.pk) (accessed 7 September 2009).
- Rahman, Attaur, *et al.* (2005) Technology-based Industrial Vision and Strategy for Pakistan's Socio-economic Development. Higher Education Commission (HEC), Pakistan Institute of Development Economics (PIDE) and COMSTECH, Islamabad, Pakistan.
- USAID (2008) Evaluation of USAID Higher Education Portfolio. Volume 1, Assessment Report, Islamabad, Pakistan.

## **Public Sector Innovation: Case Study of e-government Projects in Pakistan**

M. IRFANULLAH ARFEEN and NAWAR KHAN

### **INTRODUCTION**

The word innovation means to introduce new thing. Without innovation capability, there would be no computers, aero-planes, high tech television, internet and wireless technology, just to name a few. Innovation has been practiced throughout human history and has become a way of improving human life.

The importance of the innovation in the private sector is well recognised and is considered as the main force for the firm survival and profit. This is not the case for the public sector, where innovation has suffered from not only the lack of research seeking to understand it, but also a considerable lack of recognition of its importance, contrary to the case in private sector. Innovation has been seen only as a supplement to the main role and activities to the government. Hence, it is difficult to find innovative individuals and organisations in the public sector as compared to the private sector. Innovation skill and practice are not always considered as the main drive for the government in enhancing its service internal organisations and also to citizens and businesses.

Since much of the topic and studies on innovation are focusing only on the private sector, it is aim of the study to analyse the process of innovation, mainly in the ICT in the public sector. Many scholars and consultants have provided comprehensive studies and models on how to innovate in the private sector. Innovation capabilities in the private sector and their success stories have influenced the public sector to begin appreciating and practicing innovation seriously. One would assume that it is only a matter of

M. Irfanullah Arfeen <Irfanullah.Arfeen@mbs.ac.uk> is Doctoral Research Visitor, Manchester Institute of Innovation Research, Manchester Business School, University of Manchester, United Kingdom. Nawar Khan <nwr\_khan@yahoo.com> is Dean of the Department of Engineering Management, National University of Science and Technology, College of Electrical and Mechanical Engineering, Rawalpindi.

*Authors' Note:* This is part of PhD research work, second case study is based on 'Need Assessment Survey' conducted by the author and funded by the United Nations Development Programme. The project investigates the perception of government officials for implementing e-government projects in Balochistan. It is based on 45 interviews of public sector officials carried out at provincial and district level in Balochistan. Data was gathered on the field in late 2008. The author wishes to acknowledge the support and very useful comments provided by Sheryar Taj and all other staff of AGRP-B during interviews conducted in Balochistan. Thanks extended to Prof. Ian Miles, Prof. Kate Barker and Dr Khaleel Malik (all of University of Manchester) for guidelines received during research work in the Manchester Institute of Innovation Research at Manchester Business School, University of Manchester, United Kingdom.

transferring the same theories available in the private to the public sector. In the other words, just by transferring the good practices and styles, similar success could be achieved.

In reality, this is not the case. Innovation in the public sector demands its own study although there are some theories from private sector that can be adopted. It is not the aim of this study to do a comparative study with the private sector, as this not only a larger scope of this study, but also tends to limit the ability of this study to explore and highlight the issues that exists and may have been overlooked in the field of public sector innovation research. This study concentrating on the latest trend of innovation effort in the public sector i.e. electronic e-government. To do this, this research will look at the case study of the ICT diffusion or e-government in the public sector of Pakistan. Interestingly, despite the claimed potential and benefits of e-government, the outcomes are more frustrating due to the chaotic and high uncertainties present in it. The experience of implementing e-government in Pakistan will be used to this study in providing a better understanding of how innovation is actually carried out in the public sector.

The rise of the information society has been argued as a driver for the government to start utilising ICT to meet the challenging and complex demand of citizens and businesses. Some studies have shown that many ICT projects in government around the world have resulted in partial and complex failures. This paper discussed the literature gap that exists in the study of e-government and the need to illuminate the understanding from the field of innovation.

### LITERATURE REVIEW

Economic growth is always on a nation's agenda in order to achieve prosperity. Schumpeter (1934, 1939) was among the first economists to realise the importance of new products to economic growth. Innovation is actually the engine of economic growth. He argued that changes in the prices of existing products were not as significant as the competition posed by new products. The development of new products such as pharmaceutical drugs and computer software are more likely to result in economic growth rather than the reduction of prices of existing products such as cars and mobile phones.

Invention is the creation of an idea for new product or process and when this new product or process is introduced or implemented, it is then called innovation [see, Fagerberg (2005) and Hartley (2006)]. Innovation in firms require a combination of several types of knowledge (e.g., production and market knowledge), capabilities (e.g., good logistic system), skills (e.g., good leader) and resources (e.g., budget). An innovation cannot be produced without the availability and ability to combine all of these factors together.

Invention and innovation are complementary. A single innovation is actually the result of a lengthy process involving many interrelated innovations and inventions. This is why it is more interesting to study innovation from the system prospective rather than individual innovations.

The OECD's Oslo Manual (2005) has included the 'marketing innovation' and 'organisational innovation'. Marketing innovation cover new marketing method

aimed at opening up new markets with the aim of increasing profits. Organisational innovation, on the other hand, is concerned with the implementation of new organisational methods and practices for sharing knowledge, new organisational structures and distribution of responsibilities and decision-making; changes in governance and new ways of interacting with external organisations such as other firms and public research institutions.

Another proposed type of innovation is the service innovation. The definition of the term ‘services’ is very imprecise as it can cover many activities that range from providing after sales services to white collar and low level jobs such as cleaner. Services exist in all sectors (including manufacturing) although they differ from manufacturing as the outputs are often intangible, hard to store and transport, and difficult to demonstrate in advance to potential clients [Metcalf and Miles (1997), p. 3]. There has been a significant growth of the service industries especially where there is a strong demand for specialist workers to perform service functions (such as design and research and development). These functions normally provided by firms—service firms which later showed in the growth of the service sector.

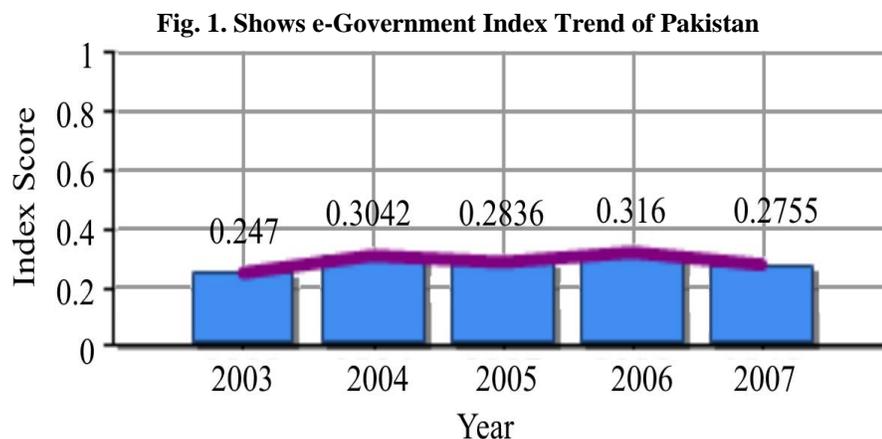
The treatment of the importance of service and its roles in innovation especially in technological change has been largely ignored until the emergence of ICT. The rapid development of ICT has made many services dependent upon technology. The ICT investment by the service sectors and new ICT developments (such as mobile and PC technology) has increased significantly.

In 1976–97, Pakistan Public Administration Research Centre formulated and submitted more than 200 recommendations to the committee for improving the quality of services and to modernise the public administration by use of ICT. Out of those, 106 recommendations were approved which cover approximately 53percent of the total recommendations. Despite these developments, it was realised that the existing system of public service is still cumbersome, outdated and out of step with the requirements of modern administration. This has given rise to wide inefficiency, malpractices and corruption, resulting in a loss of government revenues and general public dissatisfaction.

It is essential for public sector organisations to use ICT to support processes within the government for the delivery of services to its customers. The basic aim of e-government is to improve the ability of all people to access the information and to enhance the efficiency and effectiveness of all kinds of government services.

e-Government can be directly linked to main dimensions of “good governance” [Leitner (2003)], such as:

- *Coherency of Policy Making*: it supports better quality co-ordination of policy making both on the horizontal and vertical level;
- *Participatory Democracy*: it supports active participation of all players in policy making processes;
- *Consistency, Efficiency and Effectiveness of Policy Implementation*: it support cooperation and networking in policy implementation phase, makes them faster, simpler and more cost-effective; and
- *Transparency and Openness of Political Processes*: it provides general access to information at a very low cost.



Source: United Nations e-Government Development Knowledge Base (UNKB).

In the United Nations e-Government Survey 2008 Pakistan (0.3160) took the position at 131st out of 192 countries. In the 2010 survey, Pakistan had a major dropped, went to 146 as shown in the above Figure 1. This survey is based on the United Nations e-Government Readiness Index that is a composite index comprising the *Web Measure Index*, the *Telecommunication Infrastructure Index* and the *Human Capital Index*. And this situation is so despite the allocation of billions of rupees by the Ministry of Information Technology and Telecommunication Division for e-government in Pakistan.

The e-government programmes of the government of Balochistan reflect the realities of its limited web access, infrastructure and human capital capacities while balancing the priorities of its development needs. Government of Balochistan is advancing toward the stage where government is without boundaries; in this way put all provincial and district data and services online which can be access anywhere of the world at anytime. As compared to other provinces, in Balochistan enabling e-government environment is definitely weak [Arfeen (2009)]. Addressing the deficiency in its web access, infrastructure and human capital measure should be a high priority for the government of Balochistan. Help of Federal government, international organisations and private sector is urged.

Lack of connectivity to the web, inferior technology, limited e-mail capacity, absence of intranets all need to be addressed at provincial and district level before the Government of Balochistan can realistically expect online service delivery to be effective. Outside ICT community, there seems to be a limited sense of e-governance as a major driver of transformation and public sector reform.

### The Core Research Problem

In Pakistan many e-government projects have been implemented, most of them have failed to reach the deadlines. A study is then crucial to be conducted to explore why there is inertia in the e-government projects, examining this with the context of public sector innovation. Hence the problem statement it: *Why have e-government programmes been implemented at different rates?*

### Research Questions

1. What is the nature of public sector innovation within the context of ICT i.e., how is e-government carried out?
2. How do rationales of public sector innovation influence the implementation of e-government?—how and what group of actors were influential in the decision-making process?
3. What are the factors that hinder innovation in the public sector?
  - a. How has early use of IT shaped innovation in e-government?
  - b. What are the structures required for innovation?
  - c. How have aspects such as management capability, culture and change management affected the process of innovation?
  - d. Why is the formulated policy not implemented?
  - e. What forms of partnership with the private sector promote innovation in the public sector?

The core of the study is based not only on the question of ‘what is happening?’ but also ‘is this what is expected?’ and ‘why is it happening as it is?’ Therefore, this will explain ‘what is happening in the Pakistan’s e-government and why?’

### Types of Public Sector Innovation

Although the topic of innovation in the public sector has received increased attention only recently, it does not imply that there has been no innovation being practiced before. In fact, innovation has been tried and tested in the public sector using various models and principles, which were mainly influenced by experiences from the private sector. For example, new public management (NPM) was implemented with the core tools and ideas borrowed heavily from the private sector in order to fix the issue of inefficiency in the public sector. The main types of public sector innovation are outlined below:

- a. Management Innovation—e.g. New Public Management (NPM) and good governance.
- b. Accountability and transparency—e.g. performance management, programme budgeting, and citizens focus.
- c. Policy—e.g. changes in policy formulation and implementation.
- d. Good fiscal management—e.g. budget reforms, output-oriented systems, accrual accounting, capital charging, competitive tendering and contract monitoring.
- e. Regulatory change—e.g. deregulation and simplification.
- f. Devolution and decentralisation—e.g., reallocation of responsibilities from central to local authorities, ‘mixed’ type of public institutions appeared such as quasi-public and quasi-private and privatisation.
- g. Partnership—e.g., contracting out, market testing, public-private partnerships (PPPs), joint-venture, more consultations and interactions with the citizens.

- h. Organisational—e.g., horizontal integration to avoid silos and promote information sharing among government agencies, more empowerment to employees, recognising achievement of staffs, new recruitment practices, flexible staffing and emphasis on leadership.
- i. Service Improvement—e.g. more responsive, 24/7 services and personalised customer services.
- j. Research and development—e.g. creating a strategic centre, creation of incubation centre and cooperation with educational institutions and private sector.
- k. Harnessing ICTs—electronic e-government, business process re-engineering for back and front office operations, citizen portal, e-enabled, e-democracy, and e-business.

*Source:* IDeA (2005, pp. 8-9).

The types of innovation shown in the above figure have been given more prominence at different times, some are top-down politically driven and some are driven by technological change i.e. ICT driven.

According to IDeA Knowledge (2005), innovation in the public sector has not been featured as a critical determinant of survival as it is operating under a different set of pressures, interests, restrictions and demands. Furthermore, it added that the incentive to innovate for public sector organisations and their employees has been low and the risk associated with the innovation is high. As such, innovation is not deemed a high priority in the public sector but circumstances today has made innovation a must and no longer a luxury choice.

The public sector is a large organisation that consists of a complex system of operations, a variety of actors and cultures, different set of interests and a variety of stakeholders' expectation to be met. A private organisation is concerned only with perhaps one mission, one market, and specific customer requirements but is strongly engaged in innovation.

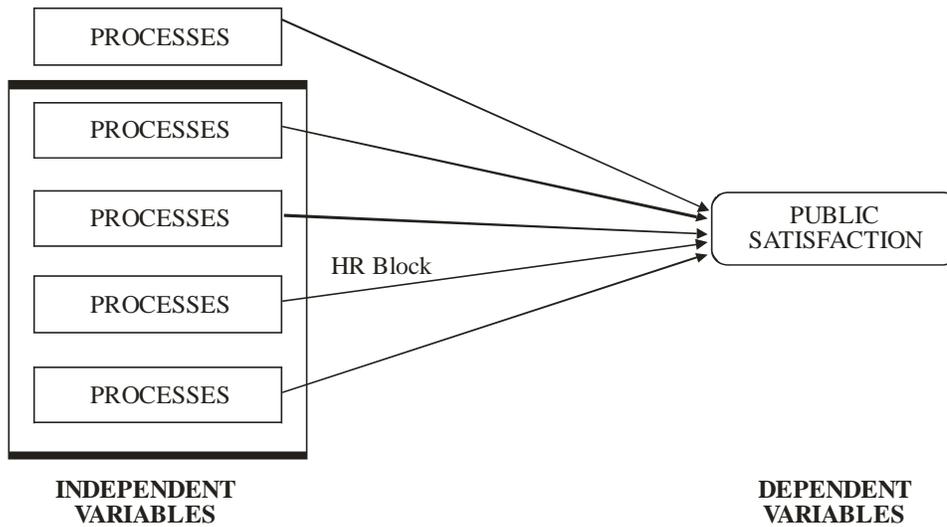
The last twenty years or so, however, have seen a growing realisation among policy-makers on the importance of public sector innovation. It could be highly valuable for studies of public sector reform to look from a new perspective, i.e., innovation, to recognise and understand better the complexity of managing change in the government.

### **THEORETICAL FRAMEWORK**

In this research study, there is only one dependent variable; the public satisfaction which is the outcome of number of variables, that one is trying to predict and explain. For example, if a study is done to determine how one know that people are more/less satisfied with one service provision of public sector organisations than others, public satisfaction is the dependent variable, that is, how much do people trust the provincial government to do the right thing most of the time?

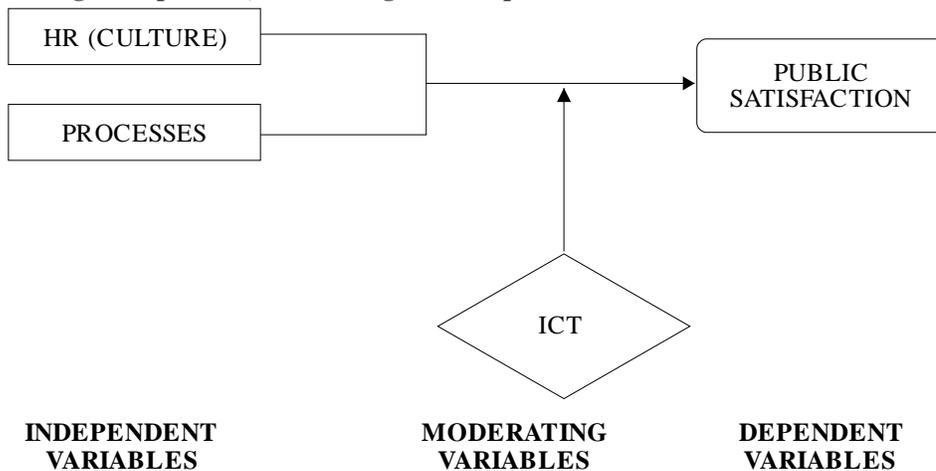
The independent variables, also known as the predictor or explanatory variables, are the factors that explain variation in the dependent variable as shown in Figure 2. In other words, these are the causes of the outcome. For example, people can be more satisfied with service provision of public sector organisations if government departments

**Fig. 2. Variables of e-Government**



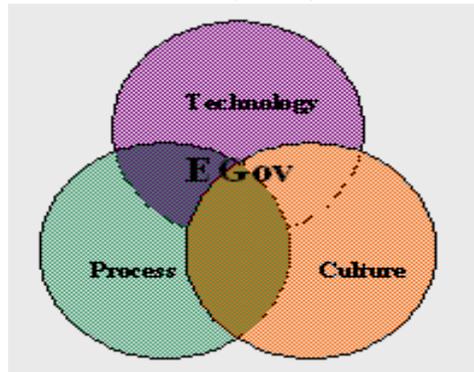
use ICT to innovate processes bring visibility and become accessible. So ‘processes’ are the independent variables, and ‘public satisfaction’ is the dependent variable whereas ICT can be considered as moderating variable. This is shown in Figure 3:

**Fig. 3. Dependent, Moderating and Independent Variables of e-Government**



**RESEARCH AIM**

This aim of this research study is to focus on the use of ICT for public sector innovation. In this scenario, it is building a new platform (model) for government to be based on three pillars making it extremely sturdy structure and difficult to tip over as shown in Figure 4. It can also be called as overlapping circles diagram which show the major actors of e-government.

**Fig. 4. Three Pillars Platform (Model) for Government**

### RESEARCH OBJECTIVES

Three objectives are set for this research

1. *Process innovation* for improving the productivity of government.
2. Change in the *culture or behaviour* of those doing the work.
3. Use of *Information and Communication Technology* to facilitate implementation of both of these changes.

All three pillars need to be present for improving the government effectiveness. Take away any one and the structure will fall over. For instance, changing work processes and culture without using ICT can produce less than optimum results. Using ICT to enable process innovation leads to disappointment with the outcomes when the culture prevents the changes from taking effect. And using ICT and cultural change programmes only ignores the need to shift work processes from a top down orientation to one that focuses on customers and workers. Finally, we would enable these changes and improve citizen trust in government by using information technology to innovate process of government departments to make it much more transparent, quick and less time consuming.

### E-GOVERNMENT PROJECTS AS A CASE STUDY

In February 2005, Electronic Government Directorate (EGD) took the responsibility for automation of the Hajj Wing of the Ministry of Religious Affairs Government of Pakistan, wanted to make it a single point of access for all major services, from registration, data verification, group formation, balloting and selection of applicants, automatic printing of Hajj passports, to tracking and search of pilgrims and their luggage, from scheduling to confirmation/changes of flights for pilgrims during the Hajj.

#### 1. Hajj Process Before Automation

A number of standalone sub-systems were developed by the Computer Cell of Ministry of Religious Affairs, to facilitate citizens and other stakeholders of the concerned departments, regarding tracking of pilgrims during the Hajj. During Hajj, there was not any automated coordination among different agencies like Banks, Airline

companies, DG offices at Jeddah and Hajji Camps in Pakistan. Furthermore, data was not provided by these agencies electronically for planning and performance measurement of Hajj activities. Thus, Computer Cell of Ministry of Religious Affairs had to feed data of all the Hajj Applicants manually. In old procedures, tracking of luggage of Pilgrims, transportation and flight scheduling of deceased pilgrims and most of the Post-Hajj processing was done manually.

### **Objectives for Automation of the Process**

e-Services to be provided by the Ministry of Religious Affairs' website include Registration, filling in of Hajj applications by citizens, dissemination of information regarding selected candidates through ballot, their group name/code, flight schedule. In same way, information about pilgrims' luggage and deceased/sick pilgrims must also be made available on the website. Availability of updated information 24 hours a day and 7 days a week, real-time *updatation* of status of pilgrims during the period of Hajj must be available. The status of pilgrims can be updated from any authenticated terminal within and outside Pakistan i.e., from Hajji Camps and from offices of Directorate General Hajj (DGH), Jeddah, Mecca or Medina etc. Updatation of status of the pilgrims will be done through a *secure, reliable* and *efficient* manner after proper *authentication* and *authorisation* of the requesting terminal. However, the dissemination of information will be done through a simple and easy-to-use interface provided to pilgrims and their relatives on the Hajj website.

## **FINDINGS**

Government of Pakistan is spending millions of dollars on e-government projects. In the end, spending all amount, achieving all milestones on papers and getting hardly 40 percent results due to deficiency of skilled manpower. However purchasing all kind of hardware but not able to develop user-friendly software.

### **1. A Case Study of e-government Projects in Balochistan**

*Needs assessment process can help policy-makers;*

To know the ICT perception of people; assess ICT infrastructure and availability;

To see public opinion about e-government challenges and set the priorities according to their needs;

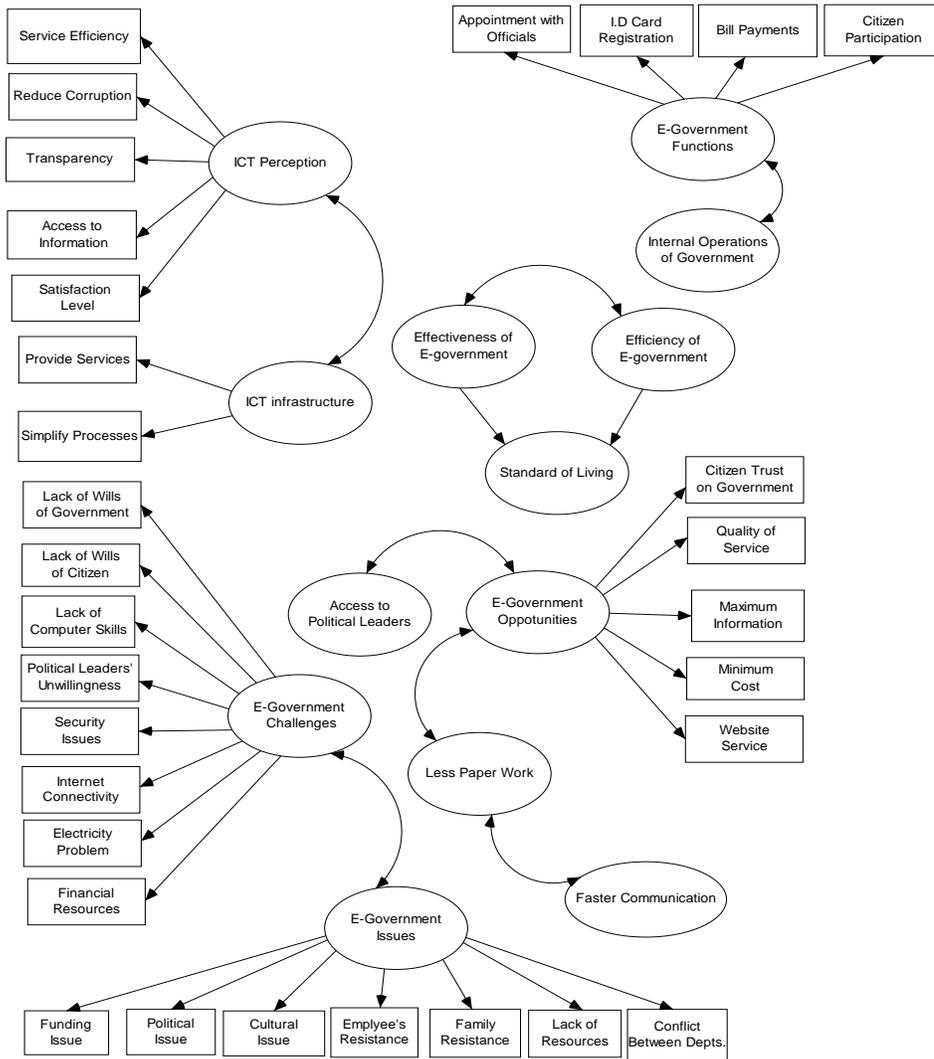
Systematically evaluate e-government functions/services and planning for improve productivity of government departments;

Provide justifications or explanations for budget and grant requests; improve standard of living and citizen trust on government departments through public sector innovation;

Build an increased citizen participation and give them access to information, and develop a greater "sense of ownership" through public involvement;

Empower the citizen, give them access to "Political Leaders" through e-services and examines the e-government issues as shown in Figure 5.

**Fig. 5. Factors Involve in Policy Making of e-Government**



**Government of Balochistan; Departments Overview—  
Discussions/Interviews Based**

Quetta, Ziarat, Loralai and Lasbela were visited to conduct District level meetings in order to carryout e-Governance need assessment survey. Author visited provincial government departments such as IT, Health, Education, Social Welfare, Local Government, Livestock and etc. and to follow the Peshawar/Karachi e-government model and study their land reform system. Also, visited Rural Development Authority, had a meeting with Director and Instructor, visited Karachi, Peshawar and studied their success stories and possibility to replicate it in Balochistan as well.

### **Balochistan Public Service Commission**

Balochistan Public Service Commission announced 12 vacant positions for District Officers (IT) BPS-18 but able to hire only 4 people, now commission wants to relax the criteria to hire the officials at BPS-17 level.



### **Agriculture Department**

Agriculture Policy and Agriculture Water Management System must be put online for information of the farmers/agriculturists; similarly website must be developed to highlight its three essential components:

1. Research;
2. Agriculture engineering; and
3. Facilities extended by the agriculture secretariat.

### **Education Department**

BEMIS—Balochistan Education Management Information System established in 1990. BEMIS data is use by decision makers and planners. Normally, they were required to collect data twice a year in the month of April and October but they have been collecting in the month of October only because of financial constraints. They used to collect data from 11895 schools annually. Education department was interested to update the BEMIS and put the data online to make it available for public.

### **Finance Department**

New account model, aided programme, offered one week training that was not sufficient; the government policy must be made available on website; letters being sent to remote areas which take more than a week to reach its destination; there is contradiction in the figures given in files and net that must be the same; the budget preparing process starts in the month of March and takes four months to its announcement but within next 15 days the policy revealed to be changed which shows inefficiency of preparing budget process.

### **Educational Institutions**

In Balochistan, about 1500 computers were distributed in 95 schools, approximately 10–15 computers in each lab of each school; it is observed that headmasters of most of the schools kept the computers locked in the lab because of non-availability of computer instructor and fear that students will wrongly handle the computers and spoil them. The computers became obsolete and useless as it remained unused by the students during the last four years. The purpose of provision of computers was not achieved.

### **Higher Educational Institutions**

In the Khuzdar Engineering University, data computer lab was established with the expenditure of rupees 25 million provided by HEC that was shown to be burnt out within few months without any apparent evidence of fire. If this incident is proved to be true, one may conclude that some segment of society may not welcome advancements in IT literacy or have some vested interest in such negative actions.

### **IT Institute Quetta and Rural Development Authority**

About 450 government officials got IT training, out of them only 250 was able to pass the exam in the IT Institute of Quetta. Rural Development Authority is facing financial constraints; the staff was never provided facility for foreign training to enhance their capability for use in the department; the local training programme is not functioning properly because of limited promotion chances for training instructor, moreover, training equipment is not available; to meet the requirement, to some extent computers, networking and DSL connections may be provided.

### **District Quetta**

In the Quetta District, IT department furnished data based forms to the 9700 employees to fill and return to the department for statistical analysis but only 2000 employees responded to return the forms in a year which show unsatisfactory response.

### **District Lasbela**

DCO Lasbela confirmed that ten IT centres exist with the facility of website at district level on website: [www.districtgovtlasbela.com](http://www.districtgovtlasbela.com) which provide training to the interested students in Lasbela. The online exam software has been developed and being used successfully. In addition for Tehsil High Schools, IT training labs have been established including development of IT vision 2010.

Jam Kamal Yousaf, son of former Chief Minister and Nazim District Lasbela while using advanced techniques/methods as a practice sent his recommendations to the concerned department through email and in this way he solved problems efficiently with speed and minimum cost.

### **Short Questions Based Recommendations**

In response to the questioner, recommendations for provision of computer hardware and software, training facility, and human resource development were made.

The availability of computers in government offices with connectivity of internet must be ensured. Basic introductory workshops about the computers for the people should be conducted. The duration of the computer training should be at least of one month to train maximum number of persons.

Adequate provision of funds and resources should be ensured. e-Government directly depends on the availability of electricity and trained/skilled persons because without these two essential requirements, will not solve the problems and expected results would not be achieved. e-Government provides good interaction between public and private organisations with quick response and coordination amongst these important entities.

### **Officials Views/Suggestions**

An official suggested that computer skilled employees working in low scale must be given promotion to motivate all officials to get computer training.

All the tender notices for provision of goods / material / equipment and construction of government buildings, labs, roads, bridges, etc. should be put on website for transparency of awarding the contracts.

Recommendations by an official that schooling at nursery level be started with the provision of computers; need to link the government departments with internet and field offices as well. He observed that education level was low and did not have computer skills.

E-mail service must be recognised as a legal document and ratification should be done for the purpose by the government of Balochistan.

The domicile certificate should be issued on the basis of computerised system linked with the NADRA to route out unauthorised/illegal issuance of the certificates.

### **Data for Web Portal**

Data relating to ongoing, under process projects, developmental activities of the department, personal CV of its officers, developmental/non-developmental budgets, district government plans and its budgets, provincial plans for next 5-10 years, information of budget, furniture, equipments etc. in any office, training module, training calendar of each institution, training curriculum for each training course/centres, list of resource persons and their specialisation, basic information of Local government, HMIS data, disease data, health staff data, new information about diary farming, poultry farming, livestock management, information about slaughter houses, number of existing tube wells, about modern technique regarding agriculture and food and contact numbers of all the officers should be available on website of the Government of Balochistan. Newly created Prosecution department should be made available online. In a single click of mouse, all information about relevant departments would be available.

## **OPERATIONAL ISSUES**

Financial, law and order, lack of qualified manpower in IT sector and lack of incentives for IT experts in government departments and frequent transfer are the major issues in ICT at provincial and district level.

## **RECOMMENDATIONS**

### **Provincial Level**

Results of “Need Assessment Survey” showed that in Balochistan very limited people have the access to Internet whereas in some government departments position is better but most of the employees does not have computers in their rooms. They are using dial-up connection. In civil secretariat; P&D, Finance and IT departments are comparatively better than other departments in the availability of computers and networking.

Government employees are optimistic and willing to work in paperless environment. At the initial stage, automation of civil secretariat should be started as pilot project from IT department, after that link with other departments be established in a period of three years. In this regard, there remains a need to replicate the software which is in use at Provincial level in Sindh government departments in Karachi. Also, need to adopt policy of ‘one official one computer’.

### **District Level**

No study has been carried out at district level. There are indication that most of government institutions are not having access to computers at district level but few districts are better due to support of United Nations and some other international organisations. It would be useful to take the Lasbela city as the pilot project, integrate DCO Office and other departments and later on replicate it in other districts. It would be better to bound government to not transfer DCO during the implementation phase of the project.

### **Participatory Information System (PIS)**

It is very essential element of service innovation. It provide a very comprehensive socio-economic picture of community, it would be better to put PIS data online and later on replicate it in other districts in Balochistan (see Annex–A).

### **Land Record Computerisation in District Quetta**

Land is the most valuable asset of humans being. It is also an important asset of any country. Without land, there can be no county. Moreover, the wealth of a nation and its economic development are dependent on the state of the land and its usage. The availability of funds depends on tax collection. It is apparent, therefore, any information concerning land is valuable information which serves as a key to financial investment, commerce, industry and agriculture. Therefore, making land rights secured, reducing the potential for disputes and enabling an improved investment climate are urgent tasks as part of public sector innovation and have been prioritised at the highest levels of the government. One of the key elements of this agenda is to improve the revenue record system. There is a very keen political commitment in making hassle-free services available to the citizens and, at the same time, diminishing the scope for litigations and land-related disputes.

China did lot of work on land record information system. Senior Revenue Officer should send to study China Land Record Information System. IT Directorate of Peshawar is also working on Land Record Computerisation, if possible it be replicated as pilot project in Quetta district level. Also, it is necessary to established IT cell in the department of Board of Revenue, Government of Balochistan.

### Advisory Committee

Advisory Committee under the supervision of Governor of Balochistan should be established in order to monitor the implementation of e-government projects. Advisory Board/Steering Committee should be composed of 10-15 individuals representing a variety of community interests, including the government departments, CBOs, NGOs, public representatives, etc.

### Automation of Driving Licence and Other Government Services

In Peshawar, automation of driving licence improves government revenue from 3 lac to 44 lac per months so it can be considered as best practice and replicate it in Quetta.

### Health Management Information System (HMIS)

In the last 2 years, there is not a single output. There is deficiency in reliable data. Foxpro software is used for HMIS which is out dated now.

### Balochistan Education Management Information System (BEMIS)

It has deficiency in reliable data and need to put all data online. Secondary data can be collected through EDOs, counter check can be done through collection of primary data. These data should be available on website for public.

## SWOT ANALYSIS

In this section, the challenges of public sector innovation for Pakistan as a developing country is analysed.

Table 1

### External Strategic Factor Analysis Summary (EFAS)

| External Strategic Factors      | Weightage/<br>Importance | Relative Rating<br>(Scale 1-5) | Weighted<br>Score | Comments  |
|---------------------------------|--------------------------|--------------------------------|-------------------|---|
| <b>Opportunities</b>            |                          |                                |                   |   |
| e-government                    | .20                      | 4                              | .80               | Public Sector Innovation                        |
| Access to information           | .05                      | 3                              | .15               | Transparency                                    |
| Connected government            | .05                      | 2                              | .10               | Seamless/fast communication                     |
| IT education/skills development | .10                      | 4                              | .40               | Knowledge worker                                |
| Poverty reduction               | .10                      | 2                              | .20               | Bridging gap                                    |
| <b>Threats</b>                  |                          |                                |                   |   |
| Dependency on technology        | .10                      | 2                              | .20               | Load shedding / system down                     |
| Piracy, plagiarism              | .10                      | 3                              | .30               | Misuse  |
| Brain drain                     | .10                      | 3                              | .30               | Skilled worker highly paid by developed country |
| Privacy                         | .05                      | 2                              | .10               | Hacking   |
| Corruption                      | .15                      | 3                              | .45               | Viruses   |
| Total                           | 1.00                     |                                | 3.00              |   |

Table 2

*Internal Strategic Factor Analysis Summary (IFAS)*

| Internal Strategic Factors            | Weightage/<br>Importance | Relative Rating<br>(Scale 1-5) | Weighted<br>Score | Comments                                    |
|---------------------------------------|--------------------------|--------------------------------|-------------------|---|
| <b>Strengths</b>                      |                          |                                |                   |   |
| Everything is new: no negative legacy | .10                      | 3                              | .30               | Leapfrogging possible                       |
| Internet as a pull factor             | .05                      | 3                              | .15               | ICT is facilitator                          |
| e-government projects                 | .15                      | 5                              | .75               | Service Innovation                          |
| Technology diffusion                  | .10                      | 3                              | .30               | Linked departments / transformation         |
| Transparency in process               | .10                      | 4                              | .40               | Simplification/improvement                  |
| <b>Weaknesses</b>                     |                          |                                |                   |   |
| High cost of projects                 | .15                      | 3                              | .45               | Limited Internet access                     |
| Lack of IT standards                  | .10                      | 3                              | .30               | Lack of cyber laws                          |
| Skill shortage: literacy rate         | .10                      | 4                              | .40               | IT literacy/limited access to IT facilities |
| Language barrier/Software license     | .05                      | 2                              | .10               | 70 percent cannot utilise information       |
| Deficiency in software development    | .10                      | 2                              | .20               | Wastage of funds/not getting desire results |
| Total                                 | 1.00                     |                                | 3.35              |   |

Above rating is given on the basis of observation and survey where 1 (poor) and 5 (outstanding). According to above analysis implementation of e-government projects are at satisfactory level in Pakistan but still we are not getting desire results.

Computerisation in Government departments is not just a matter of installing hardware, buying relevant software, or setting up of Networking is also important for public sector innovation. Whereas in order to reap its benefits, its users i.e., the Government, Citizens and Business have to be e-ready to skilfully exploit the opportunities provided to them.

### CONCLUSION

The public sector innovation and its impact on the society have been experienced all over the world. IT has influenced every aspect of human life, be it trade, services, manufacturing, government, education, research, entertainment, culture, defense, communications etc. It has undoubtedly become the determinant of progress of nations, communities and individuals.

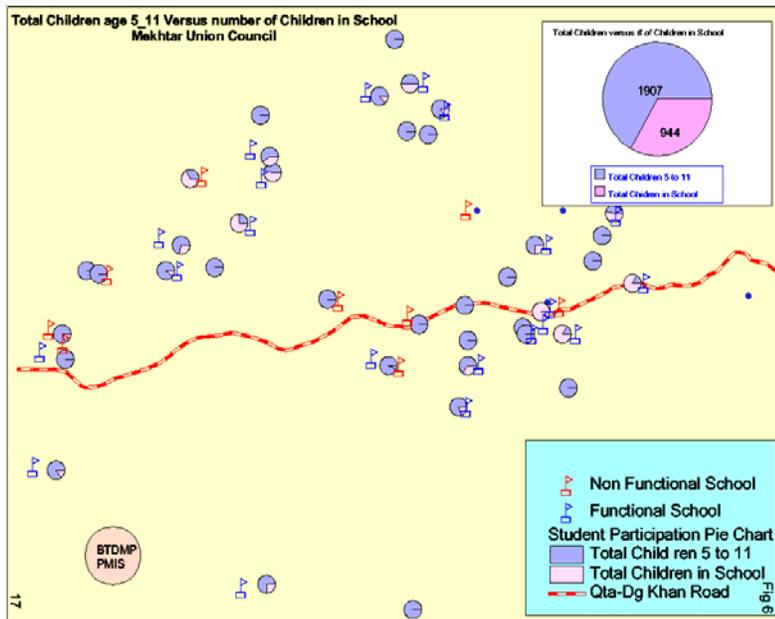
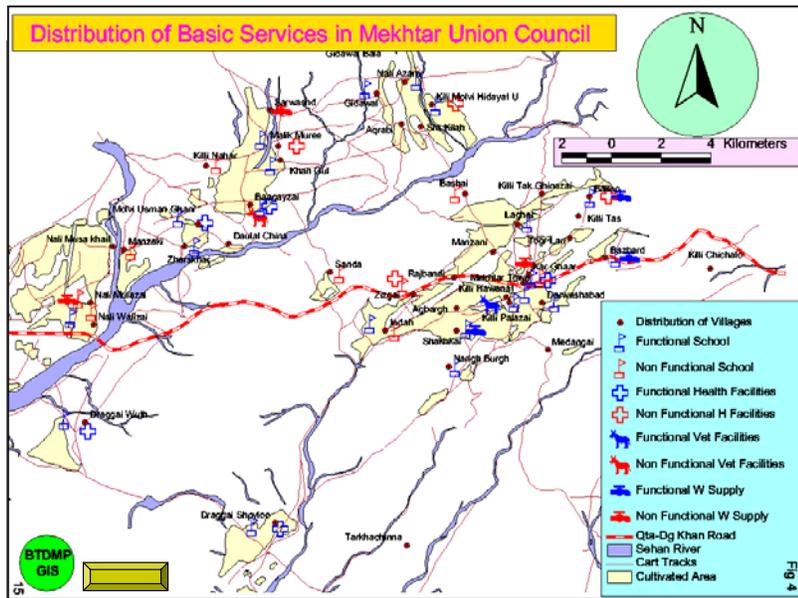
Information Technology as a tool provides tremendous opportunities for Pakistan especially its province Balochistan to overcome its historical disabilities and leapfrog (by compressing time) concept can be used to attain a position of economic strength.

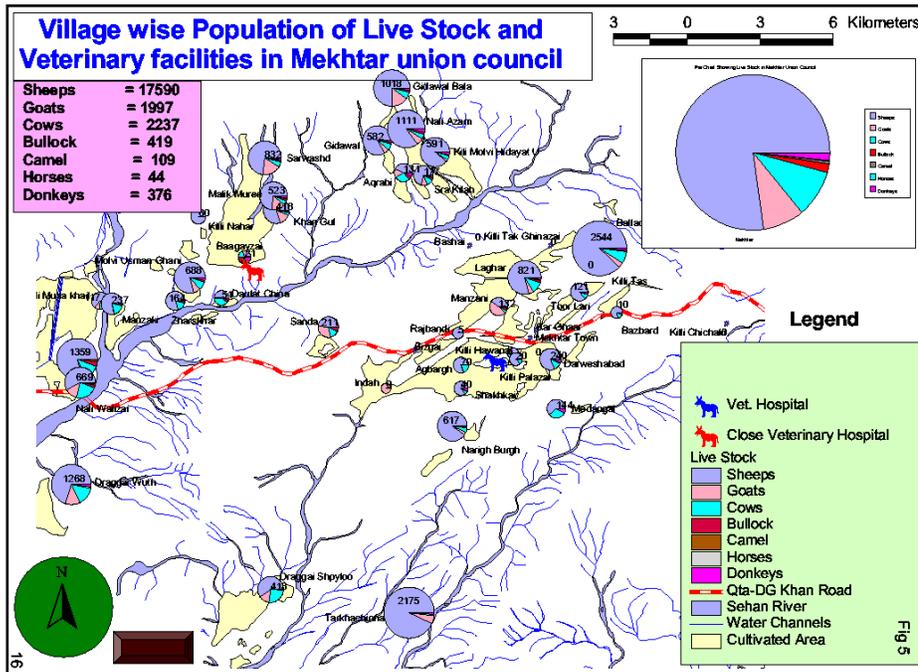
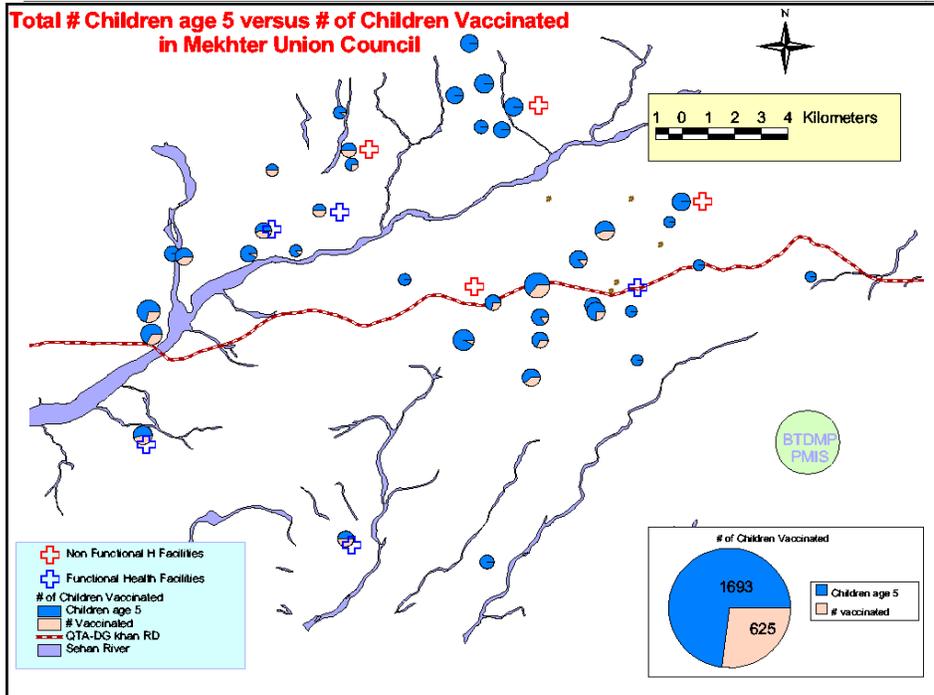
Recognising the power of ICT, Pakistan can promote it as a way of helping businesses improve efficiency, create jobs and reduce poverty. ICT has already shown its potency in increasing the productivity and effectiveness of public sector organisations. The use of ICT is fundamental to linking government organisational functions. It can form the base for management a technology environment. The ultimate test is whether governments of Pakistan can use e-government as a technology to operate more efficiently, to design and implement better policies, and to provide programmes and provide services more effectively or not.

The recommendations put forward by the officials quoted are very relevant and suitable for integrating ICT in its normal process.

*Annexure A*

**Participatory Information System: A Decision Support System to help Decision Makers in Monitoring, Planning and Implementation of Public Services**





## REFERENCES

- Arfeen, M. I. (2009) *Government of Balochistan: Provincial and District Level e-Governance Need Assessment Report*. AGRP-B, UNDP, Islamabad.
- Eggleston, Karen, Robert Jensen, and Richard Zeckhauser (2002) Information and Communication Technologies, Markets, and Economic Development. In *The Global Information Technology Report 2001-2002: Readiness for the Networked World*. New York: Oxford University Press.
- Electronic Government Directorate (2005) *Automation of Hajj Wing of the Ministry of Religious Affairs*. Islamabad.
- Fagerberg, J. (2005) Innovation: A Guide to the Literature. In J. Fagerberg, *et al.* (eds). *The Oxford Handbook of Innovation*. Oxford: Oxford University Press. 1–26.
- Hartley, J. (2006) *Innovation and its Contribution to Improvement: A Review of Policy Makers, Policy Advisors, Managers and Researchers*. May, London: Department of Communities and Local Government.
- IDEA Knowledge (2005) *Innovation in Public Services: Literature Review*. Retrieved: October 20, 2009 from <http://www.idea.gov.uk/idk/aio/1118552>
- Leitner, Ch. (ed.) (2003) *e-Government in Europe: The State of Affairs*. European Institute of Public Administration, Maastricht, Holandsko.
- Metcalf, S. and I. Miles (1997) *Services: Invisible Innovators*. Paper presented at the CSLS Conference on Service Sector Productivity and the Productivity Paradox, April 11-12. Canada. PREST and CRIC, University of Manchester.
- OECD (2005) *Oslo Manual: Guidelines for Collecting and Interpreting Data. The Measurement of Scientific and Technological Activities* (3rd edition.). A Joint Publication of OECD and Eurostat. Retrieved: October 20, 2009 from [http://epp.eurostat.ec.europa.eu/cache/ITY\\_PUBLIC/OSLO/EN/OSLO-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/OSLO/EN/OSLO-EN.PDF)
- Schumpeter, J. (1934) *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. Cambridge, Massachusetts, Harvard University Press.
- Schumpeter, J. (1939) *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. Vol. 1. New York: McGraw-Hill.
- United Nations (2008) *e-Government Survey 2008 From E-Government to Connected Governance*. Department of Economic and Social Affairs, Division of Public Administration and Development Management, New York.
- UNKB (Nations E-Government Development Knowledge Base) (2010) *e-Government Survey 2010*. Department of Economic and Social Affairs, Division of Public Administration and Development Management, New York. Retrieved: January 15, 2010 from <http://www2.unpan.org/egovkb/profilecountry.aspx?ID=128>
- World Bank (2000) *Entering the 21st Century—World Development Report*. Oxford University Press.

## **Economic Evaluation of Health Cost of Pesticide Use: Willingness to Pay Method**

MUHAMMAD KHAN

### **1. INTRODUCTION**

Pesticides are the most familiar way to control pests. It helps farmers to kill pests that would otherwise reduce the yield obtained from fields. This role of pesticides, on the other hand is accompanied by disutility in the form of health impairment. Due to the high interdependency of farms and farm workers, an impairment of the health status of the farm worker imposes potential negative effect on agricultural production [Ajayi (2000)]. This negative effect may manifest in a lower level of farm production (e.g. through a reduction in the number of farm labour that are available to work at farm). It may also lead to decrease income for the agricultural household (e.g. through a reduction in the output level). Another negative effect is that it may lead to a reduction in the amount of leisure time available for the household (through a reduction in the leisure time available for sick farm household/worker or more stress of work for the healthy members of farm household who have to work more and harder to fill in for sick members).

In addition to short term health effects, there is now increasing evidence of chronic effects of pesticide use which indeed impose potential negative effects on farm production in future. Given that labour is the most important factor in agricultural production particularly in developing countries, the use of pesticides therefore lower potential output not only in short run but also in long run through negative effects on the health of farm workers. With these concerns, it becomes important to examine the health implications of pesticide use. The measurement of health cost of pesticide use helps to inform policy-makers about the productivity reducing effects of pesticide use (due to morbidity effects on labour). The quantification of human health cost of pesticide use will help: first, for effective allocation of resources to necessary health and safety programmes that can safeguard rural communities and second, for formulation of new rules and regulations to protect farmers from pesticide hazard [Atreya (2007)].

However, economic valuation of health costs of pesticide use is constrained by the measurement challenges because of different value components (market components, e.g. cost of illness and non-market component, e.g. cost of pain and discomfort) of human health. Since it is almost impossible to integrate market and non-market elements of health cost, the economic measurement of pesticide associated health cost in most cases have focused on the market components.

Muhammad Khan <mkhan\_490@yahoo.com> is PhD Scholar in Federal Urdu University of Arts, Science and Technology, Islamabad.

However, a comprehensive analysis should also include non-market component of health cost. To overcome these limitations, economists developed some modern approaches for assessing changes in value for these goods in the absence of markets. One such technique is Contingent Valuation (CV) which this study applies to measure health cost of pesticide use in two districts of Punjab, Pakistan.

### 1.1. Economic Evaluation of Health Cost

Like many other environmental goods, economic evaluation of health cost of pesticide use is embarrassed by the practical obstacles because of different value components of human health; market component such as the cost of illness, productivity loss, work days loss (days on which a person is unable to engage in gainful employment/job) and non-market component like cost of discomfort.

Since it is difficult to integrate market and non-market elements of health cost in a health cost model, evaluations of health costs of pesticides so far have focused on the market components, i.e., estimating the costs of illness, work days loss and productivity loss. Different researchers used different approaches include: accounting for farmers' private expenses for the treatment of acute poisoning and the opportunity cost of labour days lost due to illness [Ajayi (2000); Huang, *et al.* (2000)] which obviously a conservative measure of health cost. Others like [Rola (1993)] included effects on the productivity of the family labour and estimates of the cost of chronic illnesses based on clinical studies [Garming (2006)]. Since economic perspective on health focuses on effects that people are aware of and want to avoid, that is, health effects that would decrease their utility. "Much clinical research focuses on effects of questionable significance to individuals, and measures effects that are difficult to relate to individuals perceptions and behaviour" [Freeman (2003)].

Keeping in mind that individual's preferences give better/suitable basis for making decisions about changes in welfare, health cost of pesticide use should be measured according to individual's preferences or willingness to pay. Hence, the Contingent Valuation method (CV)<sup>1</sup> has been proposed in order to obtain a valuation of health based on the individuals' preferences. As pointed by Carson (2000), CV is a useful tool for benefit-cost analysis and offers potentially valid measure to trace out the distribution of willingness to pay<sup>2</sup> for a population of economic agents for a proposed change in a good. Through benefit-cost analysis, welfare economics, attempts to explain possible change in utility resulting from a minor change in an economic variable. Typically, welfare implications are demonstrated in terms of a change in monetary amount which would need to be taken from or given to the agent to keep the agent's overall level of utility constant [Carson (2000)]. Conceptually, the same measure of benefit applies to non-market goods, that is, the maximum amount an individual would pay to avoid losing or gaining access to the good [Lipton (1995)].

<sup>1</sup>In this approach, respondents are offered a hypothetical market, in which they are asked to express the WTP for existing or potential environmental conditions not reflected in any real market. The monetary values obtained in this way are thought to be contingent upon the nature of the constructed market, and the commodity described in the survey scenario [Garming (2006)]. The answers offered a direct way to trace the demand curve for an environmental good that could not otherwise be seen from the market data [Hanemann (1994)].

<sup>2</sup>CV is better measure of health cost of pesticide use since; it also includes non-market value.

## 2. THEORETICAL BACKGROUND

Microeconomic theory provides necessary elements to model the decision process of an individual's choice of non-market good. In Contingent Valuation Method, the change in the supply of a non-market good is evaluated with respect to a constant utility for the individuals following the concept of Hicks compensated demand functions. The utility of the farm household ( $U_0$ ) can be expressed as the sum of health ( $H_0$ ) and other goods, summarised as income ( $Y_0$ ). If supply with health is improved to  $H_1$ , keeping income constant, farmers move to a higher utility level ( $U_1$ ). The value of the change in supply is measured as that amount of income that the farmer is willing to pay (WTP) in order to be indifferent about the change in health, i.e., to remain on his initial utility level, conceptually, using an indirect utility framework; the economic valuation construct can then be represented as:

$$U_0 = Y_0 + H_0 = Y_0 - C(\text{WTP}) + H_1$$

Where, for a given individual,  $U_0$  is a base level of utility,  $Y_0$  is current income and  $H_1$  is the improved health. WTP is the amount of income a farmer would give up in order to gain improved health, while maintaining a constant level of utility. Also the Willingness to pay is a function of the product attributes, characteristics of the consumer, and other factors thought to influence the choice.

## 3. RESEARCH METHODOLOGY

### 3.1. Sampling and Data Collection

Data from the Pakistan agriculture statistics [Agriculture Census (2000)] were collected to find the composition of pesticide use in different crops and geographical areas. Cotton has been identified as the major crop, which accounts more than 80 percent of total pesticide use in Pakistan [Pesticide Use Survey Report (2002)]. Whereas more than 80 percent of cotton is produced in Punjab province and being the centre of cotton crop the cotton zone of the Punjab has been recognised as the most intensive with respect to pesticide use. Over all two districts (Lodhran and Vehari) of the cotton belt in Punjab province are selected for the study.

A well-designed, comprehensive and pre-tested questionnaire was used to collect data from both the districts in 2008. The method of meeting interview was used for filling in the questionnaire and all interviews were conducted face to face. The questionnaire is based on United States Environmental Protection Agency questions and on that used in the similar World Bank studies in Bangladesh and Vietnam.<sup>3</sup> Sampling for this study combined purposive and probabilistic sampling methods.

To study a small subset of a larger population in which many members of the subset could easily be identified. Area sample/cluster sampling was used to collect data economically. Hence as a sampling strategy, after the selection of study districts, all three tehsils were chosen for survey as the representative area. At least three villages (clusters), from every tehsil were selected in each district to get the pesticide-related information from a sample of farmers. In each village, well informed men were hired to make

<sup>3</sup> See, Dasgupta (2005).

farmer's list in their respective villages. Overall 915 farmers from both the districts, 412 from district Vehari and 503 from district Lodhran were enlisted. A random sample of 400 farmers was drawn without replacement using [Random. Org (2008)]. Respondents were selected in order from the numbers drawn until 318 interviews were successfully completed. The overall response rate (i.e. successful interviews completed) was 80 percent, including 85 percent response rate for Lodhran district and 75 percent response rate for Vehari district.

### 3.2. Validity and Reliability Tests of CVM

Since CVM has been criticised for relying on stated preferences instead of observable behaviour and controversy, to some extent continues to exist between researchers regarding validity and reliability of CVM, it is important to discuss this issue in present context.

Validity refers to the correspondence between what one wished to measure and what was actually measured. Reliability refers to the measurement's replicability [Carson (2000)]. Both terms can be operationalised in a variety of ways. The ideal way of determining validity is by comparing the measurement made to some criterion measurement known to be correct. Unfortunately, such a criterion to which CVM can be compared does not exist. Furthermore, no such criterion exists to which any other consumer surplus estimate can be compared, irrespective of the econometric technique used or whether the good is private or public [Gunatilake (2003)]. In such cases, investigators adopt different approaches to determining validity; two common ones are Construct validity and Convergent validity. Construct validity refers to how well the measurement is predicted by factors that one would expect to be predictive *a priori*. Convergent validity can be taken only when measurements of the phenomena of interest are available using two different techniques. Two types of reliability have interested CV researchers. One is the chronological/temporal stability of the estimate if two different samples of the sample population are interviewed with the same survey instrument at two different points in time. The other is the classic test-retest reliability where an original sample of respondents is later re-interviewed using the same survey tool.

In practice, as described by Garming (2006) that there is consensus among researchers that the reliability of the CV is not an issue of concern; one should stress on the validity of the results for the assessment of the quality of the particular CV studies. However, this study also measures reliability and the statistics of reliability analysis shows a reasonably good reliability value (.70). Hence questionnaire appeared to have good internal consistency. All items appeared to be worthy of retention except health effects. But the change in overall alpha if item is deleted is only .708. Nevertheless this increase is not dramatic and both values reflect reasonable degree of reliability.

For validity of the CV, there are two main types of validity assessments. Content validity refers to the design of the survey instrument. Is the good defined in a way that the correct value can be measured? Are respondents provided with sufficient and plausible information? Is the proposed way of payment acceptable and scenarios plausible? Careful survey design and pre-tests are tools to enhance content validity [Garming (2006)]. The theoretical validity test applies the idea that the preferences for environmental (non-market) goods follow the same rules as the preferences for conventional market goods.

The valuation should be sensitive to the quantity of the good and WTP should vary with income and attitudes towards the good. Attitudes towards the good, e.g. concerns about pesticide poisoning and experience of illness, as well as budget constraints and risk measures like intensity of pesticide use are expected to have an impact on farmers' valuation of pesticide related health effects.

The study followed NOAA guidelines for good practices in CVM obtained by Portney (1994).

The design of the questionnaire therefore was guided by the CV guidelines, data requirements for the WTP analysis and the tests on the validity. Table 1 gives a snapshot of the validity criteria used in implementation of the field survey. The description of health for the valuation scenario was based on the approach used by Garming (2006). Health was represented as an attribute of a pesticide which was offered in a hypothetical purchase situation.

Table 1

*Validity Test in the Implementation of the CV*

|                                 |   |   |
|---------------------------------|---|---|
| Content Validity                |   |   |
| Definition of the Good          | Pesticide without health risks  | Response rates<br>Analysis of risks   |
| Payment Vehicle                 | Pesticide price   | comments of   |
| Familiarity                     | Farmers' heavily dependent pesticides   | respondents with zero WTP.  |
| Acceptance of the Questionnaire | Modifications after pre-tests   |   |
| Construct Validity              |   |   |
| Theoretical Validity            | Household characteristics<br>Pesticide related health experiences<br>Perception/attitudes | Scope test: larger the scope (benefits) = more WTP?<br>Ordered probit model on WTP. |

*Source:* Adapted with changes from Garming (2006).

In order to increase the farmers' familiarity with the good, for each respondent his most recent used/heavily dependent pesticide was taken as a reference with respect to pest control efficiency. The price premium, he would be willing to pay for a pesticide (IPM) with the same characteristics except the health risks of the product was then established as the WTP for the health attribute. Other possible descriptions of the good "health" could be included e.g. the willingness to invest in IPM. However, discussions with farmers showed, that most of the farmers were not familiar with IPM; this type of description might not reflect true reference and would have reduced the plausibility of this scenario for the farmers. Thus the most practical description remains chemical pesticides which farmers are very familiar with, rendering the "low toxicity pesticide option" as the most feasible option for the CV survey [Garming (2006)].

Following standard practice in CVM analyses, the respondents were asked suppose that you were able to have access to a pesticide that was just as effective as the one(s) you

are using now, but it did not have any short- or long-term health effects. Thinking about the health effects you have experienced with your current use of pesticides, how much would you be willing to pay for the use of the safer pesticide? Furthermore, economic theory would suggest that consumer's choices are influenced by their individual tastes and preferences, income, attitudes towards and perceptions of the different types of products, as well as household and demographic characteristics [Garming (2006)]. One could then use the relationship between WTP and factors affecting WTP.

### 3.3. Empirical Model

In many empirical analyses, including this study, WTP takes the form of a multiple response variable that has intrinsic order. As a result, ordered qualitative response models must be used. In this case, the WTP model can be written using a latent variable as follows:

$$WTP^* = X' \beta + \varepsilon$$

Where  $WTP^*$  is the latent (or unobserved) willingness-to-pay,  $X$  is a vector of variables thought to influence willingness-to-pay,  $\beta$  is a vector of parameters reflecting the relationship between willingness-to-pay and variables in  $X$  and  $\varepsilon$  is an independently and identically distributed error term with mean zero and variance one. If a farmer's  $WTP^*$  falls within a certain range,<sup>4</sup> their WTP is assigned a numerical value that reflects the category in which their unobserved willingness-to-pay lies [Cranfield (2003)].

The probability of a WTP being in one of  $J$  finite categories can now be written as:

$$Pr(WTP = j - 1) = \Phi(\alpha_j - X' \beta) - \Phi(\alpha_{j-1} - X' \beta) \forall j \in J$$

Where  $\Phi(\cdot)$  is a cumulative density function (CDF), which measures the probability of WTP. Two broad choices, the logistic or standard normal density functions, are readily available. An ordered probit model was used. Like all probability models, an ordered probit model allows for calculation of predicted probabilities for each WTP category and marginal effects. When calculated at the means of the data, predicted probabilities indicate the chance of the average farmer being willing-to-pay a premium falling within each of the categorical premium levels. A number of different explanatory variables also included as common practice in the WTP model. These include household socio-economic characteristics, health-related pesticide exposure. Attitude or perception towards health risk is expected to be the most important variables determining WTP. Similarly previous experience with pesticide poisoning, the reporting of sign/symptoms related to pesticide application was also important explanatory variable. Personal characteristics of the respondent like income, age and education were also used in the ordered probit model [Cranfield (2003)].

### 3.4. Data Analysis and Result

Table 2 shows the willingness-to-pay categories and distribution of responses. Respondents were asked to indicate their WTP either in actual monetary amounts<sup>5</sup> (which

<sup>4</sup>The amount classified into categories, 1= Not willing to pay, 2= willing to pay from 1 percent up to 5 percent premium, 3= willing to pay up to 6 percent to 10 percent premium, 4= willing to pay up to 11 percent to 20 percent premium, 5= willing to pay over and above 20 percent premium.

<sup>5</sup>Which helps to eliminate respondent's need to make mental calculations, and to be reflective of a retail market situation?

Table 2

*Distribution of WTP Responses (%)*

| Willingness to Pay Category                      | Both Districts | Vehari     | Lodhran    |
|--|----------------|------------|------------|
| Not willing to pay                               | 22.9           | 17.4       | 27.8       |
| Willing to pay one to five percent premium       | 21.6           | 26.2       | 17.8       |
| Willing to pay six to ten percent premium        | 39.8           | 36.9       | 42.6       |
| Willing to pay eleven to fifteen percent premium | 1.9            | 2.0        | 1.8        |
| Willing to pay sixteen to twenty percent premium | 13.2           | 17.4       | 9.5        |
| Willing to pay more than twenty percent premium  | 0.3            | 0.0        | 0.6        |
| <b>Total</b>                                     | <b>100</b>     | <b>100</b> | <b>100</b> |

later converted into percentages), or to percentage amounts directly. The table shows that out of 318 respondents 73 (22.9) percent farmers are not willing to pay any premium. Following standard practice in CVM the farmers were asked if this was because they did not value the health improvements, or because they objected to the payment vehicle or some other aspect of the question [Cho (2005)]. The answers were categorised into (a) I have not enough money to pay more, government should provide these pesticides at the same cost (b) I do not believe that pesticide use lead to health effects as claimed. The farmers who answered (b) can be classified as legitimate zero WTP who did not value health improvements. The households who answered (a) can be categorised as who objected to the payments vehicle.

The zero responses are significantly higher in district Lodhran which was expected since farmers in district Vehari are relatively more educated as well as having higher mean income and higher risk perception. This is also evident from the Table 3. The results, therefore, appear logical and consistent with theory and existing literature.

Table 3

*District Wise Mean WTP*

|                  | Mean WTP (%) | Mean WTP Amount in (Rs) |
|------------------|--------------|-------------------------|
| WTP in Lodhran   | 7.5          | 542                     |
| WTP in Vehari    | 8.8          | 628                     |
| Total Sample WTP | 8.1          | 582                     |

The mean willingness to pay appears to be very low, as compared to other studies such as Garming (2006) found that farmers in Nicaragua willing to pay 28 percent more, the total cost of pesticide. Similarly Cuyno (1999) found that Philippines farmers were willing to pay 22 percent of pesticide costs for human health category. This is however not surprising, if taking into account, that the most of the farmers are poor (small-scale farmers), and uneducated.

**3.4.1. Age, Gender and Education of the Farmers**

All the surveyed farmers were male; this is because usually the spraying operations are done by male in Pakistan. Age ranges from 18 to 66 years, with an average age of 33.3 years approximately. Most of the farmers 113 were in age groups 21-30 (35.5 percent) and 101 were in age group of 31-40 (31.8 percent). The Table 4 displays the education attainment of different age groups.

Table 4

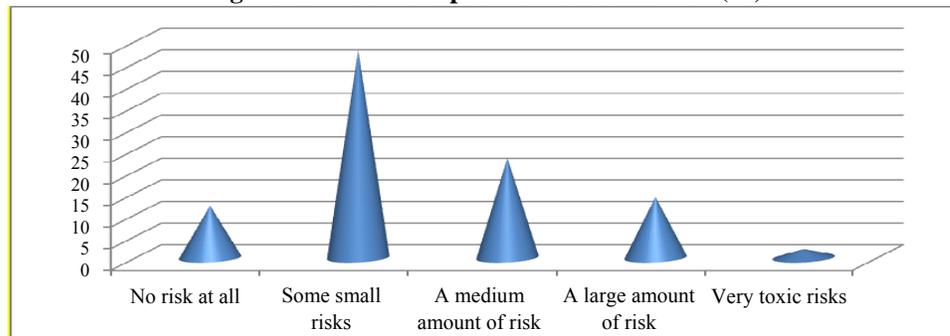
*Education Attainment of Different Age Groups*

| Age Categories | Education Attainment |               |        |        |                  |                      |
|----------------|----------------------|---------------|--------|--------|------------------|----------------------|
|                | Illiterate           | Up to Primary | Middle | Metric | Higher Secondary | Graduation and Above |
| ≤20            | 5                    | 6             | 2      | 3      | 0                | 2                    |
| 21-30          | 32                   | 25            | 28     | 15     | 6                | 7                    |
| 31-40          | 27                   | 33            | 25     | 7      | 3                | 6                    |
| 41-50          | 10                   | 13            | 18     | 4      | 3                | 2                    |
| 51-60          | 9                    | 11            | 5      | 8      | 1                | 1                    |
| 61+            | 1                    | 0             | 0      | 0      | 0                | 0                    |
| Total          | 84                   | 88            | 78     | 37     | 13               | 18                   |

**3.4.2. Risk Perception**

Perception of a pesticides' health risk is also of interest as this may influence WTP decision by the farmers. According to the study's results, the majority (88 percent) of farmers believed that they are at health risk while using pesticides. During the interview, farmers were asked to rank the risk. Five categories were presented and scaled as shown in the Figure 1. More than half 52 percent reported some small risk, 23 percent, a medium amount of risk, 10 percent believed that the risk is large and significant, 3 percent said the risk is very toxic, however 12 percent believed that there is no risk at all.

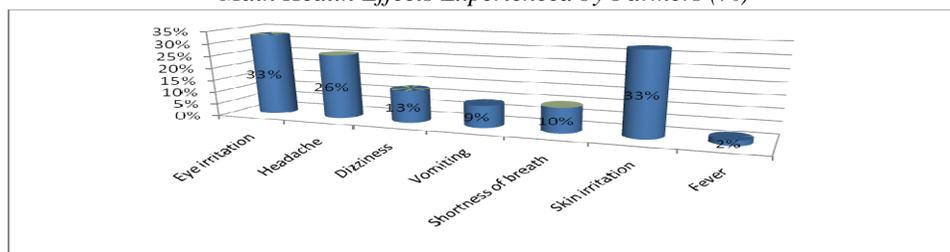
It is important to note that pesticides were regarded as very important for successful production. They also added that they could not grow crops without pesticides. Although many of them believed that spraying pesticide is dangerous but, they said that they have "no other option" at all.

**Fig. 1. Farmers Perception of Pesticides Risk (%)**

Farmers were also asked if they experienced any health impairment during mixing and spraying pesticides or within 24 hours after the pesticide application is finished.<sup>6</sup> Almost 82 percent of farmers said they experienced health impairment after mixing and spraying pesticides (see Table 5).

<sup>6</sup>It must be noted that most of the pesticide mixture consist of chemicals which have essentially acute effects. Therefore it is expected that the health symptoms of exposure to these chemicals would be visible within 24 hours time period.

Table 5

*Main Health Effects Experienced by Farmers (%)*

The most common signs<sup>7</sup> and symptom<sup>8</sup> experienced were eye (irritation: 33 percent), neurological (headaches: 26 percent, dizziness: 13 percent), gastrointestinal (vomiting: 9 percent), respiratory (shortness of breath: 10 percent), dermal (skin irritation: 33 percent) and (Fever: 2 percent).<sup>9</sup>

Over 34 percent of the respondents experienced multiple health effects, with an average of 2.6. The maximum numbers of symptom reported were 6. Upon asking sick farmers whether they believed that these symptoms were related to pesticide use, 63 percent believed this to be true. More than 44 percent of them strongly believed that these symptoms were related to pesticide use.

### 3.4.3. Results of Ordered Probit Model

Since the ordered probit model is non-linear, the estimated coefficients are not marginal effects. Therefore, coefficient estimates and marginal effects are reported individually. The estimated coefficients of the ordered probit model and the corresponding p-values are shown in Table 6. Out of nine explanatory variables, five are significant and have expected signs. Importantly, these variables are theoretically-motivated variables. The Pseudo R2 about (.5167) and the null hypothesis that the estimated coefficients are jointly equal to zero is rejected at the one percent level.

Table 6

*Estimated Coefficients of Ordered Probit Model for Positive WTP*

| Variables              | Estimated Coefficients | Z-scores |
|------------------------|------------------------|----------|
| Education              | .2190725***            | (4.64)   |
| Perception             | 1.293249***            | (11.46)  |
| Training               | -.4451418              | (-1.43)  |
| IPM                    | -.023301               | (-0.08)  |
| Farm Size              | .1811018*              | (1.86)   |
| Age                    | .0718007               | (0.363)  |
| Health Effects         | .6933518***            | (3.36)   |
| Income                 | .7846149***            | (7.13)   |
| District Dummy(Vehari) | -.027809               | (-0.18)  |

Log likelihood = -206.46517, Pseudo R2 = 0.5167, LR chi2 (12) = 441.41\*\*\*

\* – Significant at the 10 percent level. \*\* – Significant at the 5 percent level.

<sup>7</sup>Sign: something you can observe or see that requires an examination.

<sup>8</sup>Symptom: something a person feels but you cannot see.

<sup>9</sup>These are the health effects that farmers did not have before they started spraying, but these appeared only during mixing or spraying or within 24 hours after the pesticide spraying has ended.

Regarding personal/household characteristics, it comes as no surprise that income variable approximated by the sum of all the household expenditures, either in cash or in goods is positively related to WTP. Thus, purchasing power of the farmers is highly significant determinant of WTP. Whereas low income farmers cannot decide freely on environmental friendly or quality pesticides for higher prices. Similarly, the coefficient for education is consistently highly significant to a positive WTP. Continuing with personal/household characteristics, the age of the respondent has no impact on WTP. Contrary to Garming, *et al.* (2006) adoption of Integrated Pest Management practices may not always positively associated with WTP. This is supported by the fact that an individual will be least interested to pay for the good which he/she already has; that is, they already practicing IPM successfully. The training variable carry's same arguments, the farmers who already got training of safe handling of pesticide are less likely to pay more for safer pesticide.

Of the health and exposure-related variable, the reporting of an adverse health experience was positively and significantly associated to a positive WTP. Similarly perception of risk is significantly related to positive willingness to pay. More over results showed that the association between the farmers' risk perception and WTP is very strong. Thus risk perception is the most important determinant for positive WTP. The size of the farm is significant to the positive WTP in present analysis which was very much expected since it can be interpreted as an indicator of wealth. With respect to the different regions, WTP is not significantly different in both the districts.

The predicted probabilities for the five willingness to pay categories are reported in Table 7. The reported probabilities indicate the likelihood that on average farmers are willing-to-pay some premium for safe pesticides which possibly improve their health. The table has two panels, the upper panel reports predicted probabilities and the lower indicates the marginal effect for all explanatory variables. Model includes both continuous and binary variables. Starting from top of the table, age of the farmers, nevertheless not significant more likely to pay some premium for safer pesticides since we also assume age as the proxy of farming/pesticide use experience, suggests that farmers who have been using pesticide since long are more likely to perceive higher risk and therefore willing to pay premium for safer pesticides. Differently this can also be explained in terms of income of the farmers. Old farmers are more likely having higher income and more empowered. The "risk perception" variables have negative marginal effects for the first two WTP categories (i.e., the not willing to pay any more and the willing to pay between one and five percent categories), but a positive marginal effect for the other willingness-to-pay categories. Moreover, the marginal effect tends to be very strong for the category "medium amount of risk". Thus the farmers who perceive pesticide a health risk are more likely to be willing to pay premium relative to those who do not perceive pesticides a health hazard.

The pesticide related health effect variable has negative marginal effects for first two categories of WTP but positive marginal effects for other three categories of WTP. These results are analogous to priory expectation since logically, negative health experiences from the pesticides more likely to influence farmer's attitudes to pay higher premium for safe pesticide. The marginal effect of education is negative for the first two categories of WTP; but it is positive for the higher categories of WTP. This suggests that

Table 7

*Predicted Probabilities and Marginal Effects from the Estimated Model*

|                         | WTP(=0)                 | WTP (1-5 %) | WTP (6-10%) | WTP (11-20%) | WTP (20 % and above) |
|-------------------------|-------------------------|-------------|-------------|--------------|----------------------|
| Predicted Probabilities | .03946155               | .38032781   | .57760992   | .00260072    | 7.644e-10            |
|                         | <b>Marginal Effects</b> |             |             |              |                      |
| Age                     | -.0061195               | -.0219439   | .0274859    | .0005775     | 3.40e-10             |
| Perception              | -.1102229               | -.3952452   | .4950665    | .0104016     | 6.13e-09             |
| Health Effects          | -.0869063               | -.1842272   | .2676826    | .0034509     | 1.66e-09             |
| IPM                     | .0020161                | .0071064    | -.0089395   | -.000183     | -1.05e-10            |
| Training                | .0503218                | .1256599    | -.1735827   | -.002399     | -1.05e-09            |
| Farm Size               | -.0154352               | -.0553487   | .0693273    | .0014566     | 8.58e-10             |
| Education               | -.0186714               | -.0669534   | .0838628    | .001762      | 1.04e-09             |
| Income                  | -.0668723               | -.2397955   | .3003572    | .0063106     | 3.72e-09             |
| District (Vehari)       | .0023701                | .008499     | -.0106455   | -.0002237    | -1.32e-10            |

holding, other things same, there is a higher probability of being in lower WTP categories when farmer's education is low compared relative to when farmer's education is higher. Differently, more educated farmers are more likely to pay higher premium for safe pesticide relative to less educated farmers.

The marginal effects of training and IPM variables for the first two categories (i.e., the not willing to pay any more and the willing to pay between one and five percent categories) are positive, such that the farmers who got training of safe handling of pesticide use and farmers who currently practicing IPM are more likely to pay either no premium or up to five percent premium and very less likely willing to pay higher premium for safe pesticides. The income variable shows a similar pattern. The marginal effect for the first two categories of WTP is negative however these effects are positive for other categories. This is because higher income farmers can afford premium. The farm size variable follows same reasoning. This variable is an indicator of individual's wealth which ultimately expands farmer's budget constraints. Thus more the size of farm, the more likely farmer willing to pay premium for safe pesticides. The result is parallel to priory expectation and consistent to theory.

#### 4. CONCLUSION

This paper highlights the results of Contingent Valuation method to measure health cost of pesticide use from farmer's point of view. Analysis shows that farmers have a positive willingness to pay for avoiding pesticide related health risks. Theoretical validity tests show that relevant indicators such as risk perception, previous experience of pesticide related poisoning, education and income are significant predictors for the positive WTP.

Compared to the other studies in literature [Garming, *et al.* (2006); Cuyno (1999)] mean willingness to pay is relatively small. This is not surprising, since most of the farmers are poor (small-scale farmers), and uneducated and cannot afford premium. From the results it is evident that health effects provided motivation for farmers to pay more for practices like IPM that reduce dependence on pesticide use which in turn a strong motivation for policy-makers to continue research on IPM and its implementation.

## REFERENCES

- Ajayi, O. O. (2000) Pesticide Use Practices, Productivity and Farmers' Health: The Case of Cotton-Rice Systems in Côte d'Ivoire, West Africa. (Pesticide Policy Project Publication Series Special Issue No. 3).
- Cranfield, J. A. L. (2003) Canadian Consumer's Willingness-to-pay for Pesticide Free Food Products: An Ordered Probit Analysis. *International Food and Agribusiness Management Review* 6:4.
- Dasgupta, Susmita C. M. (2005) Health Effects and Pesticide Perception as Determinants of Pesticide Use: Evidence from Bangladesh. World Bank Policy Working Paper Series (WPS3776) .
- Freeman, A. M. (2003) The Measurement of Environmental and Resource Values: Theory and Methods. Washington, DC: Resources for the Future.
- Garming, H. W. Hildegard (2006) Willingness to Pay to Avoid Health Risks from Pesticides, a Case Study from Nicaragua. Development and Agricultural Economics, Faculty of Economics and Management University of Hannover, Germany. (Working Paper 2006 No. 4).
- Gunatilake, H. (2003) Environmental Valuation: Theory and Applications. Chapter 6, Contingent Valuation.
- Hanemann, W. M. (1994) Valuing the Environment Through Contingent Valuation. *Journal of Economic Perspective* 4, 19–43.
- Jikun Huang, F. Q. (2003) *Farm Pesticide, Rice Production, and Human Health*. <http://203.116.43.77/publications/research1/ACF268.html>.
- Leah, C. M. Cuyno (1999) An Economic Evaluation of the Health and Environmental Benefits of the IPM Programme (IPM CRSP) in the Philippines. Agricultural and Applied Economics. Blackburg, Virginia Polytechnic Institute and State University 133.
- Lipton, W. and K. W. Douglas (1995) Economic Valuation of Natural Resources: A Handbook for Coastal Resource Policymakers. National Oceanic and Atmospheric Administration (NOAA), USA.
- Pakistan, Government of (2000) Agriculture Census 2000-Procedure and Data Tables Punjab. Statistics Division, Agriculture Census Organisation Lahore, Pakistan.
- Pakistan, Government of (2002) *Pesticide Use Survey Report 2002*. National Fertiliser Development Centre, Islamabad Pakistan.
- Portney, P. R. (1994) Contingent Valuation Debate: Why Economist should Care. *Journal of Economic Perspective* 8:4 , 3–17.
- Random. Org. (2008) Retrieved from [www.random.org/nform.html](http://www.random.org/nform.html).
- Richard, T. and N. A. Carson (2000) Contingent Valuation: Controversies and Evidence. Department of Economics, UCSD.
- Rola, A. C. (1993) Pesticides, Rice Productivity, and Farmers' Health—An Economic Assessment. IRRI, Manila, Philippines.

## Skills, Competitiveness and Productivity

MUHAMMAD KHAN, FOZIA AFTAB KIANI, AFSHEEN ASHRAF, and  
M. IFTIKHAR-UL- HUSNAIN

### 1. INTRODUCTION

Productivity is a key factor driving long term economic growth and increases in living standards. Productivity also affects business cycle developments, inflation, exchange rates and other key macroeconomic variables, such as consumption, investment and employment [Salvador, *et al.* (2006)]. In terms of labour market, productivity growth is essential for creating quality jobs, since increased labour productivity can lead to higher wages, better working conditions, and more investment in human resources. It therefore provides a sustainable route out of poverty.

Education and skills development are crucial to improve and sustain productivity and income-earning opportunities at work. Without a workforce that is continuously acquiring new and improved skills, it will be difficult for a country to be competitive in the globalising world. There is now increasing evidence to show that the education and skills of the workforce are significant determinants to economic growth and raising productivity. Since mid-1980s a wave of “new” growth theories focus on increasing returns not only in physical but also in human capital and claim that the main engine of economic growth is the accumulation of human capital and the main source of differences in living standards among nations is differences in education and level of skills [Amjad (2005)]. The ILO (2001) global report on information technology points out that the full benefits of the new wave of technological change cannot be reaped without an impressive complement of skills.<sup>1</sup> Therefore, a prerequisite for sustained economic growth and development is sufficient investment in education and training.

It is also recognised that education, training and lifelong learning contribute significantly to promoting the interests of individuals and organisations. Education and training serve to enhance the mobility of workers in the labour market and offers the potential for increased career choices. Education and training also serve to improve the

Muhammad Khan <mkhan\_490@yahoo.com> is PhD Scholar in Federal Urdu University of Arts, Science and Technology, Islamabad. Fozia Aftab Kiani and Afsheen Ashraf are Research Officers in the Ministry of Labour and Manpower, Islamabad. M. Iftikhar-ul-Husnain is PhD Scholar in Federal Urdu University of Arts, Science and Technology, Islamabad.

<sup>1</sup>A skill is the learned capacity to carry out pre-determined results often with the minimum outlay of time, energy, or both or a proficiency at performing specific tasks acquired through training or experience. Skills are transferable from job to job and can be improved through training and education. ([www.businessdictionary.com/definition/skill.html](http://www.businessdictionary.com/definition/skill.html)).

capacity of people to attain decent work.<sup>2</sup> The ILO Resolution concerning human resources training and development 2000 acknowledged that “Education and training are a means to empower people, improve the quality and organisation of work, enhance citizens’ productivity, raise workers’ income and promote job security and social equity and inclusion” [ILO (2008)]. By investing in human through skills development and training, enterprises benefit from increased productivity, which ultimately serve to make the country more competitive in an increasingly integrated world.

This paper using a set of key indicators of labour market attempts to analyse the main issues related to skills and productivity performance in Pakistan. We focus on describing and explaining developments in skills, productivity and labour market. We include in our sample more recent data (covering the period 2000 up to 2008) for both the total economy analysis and the sectoral analysis. We mainly use data from the Labour Force Survey of Pakistan.

The rest of the paper is organised as follows. In Section 2 we provide an overview of the government policies concerning skills development and competitiveness of labour force. In Section 3 skills and competitiveness is discussed briefly. Section 4 is devoted to analyse skills and productivity developments in Pakistan. Conclusion and policy implications are presented in Section 5.

## **2. TOWARDS DEVELOPING A GLOBALLY COMPETITIVE WORK FORCE**

The Medium Term Development framework (MTDF 2005-10) sets out the strategic vision to develop a knowledge economy by committing increased resource allocations for: (i) higher education, (ii) science and technology and research and development; and (iii) Improvements in Information and Communication Technology (ICT) infrastructure.

The MTDF 2005-10 also places considerable emphasis on investing in skills development to make Pakistan’s labour force globally competitive. The MTDF envisages a major increase in the number of institutions (Polytechnics, Technical and Vocational Institutes) with the ultimate target of at least two in each district (of which one will be for women). It also plans for a major increase in the annual intake for skills and technical education to 400,000 by 2010 as compared to 105,000 in 2004-05 [Amjad (2005)].

In addition, National Vocational and Technical Education Commission (NAVTEC) has recently released a draft vision on skills called: *Skilling Pakistan: A vision for the National Skills Strategy, 2008–2012*. This consultation document highlights approaches to address the skills shortages in Pakistan and also points out the need for research. NAVTEC acknowledges that there is little systematic research conducted on skills development [Pakistan Employment Trends, Skills (2007)]. The vision calls for the production of more in-depth, systematic, multi-dimensional research.

In August 2007, “the Government released Vision 2030, a comprehensive strategy designed to create: A developed, industrialised, just and prosperous Pakistan through rapid and sustainable development in a resource constrained economy by developing knowledge inputs”. Amongst other salient points, major challenges identified are to

<sup>2</sup>Decent work is conceptualised as consisting of six dimensions that cover opportunities for work, work in conditions of freedom, productive work, equity in work, security at work and dignity at work.

improve the quality and expand the delivery of education, and to place employment and employability at the centre of economic and social policies. It recognises the need to invest in education and training as these are the foundations for a skilled and productive labour force. Furthermore, the Vision points out that labour reform policies should address productivity and industrial relations issues [Pakistan Employment Trends, Skills (2007)].

### 3. SKILLS AND COMPETITIVENESS

*Global Competitive Index* (GCI) published annually by World Economic Forum, looks at a range of factors contributing to productivity and competitiveness. Overall, there are twelve pillars which define competitiveness “as a set of institutions, policies, and factors that determine the level of productivity of a country.” Four out of twelve pillars<sup>3</sup> are directly linked to skills. These are health and primary education, higher education and training, business sophistication and innovation. Indirect pillars are technological readiness, as this measures how a country implements existing technologies to improve productivity, and labour market efficiency.

Pakistan is a weak performer in the competitive stakes. Pakistan is poorly ranked at number 101 in 2008-2009, out of 134 countries analysed. It is important to note that Pakistan is getting weak in terms of global competitiveness. Pakistan stood at number 92 in 2007-2008 and was at number 83 in 2006-2007. The same arguments appear to apply for the pillars related to skills. Concerning education and training, the labour market, business efficiency and innovation, Pakistan scored much less compared to previous years.

The policy-makers must turn their attention to increase skills and efficiency of Pakistani labour force which ultimately leads to improve competitiveness. Therefore, an effective workforce training system should be developed to enhance the labour productivity and competitiveness. Skills partnership between industry, education centres and governments should be build up not only to enhance the productivity of existing labour force but also to new entrants to labour market, so that more efficient and skilled labour can be provided to industries.

Table 1

#### *Global Competitive Index Rankings —South Asia 2008-09*

| Countries  | GCI 2007- 2008 |
|------------|----------------|
| Bangladesh | 111            |
| India      | 50             |
| Nepal      | 126            |
| Pakistan   | 101            |
| Sri Lanka  | 77             |

Source: World Economic Forum (2008-2009): *Global Competitive Index 2008-2009*.

<sup>3</sup>Twelve pillars of the GCI are: Institutions, Infrastructure, Macroeconomic stability, Health and primary education, Higher education and training, Goods market efficiency, Labour market efficiency, Financial market sophistication, Technological readiness, Market size, Business sophistication and Innovation.

Table 2

*Global Competitive Index Pillars—South Asia 2007-08*

| Countries  | 4th Pillar:<br>Health and<br>Primary<br>Education | 5th Pillar:<br>Higher<br>Education and<br>Training | 7th Pillar:<br>Labour<br>Market<br>Efficiency | 9th Pillar:<br>Technological<br>Readiness | 11th Pillar:<br>Business<br>Sophistication | 12th Pillar:<br>Innovation |
|------------|---|--|---|---|--|----------------------------|
| Bangladesh | 105   | 131  | 107   | 126                                       | 105  | 122                        |
| India      | 100   | 63   | 89  | 69  | 27   | 32                         |
| Nepal      | 107   | 125  | 124   | 130                                       | 117  | 126                        |
| Pakistan   | 116   | 123  | 121   | 100                                       | 87   | 82                         |
| Sri Lanka  | 53  | 65   | 115   | 82  | 32   | 36                         |

Source: World Economic Forum (2008-2009): *Global Competitive Index 2008-2009*.

#### 4. ANALYSIS OF SKILLS AND PRODUCTIVITY

##### 4.1. Analysis of Skills

The process of globalisation and openness is accompanied by interdependence and competition. As mentioned earlier, skills and education are established competitive weapons. A skilled and well developed human capital, capable of adapting innovations to handle new techniques of production is the main determinant of competitive edge in global economy. The educational system equipped to face the challenges is a pre-requisite to increased productivity, improved social and economic indicators and good governance along with overall economic development. The developed countries provide the evidence in this regard where throughout the process of economic growth; the focus has been on enhancing employability and productivity through investment on education and skill development.

To date, statistics on educational attainment of the labour force are the only available indicators of skills. The higher the level of education a person has, the more likely he can further improve his employability by acquiring additional skills through training. Unfortunately the average educational attainment of the labour force in Pakistan is very low. In 2007-2008, only 55 percent people of working age were literate at national level.

There is also a huge gap between the educational attainment levels of men and women, as the illiteracy level is much higher for females, and proportions of several education levels in the male labour force are double the proportions in the female labour force. Female illiteracy rate of the population 15 years and above is at 74.9 percent, 37.9 percentage points higher than their male counterparts. This ranks Pakistan among the 14 nations where the female illiteracy rate is more than 20 percentage points higher than that of males. The others include nine African countries, Afghanistan, India, Nepal and Yemen [ILO (2007)].

Low literacy rates have led to skills gaps and will continue doing so. Low educational attainment is also associated with low productivity and income levels. Furthermore, illiteracy impedes the trainability of the labour force, and therefore hinders the capacity of the labour market to adapt to change in the short term.

Table 3

*Educational Attainment of the Labour Force (%)*

| Labour Force 15+    | 2000 | 2002 | 2004 | 2006 | 2007 | 2008 |
|---------------------|------|------|------|------|------|------|
| <b>Illiterate</b>   |      |      |      |      |      |      |
| Both Sexes          | 53.3 | 48.1 | 47.2 | 46.2 | 45.3 | 45.3 |
| Males               | 48.1 | 43.8 | 41.7 | 40.0 | 38.4 | 37.6 |
| Females             | 80.6 | 71.3 | 72.7 | 71.8 | 73.2 | 75.3 |
| <b>Pre primary</b>  |      |      |      |      |      |      |
| Both Sexes          | 2.0  | 3.5  | 3.7  | 3.3  | 2.9  | 2.5  |
| Males               | 2.2  | 3.9  | 4.2  | 3.7  | 3.3  | 2.8  |
| Females             | 0.6  | 1.2  | 1.4  | 1.6  | 1.2  | 1.2  |
| <b>Primary</b>      |      |      |      |      |      |      |
| Both Sexes          | 14.2 | 14.9 | 14.7 | 15.5 | 16.0 | 15.6 |
| Males               | 16.0 | 16.3 | 16.3 | 17.1 | 17.8 | 17.5 |
| Females             | 5.0  | 7.6  | 7.4  | 9.0  | 8.7  | 8.2  |
| <b>Middle</b>       |      |      |      |      |      |      |
| Both Sexes          | 10.4 | 11.2 | 11.1 | 11.5 | 11.6 | 11.6 |
| Males               | 11.8 | 12.5 | 12.7 | 13.4 | 13.5 | 13.7 |
| Females             | 2.8  | 4.2  | 3.4  | 3.4  | 3.7  | 3.3  |
| <b>Matric</b>       |      |      |      |      |      |      |
| Both Sexes          | 11.4 | 12.3 | 12.6 | 12.8 | 13.3 | 13.4 |
| Males               | 12.5 | 13.3 | 13.9 | 14.5 | 15.2 | 15.6 |
| Females             | 5.2  | 6.9  | 6.5  | 6.1  | 5.5  | 4.9  |
| <b>Intermediate</b> |      |      |      |      |      |      |
| Both Sexes          | 4.1  | 4.6  | 4.7  | 4.8  | 5.3  | 5.4  |
| Males               | 4.5  | 4.7  | 5.0  | 5.3  | 5.9  | 6.1  |
| Females             | 2.4  | 4.1  | 3.1  | 2.9  | 2.9  | 2.6  |
| <b>Degree</b>       |      |      |      |      |      |      |
| Both Sexes          | 4.6  | 5.3  | 6.0  | 5.9  | 5.7  | 6.3  |
| Males               | 4.9  | 5.4  | 6.1  | 6.1  | 5.9  | 6.8  |
| Females             | 3.4  | 4.7  | 5.5  | 5.1  | 4.8  | 4.5  |

Source: Pakistan Labour Force Survey (Various Issues).

#### 4.1.1. Occupations, Wages and Skills

By assessing the occupational/wage distribution of those employed, the role of education and training can help determine labour market vulnerability. Pakistan's economic performance in the recent years and renewed policy framework does not provide any evidence that the structural change in the economy is accompanied by a major shift in occupations toward highly skilled occupational groups. By dividing major groups into three aggregates, 'highly skilled' (major groups 1-3), 'skilled' (major groups 4-8) and 'unskilled' (major group 9),<sup>4</sup> it can be seen that high skilled occupations accounted for 20.6 percent of the employed in 2008 slightly above 1999–2000. Table 4 demonstrates that highly skilled occupations although on a slow rate are on the rise and this is in line with the un-skilled occupations in the total share of employment. When looking at skilled category, there is hardly any improvement in 2008 compared to 1999-2000.

Table 4

| <i>Employment by Aggregated Major Occupational Groups (%)</i> |               |               |               |               |               |               |
|---|---------------|---------------|---------------|---------------|---------------|---------------|
| Employed 15+  | 1999-<br>2000 | 2001-<br>2002 | 2003-<br>2004 | 2005-<br>2006 | 2006-<br>2007 | 2007-<br>2008 |
| <b>Highly Skilled (Major Groups 1-3)</b>                      |               |               |               |               |               |               |
| Both Sexes  | 18.1          | 19.1          | 19.3          | 19.9          | 20.0          | 20.6          |
| Males   | 19.3          | 19.8          | 20.6          | 21.7          | 22.0          | 23.1          |
| Females   | 11.2          | 14.8          | 13.0          | 12.1          | 11.3          | 10.1          |
| <b>Skilled (Major Groups 4-8)</b>                             |               |               |               |               |               |               |
| Both Sexes  | 66.0          | 62.7          | 63.1          | 64.6          | 65.2          | 65.5          |
| Males   | 65.7          | 62.8          | 62.2          | 62.0          | 62.3          | 62.1          |
| Females   | 67.5          | 62.1          | 67.7          | 75.7          | 77.3          | 79.5          |
| <b>Unskilled (Major Group 9)</b>                              |               |               |               |               |               |               |
| Both Sexes  | 15.9          | 18.2          | 17.6          | 15.5          | 14.8          | 13.9          |
| Males   | 15.0          | 17.5          | 17.2          | 16.3          | 15.7          | 14.8          |
| Females   | 21.3          | 23.0          | 19.3          | 12.2          | 11.4          | 10.5          |

Source: FBS, 2008s, *Pakistan Labour Force Survey* (Various Issues).

Nominal and real wages were also analysed to compare trends across major groups of occupations, since a diverging trend of particular major groups may well signal skill shortages. Figure shows that highly skilled occupations increasingly demand a premium in the labour market. Wage rates of skilled and unskilled occupations do not keep up with the increases for highly skilled occupations.

Further, the review of wage data shows enormous wage discrepancies for male and female employees in average wages. In 2008, irrespective of geographical area women generally earned almost thirty to forty percent less than their male counterparts for the same jobs. Factors affecting the gender wage gap include factors related to human capital and productivity, work experience, health and location of enterprise as well as differences in wage payment systems.

<sup>4</sup>“Highly skilled” employees cover legislators, senior officials and managers as well professionals, technicians and associate professionals. “Skilled” workers cover the major occupational groups of clerks, service workers, shop market sales workers, skilled agricultural and fishery workers, craft and related trades workers and plant and machine operators and assemblers. “Unskilled” employees cover those working in elementary occupations.

Table 5

*Wages of Employees by Aggregated Major Occupational Group*

| 15+                   | 2000   | 2002   | 2004   | 2006   | 2007    | 2008    |
|-----------------------|--------|--------|--------|--------|---------|---------|
| <b>Highly Skilled</b> |        |        |        |        |         |         |
| <b>Nominal Wages</b>  |        |        |        |        |         |         |
| Both Sexes            | 5209.9 | 5786.5 | 7429.0 | 8789.6 | 9820.3  | 10738.6 |
| Males                 | 5452.3 | 6448.8 | 8310.6 | 9679.5 | 10747.7 | 11792.1 |
| Females               | 4111.5 | 3701.7 | 4608.5 | 5904.3 | 6616.4  | 6627.3  |
| <b>Real Wages</b>     |        |        |        |        |         |         |
| Both Sexes            | 5439.4 | 5588.7 | 6655.1 | 6677.0 | 6922.1  | 6758.1  |
| Males                 | 5692.5 | 6228.3 | 7444.8 | 7353.0 | 7575.7  | 7421.1  |
| Females               | 4292.7 | 3575.2 | 4128.4 | 4485.2 | 4663.7  | 4170.7  |
| <b>Skilled</b>        |        |        |        |        |         |         |
| <b>Nominal Wages</b>  |        |        |        |        |         |         |
| Both Sexes            | 3368.8 | 3537.1 | 3988.8 | 4997.6 | 5738.8  | 6309.2  |
| Males                 | 3377.7 | 3607.5 | 4052.9 | 5047.7 | 5840.2  | 6410.6  |
| Females               | 2721.8 | 1733.3 | 2094.2 | 3819.6 | 3056.3  | 3628.3  |
| <b>Real Wages</b>     |        |        |        |        |         |         |
| Both Sexes            | 3517.2 | 3416.2 | 3573.2 | 3796.4 | 4045.1  | 3970.5  |
| Males                 | 3526.5 | 3484.2 | 3630.7 | 3834.5 | 4116.6  | 4034.3  |
| Females               | 2841.7 | 1674.0 | 1876.0 | 2901.5 | 2154.3  | 2283.4  |
| <b>Unskilled</b>      |        |        |        |        |         |         |
| <b>Nominal Wages</b>  |        |        |        |        |         |         |
| Both Sexes            | 2400.6 | 2625.7 | 3013.2 | 3676.7 | 4396.2  | 4792.5  |
| Males                 | 2524.0 | 2737.6 | 3203.1 | 3914.1 | 4680.1  | 5048.4  |
| Females               | 1539.2 | 1496.2 | 1663.8 | 2060.0 | 2541.6  | 2864.4  |
| <b>Real Wages</b>     |        |        |        |        |         |         |
| Both Sexes            | 2506.4 | 2535.9 | 2699.2 | 2793.0 | 3098.8  | 3016.1  |
| Males                 | 2635.2 | 2644.0 | 2869.4 | 2973.4 | 3298.8  | 3177.1  |
| Females               | 1607.0 | 1445.1 | 1490.4 | 1564.9 | 1791.5  | 1802.7  |

Source: FBS, 2008s, *Pakistan Labour Force Survey* (Various Issues).

#### 4.2. Analysis of Labour Productivity

Economic growth in a country or sector can be ascribed either to increased employment or to more effective work by those who have to. The latter effect can be expressed through statistics on labour productivity. Conceptually, there are a number of ways of measuring labour productivity. The most common is to measure the output per worker in a country or economic sector, either as gross value added “per person employed” or gross value added “per hour worked”. Both methods provide an indication of productivity growth, but the “per hour” measure does have advantages especially in a country like Pakistan, with 37.5 percent of the employed working excessive hours (more than 49 hours)<sup>5</sup> [Pakistan Employment Trends, MDGs (2007)].

The “per worker” measure has the disadvantage, that it can be easily affected by changes in the employment composition. For example, if there is a move to increased working time in a certain sector, through a mismatch of skill supply and demand, one could have a scenario whereby employment increased moderately in line with the move away from employment in agriculture into industry and service sectors, but total hours worked in the sectors grew at a much faster pace. A “per worker” measure of productivity would suggest that output per worker increased; by comparison, the “per hour” measure

<sup>5</sup>See Appendix Table 1A.

would accurately say that labour productivity decreased [Pakistan Employment Trends, MDGs (2007)].

Labour productivity in this paper corresponds to the gross value added “per hour worked” and is presented in the national currency (Pakistani Rupee) at constant factor cost, which is the total production value minus the value of intermediate inputs. Value added, called “gross domestic product” (GDP) in the national accounts represents the compensation for input of services from capital (including depreciation) and labour directly engaged in production [ILO (2007)].

Over the last decade Pakistan experienced very low productivity growth, irrespective of whether it is measured as output “per hour worked” (1.8 percent per year on average) or output “per worker” (1.7 percent per year on average). In addition, this growth has not gone hand in hand with employment growth (4.3 percent per year on average) between 1999-2000 and 2007-2008. This development is somehow worrying, as it suggests that many new labour market entrants are taking on low-productive work, which is very often not decent as well. Since productivity growth is a key ingredient for sustainable poverty reduction, it raises concerns that the number of poor and working poor in the country might increase.

Table 6  
Average Annual Growth Rate of Selected Indicators by Sector  
during 1999-2000 and 2007-2008 (%)

|                            | Employment<br>Growth | GDP Growth | Labour<br>Productivity<br>Growth<br>(Output per<br>Worker) | Labour<br>Productivity<br>Growth<br>(Output per<br>Hour) |
|----------------------------|----------------------|------------|--|--|
| 15+                        |                      |            |  |  |
| <b>National</b>            | 3.6                  | 5.2        | 1.6  | 1.8  |
| Agriculture                | 2.2                  | 2.7        | 0.5  | 1.6  |
| Mining                     | 10.2                 | 6.7        | -3.5   | -3.8   |
| Manufacturing              | 5.4                  | 8.5        | 3.2  | 3.0  |
| Electricity, Gas and Water | 3.7                  | -5.8       | -9.5   | -9.8   |
| Construction               | 4.8                  | 4.9        | 0.1  | -0.3   |
| Wholesale and Retail Trade | 4.9                  | 5.1        | 0.2  | -0.1   |
| Transport                  | 4.9                  | 3.9        | -1.0   | -1.4   |
| Finance                    | 10.6                 | 8.8        | -1.8   | -2.7   |
| Social Services            | 3.5                  | 6.2        | 2.7  | 2.3  |

Source: FBS, 2008s, *Pakistan Labour Force Survey* (Various Issues).

Striking differences emerge when looking at the recent labour market performance, in terms of both, employment growth and labour productivity improvements, by economic sector. For example, labour productivity decreased by 9.8 percent in the electricity, gas and water sector, whereby employment in this sector grew by 3.7 percent over the same years. The same contrary movements in employment and labour productivity can be found in mining, transport, wholesale and retail, finance, as well as in construction where labour productivity declined while employment grew at the same time.

Table 7

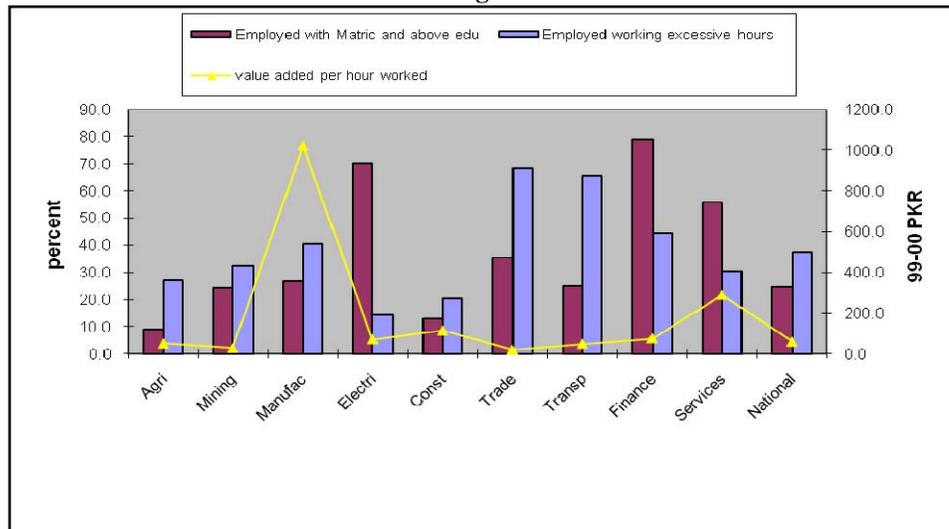
*Labour Productivity per Hour Worked by Sector (Constant Factor Cost PKR)*

|                            | 1999-2000 | 2000-2001 | 2003-2004 | 2005-2006 | 2006-2007 | 2007-2008 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>National</b>            | 44.3      | 43.2      | 45.9      | 48.0      | 50.3      | 51.2      |
| Agriculture                | 24.8      | 26.7      | 26.6      | 28.1      | 29.1      | 28.1      |
| Mining                     | 1389.3    | 1421.7    | 1855      | 1129.6    | 1084.1    | 1022.4    |
| Manufacturing              | 56.5      | 49.6      | 56.8      | 63.4      | 67.2      | 71.8      |
| Electricity, Gas and Water | 250.7     | 157.9     | 249.6     | 155.8     | 143.1     | 114.5     |
| Construction               | 19.5      | 17.4      | 15.7      | 17.2      | 19.4      | 19.0      |
| Wholesale and Retail Trade | 50.1      | 45.3      | 48        | 47.2      | 49.3      | 49.6      |
| Transport                  | 84.9      | 70.7      | 73.7      | 68.3      | 73.9      | 76.0      |
| Finance                    | 360.2     | 314.6     | 248.7     | 317.7     | 337.0     | 290.4     |
| Social Services            | 49.6      | 45.9      | 50.1      | 53.5      | 55.1      | 59.8      |

Source: FBS, 2008s, *Pakistan Labour Force Survey* (Various Issues).

These trends highlight quite well the rise of low productive employment in the country and point at widespread low quality jobs created in a number of non-agricultural sectors. The movement of workers from low productivity employment to industry and services is not an automatic development process. Its speed and extent reflects both the incentive and the ability of workers to move toward higher productivity sectors, which are most often also the once with the modern state of the art production processes. Pakistan's high demand for skilled labour, especially in high technology sectors with significant economic growth but limited supply of qualified workers is reflected in long working hours for the ones who are employed and skilled enough to work in these sectors, in order to fully utilise the capacities of modern technology. Figure 1, demonstrates that in sectors with high proportions of workers with more than matric education, labour productivity is due to excessive working hours of the employed still very low. For example, this is the case in finance as well as in wholesale and retail trade and service sectors.

Fig. 1.



Source: FBS, 2008s, *Pakistan Labour Force Survey* (Various Issues).

Encouraging are the improvements in labour productivity in manufacturing (3.0 percent per year on average) and services (2.3 percent per year on average). Like mentioned before, Pakistan is facing changes in the structure of employment, which are going hand in hand with shifting away from relatively low-productivity agricultural jobs towards higher value added industrial or service sector jobs.

## **5. CONCLUSION AND RECOMMENDATIONS**

Competitiveness is crucial for growth and development, especially in a globalising world, productivity improvements cannot be pursued through low skilled labour. Without adequate education and skills of the labour force, Pakistan will keep trapped in a vicious circle of low education, low productivity and low incomes, which makes it hard for the people to escape poverty.

To improve the capacity of people to attain decent work, the development of skills through appropriate education and training is a fundamental requirement. There is a grave need to develop a long-term strategy which emphasises on human capital accumulation of the kind needed to develop key skills in the labour market, the skills that help it absorb and enhance new technologies at the workplace. For example it is well known fact that private and social returns to primary and secondary education far greater than higher education, this is where difference can be made in terms of investment and the quality of delivery [Ahmad and Khan (2008)].

The labour market situation in Pakistan give rise to serious concern regarding skills development which needs to be given the highest attention in economic and social policy making.

- (1) There is a strong need to increase education and training in Pakistan both for new entrants to the labour market and the current labour force. The high rates of open unemployment are only partly reflective of the weak demand for labour in relation to its supply. High graduate unemployment rate particularly for women indicates that formal education may be a poor substitute for the skills and technical education demanded by the market. Consequently the high unemployment rates reflect a mismatch between the relatively more educated labour force particularly female (in the formal sense) and the demand for trained males and females in vocational and technical education. To overcome the underutilisation of the labour force more men and women need to be educated and trained in the skill mix required by the industrial and services sector. Reforms are necessary to improve literacy and basic education. Education and training investments should be closely linked to economic and employment growth strategies and programmes. Responsibility for improving the state of skills should be shared between the governments, the private sector, workers and parents. One of the most important conclusions drawn from the ILO's study of training systems worldwide for the ILO's World Employment Report 1998-99 [ILO (1998)] was that training systems are a product of the labour market institutions and incentive structures in which they operate and of the support they receive from employers, workers and governments. Yet most skills

developed over a life time are acquired on the job, mostly in enterprises in which people work in both the formal and the informal economy. The incentives for enterprise-level training and the means of overcoming disincentives to spending on training need to be carefully analysed so as to move closer to optimal levels and to efficient delivery of training. Employers' and workers' organisations play a key role in this process [Amjad (2005)].

- (2) Also there is a need to increase overall quality and relevance of TVET in Pakistan. This would result in greater confidence in the TVET system and greater perceived value of a TVET qualification, leading to more people wanting to undertake TVET courses. Further, Public's knowledge of TVET options and knowledge of the value of a TVET qualification as a channel for acquiring employable skills and the means of a decent living should be increased.
- (3) A review of TVET programme pre-requisites to ensure that unrealistic pre-requisites do not act as a barrier to people who could otherwise and complete a TVET qualification. Consideration should be given to allowing entrance to some without formal pre-requisites and to offer numeracy and literacy as part of the TVET programme. This would result in an increase in the potential number of TVET students.
- (4) One issue resonating in Pakistan is the lack of understanding of skills needs. In addition to labour force surveys, better data collection mechanisms to specifically inform skills policies and TVET reforms need to be developed. [Pakistan Employment Trends-Skills (2007)].

Table 1A

*Distribution of Employed by Major Occupational Group (%)*

| Employed 15+                                      | 2000 | 2002 | 2004 | 2006 | 2007 | 2008 |
|---|------|------|------|------|------|------|
| <b>Legislators, Senior Officials and Managers</b> |      |      |      |      |      |      |
| Both Sexes  | 11.5 | 11.9 | 12.1 | 12.7 | 13.0 | 13.4 |
| Males   | 13.0 | 13.6 | 14.2 | 15.2 | 15.5 | 16.2 |
| Females   | 2.4  | 2.0  | 1.5  | 2.3  | 2.3  | 2.0  |
| <b>Professionals</b>                              |      |      |      |      |      |      |
| Both Sexes  | 2.3  | 2.2  | 2.1  | 1.8  | 1.7  | 1.6  |
| Males   | 2.3  | 2.1  | 2.1  | 1.9  | 1.9  | 1.7  |
| Females   | 2.4  | 2.6  | 2.0  | 1.3  | 1.1  | 0.8  |
| <b>Technician and Associate Professionals</b>     |      |      |      |      |      |      |
| Both Sexes  | 4.3  | 4.9  | 5.1  | 5.4  | 5.3  | 5.6  |
| Males   | 4.0  | 4.1  | 4.3  | 4.7  | 4.6  | 5.2  |
| Females   | 6.5  | 10.2 | 9.5  | 8.6  | 7.9  | 7.2  |
| <b>Clerks</b>                                     |      |      |      |      |      |      |
| Both Sexes  | 1.6  | 1.8  | 1.7  | 1.5  | 1.5  | 1.7  |
| Males   | 1.9  | 2.0  | 2.0  | 1.8  | 1.8  | 2.1  |
| Females   | 0.2  | 0.4  | 0.3  | 0.4  | 0.2  | 0.2  |
| <b>Service, Shop and Market Sales Workers</b>     |      |      |      |      |      |      |
| Both Sexes  | 4.3  | 5.6  | 5.0  | 5.1  | 5.5  | 4.8  |
| Males   | 4.9  | 6.3  | 5.9  | 6.1  | 6.6  | 5.9  |
| Females   | 0.3  | 1.3  | 0.8  | 0.8  | 0.8  | 0.6  |
| <b>Skilled Agricultural and Fishery Workers</b>   |      |      |      |      |      |      |
| Both Sexes  | 41.8 | 35.1 | 36.6 | 37.6 | 38.4 | 39.3 |
| Males   | 39.2 | 33.2 | 33.5 | 32.5 | 32.4 | 32.6 |
| Females   | 57.6 | 46.2 | 52.2 | 59.5 | 63.7 | 66.6 |
| <b>Craft and Related Trades Workers</b>           |      |      |      |      |      |      |
| Both Sexes  | 14.9 | 16.1 | 15.9 | 16.0 | 15.5 | 15.4 |
| Males   | 15.8 | 16.4 | 16.2 | 16.3 | 16.3 | 16.3 |
| Females   | 9.1  | 14.1 | 14.3 | 14.7 | 12.3 | 11.9 |
| <b>Plant, Machine Operators and Assemblers</b>    |      |      |      |      |      |      |
| Both Sexes  | 3.4  | 4.1  | 3.9  | 4.4  | 4.3  | 4.2  |
| Males   | 3.9  | 4.7  | 4.7  | 5.4  | 5.3  | 5.2  |
| Females   | 0.2  | 0.2  | 0.1  | 0.3  | 0.2  | 0.2  |
| <b>Elementary Occupations</b>                     |      |      |      |      |      |      |
| Both Sexes  | 15.9 | 18.2 | 17.6 | 15.5 | 14.8 | 13.9 |
| Males   | 15.0 | 17.5 | 17.2 | 16.3 | 15.7 | 14.8 |
| Females   | 21.3 | 23.0 | 19.3 | 12.2 | 11.4 | 10.5 |

Source: FBS, 2008, *Labour Force Survey* (Various Issues).

Table 2A

*Selected Key Indicators of the Labour Market, Pakistan (%)*

| Pakistan (15+)  | 2000 | 2002 | 2004 | 2006 | 2007 | 2008 |
|---|------|------|------|------|------|------|
| <b>Labour Force Participation Rate</b>                          |      |      |      |      |      |      |
| Both Sexes  | 50.4 | 50.5 | 50.7 | 53.0 | 52.5 | 52.5 |
| Males   | 83.2 | 82.7 | 82.7 | 84.0 | 83.1 | 82.4 |
| Females   | 16.3 | 16.2 | 18.0 | 21.1 | 21.3 | 21.8 |
| <b>Employment-to-population Ratio</b>                           |      |      |      |      |      |      |
| Both Sexes  | 46.8 | 46.5 | 47.0 | 49.7 | 49.8 | 49.9 |
| Males   | 78.6 | 77.6 | 77.6 | 79.6 | 79.6 | 79.1 |
| Females   | 13.7 | 13.6 | 15.6 | 19.0 | 19.4 | 19.9 |
| <b>Unemployment Rate</b>  |      |      |      |      |      |      |
| Both Sexes  | 7.2  | 7.8  | 7.4  | 6.1  | 5.1  | 5.0  |
| Males   | 5.5  | 6.2  | 6.2  | 5.2  | 4.2  | 4.0  |
| Females   | 15.8 | 16.4 | 12.9 | 9.6  | 8.6  | 8.7  |
| <b>Share of Industry in Total Employment</b>                    |      |      |      |      |      |      |
| Both Sexes  | 18.2 | 21.0 | 20.6 | 21.2 | 21.4 | 20.6 |
| Males   | 19.8 | 22.0 | 21.7 | 22.7 | 23.5 | 22.6 |
| Females   | 8.4  | 14.8 | 14.9 | 15.1 | 12.6 | 12.2 |
| <b>Share of Agriculture in Total Employment</b>                 |      |      |      |      |      |      |
| Both Sexes  | 47.8 | 41.1 | 41.8 | 41.6 | 42.0 | 42.8 |
| Males   | 43.4 | 37.2 | 37.0 | 35.6 | 35.0 | 35.2 |
| Females   | 73.7 | 64.5 | 66.6 | 67.7 | 71.4 | 73.8 |
| <b>Share of Services in Total Employment</b>                    |      |      |      |      |      |      |
| Both Sexes  | 34.0 | 38.0 | 37.6 | 37.1 | 36.6 | 36.6 |
| Males   | 36.8 | 40.8 | 41.3 | 41.8 | 41.5 | 42.2 |
| Females   | 17.8 | 20.7 | 18.4 | 17.3 | 16.0 | 13.9 |
| <b>Share of Wage and Salaried Employees in Total Employment</b> |      |      |      |      |      |      |
| Both Sexes  | 35.9 | 40.4 | 38.5 | 38.4 | 38.3 | 37.1 |
| Males   | 36.4 | 40.9 | 39.8 | 41.2 | 41.5 | 40.6 |
| Females   | 33.1 | 37.1 | 31.5 | 26.6 | 25.1 | 22.9 |
| <b>Share of Own Account Workers in Total Employment</b>         |      |      |      |      |      |      |
| Both Sexes  | 43.6 | 39.9 | 38.6 | 36.5 | 36.0 | 35.9 |
| Males   | 48.0 | 43.7 | 42.9 | 41.3 | 41.1 | 41.2 |
| Females   | 16.8 | 16.5 | 17.0 | 15.9 | 14.3 | 13.9 |
| <b>Share of Employment in the Informal Economy</b>              |      |      |      |      |      |      |
| Both Sexes  | 65.0 | 63.8 | 69.4 | 72.3 | 71.5 | 72.4 |
| Males   | 65.0 | 64.1 | 69.9 | 72.2 | 71.6 | 72.4 |
| Females   | 63.9 | 60.8 | 64.5 | 73.0 | 69.9 | 71.7 |
| <b>Share of the Employed Working 50 Hours or More</b>           |      |      |      |      |      |      |
| Both Sexes  | 41.6 | 40.7 | 42.7 | 41.0 | 40.0 | 37.5 |
| Males   | 46.4 | 45.2 | 48.9 | 48.3 | 47.8 | 44.9 |
| Females   | 12.8 | 13.4 | 11.6 | 9.4  | 7.7  | 6.9  |

Source: FBS, *Labour Force Survey* (Various Issues).

## REFERENCES

- Ahmad, W. and S. Khan (2008) *Research Bulletin* 4:1. State Bank Pakistan.
- Amjad, R. (2005) Skills and Competitiveness: Can Pakistan Break Out of the Low-level Skills Trap? *The Pakistan Development Review* 44: 4, 387–409.

- FBS (2008) *Pakistan Labour Force Survey 2007-2008*. Government of Pakistan, Statistics Division, Federal Bureau of Statistics.
- ILO (2001) *World Employment Report 2001, Life at Work in the Information Society*. Geneva: International Labour Office.
- ILO (2004) Recommendation Concerning Human Resources Development: Education, Training and Lifelong Learning. (No. 195).
- ILO (2007) *Key Indicators of the Labour Market*. (Fifth Edition). Geneva: International Labour Office.
- ILO (2008) Report for Discussion at the 97th Session of the International Labour Conference 2008. Skills and Employability Department, Geneva, Switzerland. <http://www.ilo.org/public/english/employment/skills/index.htm>
- Pakistan, Government of (2005) *Medium Term Development Framework 2005-10*. Islamabad: Planning Commission.
- Pakistan, Government of (2007) *Pakistan Employment Trend, 2s*:LMIA Unit, Ministry of Labour, Manpower and Overseas Pakistanis, Islamabad, December.
- Pakistan, Government of (2008) *Pakistan Employment Trends, 4*:LMIA Unit, Ministry of Labour, Manpower and Overseas Pakistanis, Islamabad, November.
- Salvador, R. G., *et al.* (2006) Labour Productivity Developments in the Euro Area. (Occasional Paper Series. 53 / October.)
- World Economic Forum (2009) *The Global Competitiveness Report 2008-2009*. Geneva.

## **Skill Shortage versus Subject Choice: Case of Pakistan**

ATIQU-UR-REHMAN, HAFSA ANIS and SAUD AHMED KHAN

### **INTRODUCTION**

The economics is to tell how to make choices when there are multiple options. It is assumed to propose a portfolio to engage the limited resources in order to optimise certain outcomes. It is widely believed that Higher Education is an important determinant of economic growth. Therefore a suitable portfolio of experts into various subjects can optimise the economic growth. The effect of education on economic outcomes is widely recognised, [see Stevens and Weale (2003) for a comprehensive survey]. However education per se is not sufficient to optimise the economic outcomes. The subject wise distribution of the experts is very important. Therefore we need to decide what how much experts to be produced in various subjects.

We would start with the example of two countries, Japan and Turkey to show that how big difference can be made by the decision of choice of field of specialisation. The two countries were allies in the World War II. An excellent analysis of post World War II development in the two countries is provided by Binnaz (2006). Both countries were at similar position at the end of World War II with respect to their economic and social conditions. The two countries realised role of education in the development and decided to promote education. However they were having different priorities on their educational policy agenda. Turkish emphasised on education of literature, art and music etc. For any popular novel written in English, you would find its translation in Turkish as well. At the same time, Japan emphasised on education of Mathematics, Technology and Engineering. The difference their decisions made is quite evident from their recent economic and social status in the world.

The decision of field of study, especially higher studies carries high costs for society and for individuals. It is the most important decision in an individual's life, since future economic position and social status of individual depends on this decision. The cost of production of a PhD is in millions, either paid by individuals or by the governments. If this investment is pre-planned according some national policy, this would produce better results than un-planned investment. One can formulate a suitable

Atiq-ur-Rehman <ateeqmzd@yahoo.com> is PhD Scholar (Econometrics), IIIIE, International Islamic University, Islamabad. Hafsa Anis is Lecturer, National Institute of Computer Science and Technology, Muzaffarabad. Saud Ahmed Khan <saudak2k3@yahoo.com> is Lecture, IESE, NUST, Islamabad and PhD Scholar (Econometrics), IIIIE, International Islamic University, Islamabad.

portfolio of required skills that optimise the economic growth of the nation within the constraints of available budget. An educational policy to achieve this portfolio would be more helpful for the nation on the way of economic progress. Therefore for a developing country with limited resources, it is very important to analyse whether current trend of choice of field of study is optimal or near optimal according to the requirements of a nation.

Economists have studied the impact of labour market conditions and some other social and economic factors on the choice of field of study [e.g., Kelly, Connell, and Emer (2008), Kelly, Connell, and Smyth (2008)]. An equally important question is; what would be the impact of current pattern of enrolment in different fields of studies on the macroeconomic indicators in future? But unfortunately, we were unable to find any significant research in this direction after several search attempts in Google and other search facilitators. There are several studies discussing skill shortage in some countries e.g. Skill Shortage Indicator Report of New Zealand. This report is intended to recommend a visa policy for the New Zealand. Australia has formulated a national policy to deal with the skill shortage ('What is skill shortage', Local government skill shortage steering committee report, 2006). The purpose of this policy is train more labourers and professionals, since Australia is facing shortage of labour supply due 'Ageing', a global demographic phenomenon. House of Commons of Britain approved a skills development policy for the students age 14-19 (6th report of session 2004-05, House of Commons, Britain). This policy is intended to improve basic skills of mathematics and sciences among the students age 14-19 and this policy has nothing to do with the issue of subject choice.

Current study is an attempt to motivate academia to direct their attention to the problem we outlined above: Is the current pattern of choice of field of studies optimal with regard to national interests? If not, than what are blueprints of optimal pattern? Is there need of government intervention in such choice? How we can motivate individuals to opt the fields of study in accordance with national interests?

Since this is preliminary attempt to motivate research according to outlines traced above, we may have made many mistakes and we do not emphasis on validity of arguments we presented. However, we believe that the question we highlighted above is worth considering by the policy-makers and is able to create significant impact on future economic outcomes.

### **SKILL SHORTAGE IN DEVELOPING AND DEVELOPED COUNTRIES**

As we have mentioned, we were unable to find any study discussing the impacts of current pattern of the enrolment of students in higher education on future economic outcomes. In fact the problem of mismatch between skill demand and supply is less serious problem for the developed countries. The shortage of skill will motivate more of foreign workers to move toward these countries. These foreign professional usually belong to developing countries with lower income level and does not create any burden on host country since their demand is less than existing wage rate in the host country. The host country gets the advantage of cheap skill supply. Based on the skill shortage indicators, some countries (e.g. New Zealand) have different visa policies for people belonging to different professions. But there is no comprehensive to discuss the pattern of

enrolment and train the students accordingly. However for the developing countries, hiring a foreign expert is much more expensive than from recruiting local experts. Therefore the problem needs serious attention from the developing countries than from advanced countries.

### OPTIMISING HIGHER EDUCATION IN PAKISTAN

In past few years, Pakistan has introduced extraordinary incentives to promote higher education. These attempts brought revolutionary changes in the enrolment in higher education and the output produced. Definitely the Govt. is paying high costs for the incentives it introduced. However the job of an economist is to propose a portfolio such that the output can be optimised with given level of inputs. In this regard we investigate some very important questions: (i) whether or not it is possible to create more effective brain force with the same resources we currently employ, and (ii) is the current allocation pattern of enrolment compatible with the requirements of nation in near future.

The current study is an attempt to search the answers for similar questions. In particular, we take the question of enrolment in various subjects and analyse whether the enrolment pattern allocates appropriate share for various skills. If not than what are the reasons and how can effective intervention be made to remove any mismatch/inefficiency that exists.

#### The Data Problems

Unfortunately, the data is not available easily on the subject wise breakup of the enrolment. We utilise two sources for the data on subject wise enrolment. These two sources are the National Educational Census and the Higher Education Commission of Pakistan, who provide data on the subject wise enrolment for 2005 only. Few figures are obtained from Federal bureau of Statistics and from WDI-CD ROM.

### THE CURRENT PATTERN OF SUBJECT CHOICE

According to the National Educational Census of Pakistan (2005), there were 785,249 students enrolled in the institutes of higher learning allocated into different subjects. The percentage of students allocated into different subjects is illustrated in Table 1.

Table 1

*Enrolment in Institutes of Higher Learning in Pakistan, 2005*

|                |        |        |                         |        |       |
|----------------|--------|--------|-------------------------|--------|-------|
| Fine Arts      | 10913  | 1.4%   | Pharmacy                | 11183  | 1.4%  |
| Agriculture    | 9485   | 1.2%   | Veterinary              | 2956   | 0.4%  |
| Law            | 22577  | 2.9%   | Engineering             | 43801  | 5.6%  |
| Education      | 37540  | 4.8%   | Information Technology  | 37635  | 4.8%  |
| Home Economics | 7773   | 1.0%   | Commerce                | 146328 | 18.6% |
| Medical        | 19457  | 2.5%   | Business Administration | 39186  | 5.0%  |
| Nursing        | 7843   | 1.0%   | Accountancy             | 14042  | 1.8%  |
| Science Total  | 117949 | 15.0%  | Arts Total              | 256581 | 32.7% |
| Grand Total    | 785249 | 100.0% |                         |        |       |

Source: National Education Census, 2005.

Maximum number of students have opted Arts as field of study, and the Commerce comes second. The most surprising number in the table is the enrolment in agriculture related degrees. Agriculture sector is the largest sector in Pakistan providing employment to approximately 48 percent of total employed labour force.<sup>1</sup> But the enrolment in this sector is just 1.4 percent of total enrolment.

If we divide the subjects into categories according to sectors of economy, Fine Arts, Law, Home Economics, Information Technology, Commerce, Business Administration, Accountancy, Science Total, Arts Total can be included into pro-services subjects. These subjects attracted about 60 percent of total enrolment. Another surprise is that, only fine arts have attracted 1.4 percent of total enrolment compared to 1.2 percent attracted by the agriculture.

The picture is almost similar if we look at the trend in enrolment in advanced studies. Table 2 illustrates enrolment in advanced studies (MPhil and PhD) in different field of studies.

Table 2

*Enrolment in MPhil/PhD in various Disciplines, 2005*

|                           |        |        |  |      |       |
|---------------------------|--------|--------|--|------|-------|
| Agriculture               | 528    | 4.1%   | Law  | 332  | 2.6%  |
| Arts and Design           | 26     | 0.2%   | Medical and Health Science                   | 168  | 1.3%  |
| Biology                   | 1118   | 8.7%   | Pharmacy                                     | 218  | 1.7%  |
| Business Administration   | 494    | 3.9%   | Public Administration                        | 17   | 0.1%  |
| Chemistry                 | 721    | 5.6%   | Science Total                                | 1136 | 8.9%  |
| Commerce                  | 23     | 0.2%   | Social Science Total                         | 3980 | 31.1% |
| Computer Science and I.T. | 769    | 6.0%   | Veterinary and Husbandry                     | 329  | 2.6%  |
| Engineering               | 409    | 3.2%   | Consolidated (subject breakup not available) | 2531 | 19.8% |
| Grand Total               | 12,799 | 100.0% |  |      |       |

Source: Statistical Booklet of HEC, Pakistan.

Table 2 reveals that enrolment in agriculture related subjects in MPhil/PhD level is 4 percent which is more than the enrolment in the subject at B.A./B.Sc. level (1.2 percent). This implies that the students having agriculture degrees are more likely to continue their education for higher degrees. There may be two explanations for this observation; first students find it more charming to continue education if they are studying agriculture. Second, the students find it difficult to have a job after their B.A./B.Sc and therefore they decide to continue study. The enrolment in business administration and agriculture is about 4 percent students. Enrolment in management related degrees and commerce is much smaller at PhD level than from graduation level. Students choosing commerce at graduation level are 18 percent whereas at PhD level its only 0.2 percent. This means the trend to continue study toward higher education is very low for the students enrolling in these subjects. Again there may be two reasons for this observation: either the students get reasonable jobs after their Bachelor degree and discontinue to study further or the students does not find it more attractive to have a higher degree.

<sup>1</sup>Source: World Development Indicators (WDI), 2008 CD-ROM.

## SUBJECT CHOICE AND NATIONAL INTERESTS

Now we investigate very important question; whether current pattern of enrolment in higher education compatible with the national interests? This question can be answered only indirectly, natural measure of compatibility of skills with national needs would be the gap between need of skills and supply of skills. We are intentionally using the word 'need' instead of 'demand' of skills, since demand does not always insures fulfilment of needs in the real world. A poor patient may not affect the demand of an expensive life saving medicine although he seriously needs it.

The shortage of a skill in a subject or sector is an indicator of needs of nation and shortage of skill is approximated by different indicators. Some countries e.g. New Zealand [Department of Labour, New Zealand, 2006] have made arrangements to develop the measures of shortage of skills. The following are popular measures of shortage of skills:

- Vacancy fill rates.
- The relative volume of vacancies.
- Evidence of excessive wage pressures.
- Assess the occupations exposure to product and labour market competition.

The data availability for these indicators requires sufficient resources and time which we plan for future. The indicators we use to analyse shortage or otherwise of skills are the efficiency, productivity, import/exports related to profession and the cross country comparison.

### Agriculture

Our first focus is the agriculture sector, since it is the largest sector of economy and it provides employment to about half (48 percent) of employed labour force in Pakistan. As reported in Table 1, agriculture sector has attracted only 1.2 percent of the students in universities. There is huge gap between the employment generated by agriculture sector and the students seeking university education in this profession. The gap is natural indicator of shortage of skills in the profession. However some people may argue that farming does not demands a degree and therefore the gap is no surprise. But this argument is not true since Pakistan is a big importer of seeds pesticides, fertiliser etc. for which Pakistan has resources to produce domestically. This implies Pakistan has lack of expertise to domestically these products. Here we summarise some indicators helping to assess the skill shortage in this sector.

The first indicator indicating shortage of skills in agriculture sector is the agricultural value added per worker. The percentile rank of Pakistan<sup>2</sup> with respect to this indicator is 32nd indicating that 68 percent countries of the world are producing more with a worker than Pakistan. This indicates that our farmers do not have enough skills in farming and therefore they are producing less.

The second indicator is imports related to agriculture. Despite of being an agricultural country, Pakistan imports seeds, fertilisers, tractors and pesticides from foreign. Pakistani imports related agriculture and live stock in 2007-08 were about Rs

<sup>2</sup> Data Source: WDI CDROM.

115,459 million.<sup>3</sup> It is important to note that for many of these imports, Pakistan have domestic production of necessary inputs. Therefore the imports reflect the deficiency of skills in the agriculture sector.

Therefore these indicators reflect there is extensive need of skills in order to achieve international level of productivity from a worker, and also to reduce the imports related to agriculture that can be produced domestically.

### **Live Stock**

Similar to agriculture sector, livestock provide livelihood to a large number of individuals in Pakistan. Pakistan is a big producer of milk and meat and leather. Products related to leather and dairy formulate a big industry in Pakistan. According to National Educational Census 2005, only 2954 people were enrolled in the veterinary/animal science institutes, which is 0.4 percent of the total enrolment. However, despite having lot of individuals involved in livestock related business, large number of diary products are imported in Pakistan. Imports related to livestock during 2007-08 were about 121,756 million rupees. This reflects that there is heavy need of skill in the live stock sector as well.

### **Manufacturing**

Next sector that we analyse is manufacturing sector. We think that there is no need to present data to convince that we need skills in manufacturing sector. Pakistan is importing a lot of things for which raw material is domestically produced. The shortage of skills is better reflected by quantity of import items for which raw material is available in the country. Pakistan's imports of manufactured goods during 2007-08 were about 238,769 million rupees.

### **Medical**

The professions related to medical (including Nursing, Pharmacy and Dental Surgery) attracted about 4.9 percent of the students at junior level and about 3 percent at MPhil/PhD level. The shortage of skill in medical sector is estimated by the indicator 'Physician Per 1000 people'. Average number of physicians in Pakistan in recent years has been 0.7 per 1000 people and the percentile rank of Pakistan with respect to this indicator is 41<sup>4</sup> percent. This means about 60 percent of countries of world have more doctors than Pakistan. About 60 countries have more than 2 physicians for 1000 people.

### **Engineering**

Engineering and poly technique attracted about 5.6 percent of total students at junior and 3.2 percent students at MPhil and PhD level. However an important thing we must consider is uneven demand of engineers in different engineering cadres. A large number of universities awarding engineering degree provide training in Computer, Software and Telecom Engineering etc. We would like to ask Overseas Employment to

<sup>3</sup> Federal Bureau of Statistics, 'Imports by Commodity/Group'.

<sup>4</sup>Data Source: WDI-CD ROM based on averaged data from 2000 to 2004.

provide authentic figures on the professional affiliation of overseas Pakistanis. However our daily life experience tells that these skills are usually exported from Pakistan.

However Pakistan is a big importer of advanced engineering skills in Civil, Mechanical and Electrical Engineering. Most of mega projects running in Pakistan e.g. Gawadar Port, Thar Coal Projects etc. are administered by foreign firms. This means there is still a shortage of skills in the engineering-related services.

Power Sector is perhaps the most demanding sector of Pakistan in the future. Pakistan has a lot of resources of renewable energy e.g. wind, hydro and solar energy. But most of infrastructure for these energies is imported in Pakistan, which is an indicator of a severe shortage of skills in this sector. For an excellent overview of energy technologies in Pakistan, the reader is referred to Awais, *et al.* (2008). This stimulating presentation recommends the need of investment in the engineering skills related to turbine manufacturing.

### **Business Administration, Commerce, Arts and Social Sciences**

Table 1 and Table 2 reveal that the maximum number of students have opted Business Administration, Commerce and Social Studies for their careers. Business Administration and Commerce represent so-called executive classes and therefore attract a large number of students. Moreover, teaching of these subjects does not require huge physical infrastructure; therefore, almost all universities in Pakistan have started programmes for MBA and BBA. We do not have authentic figures to present, however our daily experience tells that the maximum number of skilled Pakistanis working abroad have specialisation in these subjects. These Pakistanis earn a lot of revenue for the country.

## **REGULATING CAREER CHOICE**

Post-Keynesian economics admits the role of governments in regulating economic activities to optimise certain economic outcomes. There are evidences on frequent failures of the phrases 'supply creates its demand' or 'the demand creates its supply', necessitating government intervention in the market. The career choice is an important decision having impact on economic outputs at individual and national level. We have presented evidences of a mismatch between national needs and allocation of students in different professional cadres. The question is whether Government needs to regulate the enrolment of students into different professions or not? It is obvious that production of a graduate or a PhD carries heavy cost for the society and for individuals. Governments are investing a lot of resources to promote education. If we can produce more efficient brain force with currently employed resources, why not opt to do this? Pakistan has allocated more than 22 billion rupees in higher education in the last budget, and is spending in higher education since the last decade. Despite of this huge investment, the country does not have sufficient skills infrastructure to produce seeds and pesticides for the agriculture, the backbone of its economy.

Therefore our opinion is that Government must interfere in the enrolment pattern to make it suitable for the faster development of the country. Government is investing a lot of capital in higher education. This investment does not differentiate between subjects with skill shortage and skill abundance. Most of people opt Commerce, Business Administration, Arts and Social Sciences for their career. Commerce and Business Administration are considered

to produce so called executive skills, therefore attract a large number of students. Arts and Social Sciences comprise large number of subjects like Sociology, Pakistan Studies, History, Literature etc. These subjects also attract a large number of students. Actually, bachelors' degree in Arts/social science is considered as non-professional degree and the students who do not opt any professional degree in their bachelors, adopt Arts and Social Science for their higher degrees if they continue their education.

Agriculture, Medical and Engineering are the subjects with severe skill shortage. Medical and Engineering offer promising career to the students but existing infrastructure allows only limited number of students to be successful to get education in these subjects. Although agriculture is the backbone of the economy of Pakistan, it suffers severe skill shortage since it is less charming for the new students. Therefore there is need of educational reforms that can make the enrolment pattern more compatible with the national needs without any extra financial burden.

### **SOME CONSIDERABLE REGULATORY MEASURES**

In order to regulate career choice, we need to understand the determinants of this choice. We can find several studies on the economics of career choice. Some of the determinants of career choice can not be regulated by the any regulating authority e.g. parent's profession, mental aptitude etc. However some of the determinants are in the control of Government. For example, availability of physical infrastructure, availability of teacher and trainers etc. can be used to regulate the career choice. Here we mention some of the determinants of career choice which can be regulated.

#### **1. Availability of Physical Infrastructure and Staff**

Availability of Physical Infrastructure and faculty is a big hurdle in the choice of many fields as a career for some of students. Every year large number of students fail to get admission in medical/engineering institutes because the institutions have resources to accommodate only a limited number of students. In Pakistan, there are only two institutes provide training in space/aeronautical engineering. Therefore despite willingness of many students to opt such disciplines, only few would succeed to get admission in these subjects. Pakistani culture puts some restrictions on the females to go far from there home places for education. Therefore the female students of remote areas would be unable to opt career of their choice because of unavailability of infrastructure in the vicinity.

Most of private sector universities and colleges provide education in Business Administration, Commerce, Computer Sciences and Social Sciences. Since Education in these fields requires minimum physical infrastructure, it is easy to start the education of these disciplines. The education of civil, mechanical and electrical engineering is demanding lot of physical infrastructure. Therefore despite the fact that lot of students would be willing to get admissions in these disciplines, only few private institutions have started recruitment in these fields.

#### **2. Career Counselling**

Most of students do not have any idea of the nature and scope of the discipline of the subject they are choosing for higher education. Most of students depend on their

friends and seniors for getting information about the disciplines they are choosing (especially about 'scope' of subject) and these people themselves have imperfect information about the subject. This may be an ideal occasion when authorities can regulate the student's choice if there is some institution with facts and figures about the demand/need of market. This type of institution would reduce the tension of job search for the students since it is already playing a role to reduce the gap between market requirements and university's output.

### **3. Incentive for Professions with Skills Shortage**

Premium to field of study is considered as most important determinant of the career choice. You would often see that some professions give a heavy reward to the student than from other profession. Salary of a management graduate from LUMS is much more than the salary of an agriculture graduate of Agriculture University Faisalabad. Therefore students would put management at their first priority, although there is equal need of agriculture graduates. Therefore if government wants to increase enrolment in a discipline which is important for nation but having lower market value, than government should increase the incentives for graduates in such discipline. For example, government may introduce special allowance for the graduates with severe skill shortage.

### **4. Incentives for the Institutes**

As we have discussed above, most of institutes awarding engineering degrees provide training in Computer, Software and Telecom Engineering etc. This is because these disciplines require less quantity of physical infrastructure. Disciplines like Electrical, Mechanical and Space engineering require lot of infrastructure. Similarly education in medical is so costly that private sector can rarely afford organising medical institution, and if it happens, it becomes out approach of students from middle class families. Government can introduce subsidies/tax waiver for the import of infrastructure for the private institutions launching an academic programme with skill shortage.

Furthermore we recommend following regulatory measure that might be helpful in creating a trend in higher education compatible with national interests.

- (a) If the subsidies given to students of management science (business administration and commerce) are withdrawn, this will not reduce the enrolment in these subjects significantly. This is because these subjects are usually adopted by the youth of economically stable families. Most of the students would continue their study of these subjects after removal of subsidies. In case if enrolment in these subjects is reduced (which is unlikely), this would not create any threat for economic growth of the country since there is abundance of skills in these subjects.
- (b) If incentives/subsidies are given to universities for starting medical/engineering departments, this will create more opportunities for students to opt these subjects and thus reduce the skill shortage in these subjects. Government can introduce special incentive package for universities providing training in rare engineering skills e.g. space and electrical technology. For this government may seek recommendations from a board of professional engineers. Similarly, Government can introduce incentives for medical specialisations with severe skill shortage.

- (c) Agriculture and Live Stock sectors need serious attention of the Government. Despite of being an agricultural country, Pakistan imports a large number of agricultural products (wheat, sugar etc.) and input material for agriculture (seeds, fertilisers, pesticides etc.). To make these subjects attractive for a student willing to join a university, the Govt. should reduce gap between incentives available to a doctor, an engineer and a horticulturist. The existing centres of excellence in agriculture should be made more effective. The pay package and other incentives should be made as attractive for agriculturists as for bankers and management professionals. However to introduce these incentives for the professions with shortage of skills, Government does not need additional financial resources. The only job that Govt. has to do is, put those subjects on first priority while allocating funds in which there is shortage of skills.

### **Costs and Benefits of Regulations**

The advantage of regulatory action is obvious; the country would have a skill supply more compatible with the requirement of nation. The cost of these regulatory actions is reduced incentives for the subjects with skill abundance. But these regulatory actions are unlikely to reduce enrolment in subjects with skills abundance since such subjects are usually chosen by pupil from established families and they can continue with their studies without seeking incentives from the Government.

### **REFERENCES**

- Awais, H. N. Tariq, H. R. Nawaz, and F. Ali (2008) The Role of Finance Institutions to Support Product-Oriented-Research at University Level in Metallurgy and Materials to Solve the Energy Crises in Pakistan. Paper presented in National Conferences on Socio-economic Challenges Faced by Pakistan, International Islamic University, Islamabad.
- Binnaz, Toprak (2006) Economic Development versus Cultural Transformation: Projects of Modernity in Japan and Turkey. New Perspectives on Turkey, Political Science and International Relations, Bogazici University.
- Federal Bureau of Statistics (2005) National Educational Census, Pakistan.
- Higher Education Commission (2005) Statistical Booklet of Higher Education Commission, Pakistan.
- Infometrics Ltd. (2006) Indicators of Skill Shortage. Department of Labour, New Zealand.
- Kelly, E., P. Connell and Emer (2008) The Economic Returns to Field of Study and Competencies among Higher Education Graduates in Ireland.
- Kelly, E., P. Connell, and E. Smyth (2008) The Economic Returns to Field of Study and Competencies among Higher Education Graduates in Ireland. (ESRI Working Paper No. 242).
- Skill Shortage Steering Committee (2006) National Skill Shortage Strategy for Local Governments. Australia.
- Stevens, P. and M. Weale (2003) Education and Economic Growth. *International Handbook on the Economics of Education*. Edited by G and J. Johnes Edward Elgar.
- Yong, Y. K., T. M. Heng, S. M. Thangavelu, and J. Wong (2007) Premium on Fields of Study: The Returns to Higher Education in Singapore. Department of Economics, National University of Singapore. (Paper No. 1/2007).

## The Dynamics of Moonlighting in Pakistan

ASMA HYDER and ATHER MAQSOOD AHMED

### 1. INTRODUCTION

There is substantial amount of literature available in Pakistan focusing on wage level and trends in different sectors of the economy to determine labour market outcomes and differences in the living standard of workers. Irfan (2008) has shown that the time trend growth in wages for the last two and half decades has been 7.7 percent in contrast to 7.2 percent in prices thereby yielding 0.7 percent growth in real wages. This confirms that the purchasing power of consumers has remained very low due to surge in prices of commodities of consumer basket. Unfortunately the economy of Pakistan is facing multiple challenges, starting from its difficulty in arresting the escalation in prices, to achieving sustainable growth in a longer term horizon. There is virtually no improvement in socio-demographic indicators. The labour market dynamics are such that it is becoming increasingly difficult to train and educate people for work and to provide them with decent well-paying jobs. Resultantly, there is a dearth of educated and skilled people, and the mismatch between jobs and workers has increased. In this scenario, those who possess some sort of skills or specific education, they try to get maximum benefit out of it, including holding multiple jobs, even if it involves jobs in other than their own primary occupation.

The moonlighting or holding of dual jobs has not been an attractive agenda of labour economists in Pakistan, even though it has been a common phenomenon in many developing countries. The subject is serious because it not only helps in understanding workers' behaviour and decision to allocate his/her time between work and leisure, moonlighting also affects the very structure of labour market including workers' performance and productivity. An in-depth analysis is therefore, required to know the significance of wage rate, demographics of the labour force, their budget constraints, their engagement in primary and secondary occupations, and above all their human capital characteristics. Given this ambitious agenda, it may not be possible to explore all these issues related with moonlighting in a single study. Therefore, the present study seeks to focus on three main research questions. The first and the main objective of the study is to find out the main determinants of dual job holding; Second, to explore the demographic and human capital characteristics of moonlighters; and lastly, to investigate relationship between workers' main occupation and second job. Within this perspective, the study may be regarded as a starting point to understand the complexities of labour market in Pakistan, particularly the job mobility, labour market transition and spillover over effects, if any.

Asma Hyder <asmabaloch2000@hotmail.com> is Assistant Professor and Ather Maqsood Ahmed <ather\_ma@hotmail.com> is Professor in Economics Department at the NUST Business School, Islamabad.

The organisation of the study is now outlined; next section will provide a review of background studies followed by a section on the facts regarding data and its characteristics. The fourth section presents brief description of the model and methodology adopted in the paper. The fifth section comprises of empirical results and discussion, last section concludes the study based on empirical findings of this paper.

## 2. BACKGROUND

Despite the importance of dual job holding in today's economy, it is difficult to find comprehensive information particularly in terms of empirical evidence in the available economic literature. Despite the fact that dual job holding in labour market is the result of many integrated reasons, Shishko and Rostker (1976), O'Connell (1979) and Krishnan (1990) have concentrated only on the constraint motives which restrict the working hours on the primary job and limits the earning capacity. Every rational worker who wants to maximise his/her utility would opt for second job if he/she is not satisfied with hours worked on first job and therefore earning less than his reservation wage. Paxson and Sicherman (1994) characterise dual-jobs and dual-job holders, with a focus on dynamics. The aim of their study was to understand why and when workers moved into and out of second jobs. Kimmel and Conway (1995) presented a diverse work which examined the characteristics of moonlighters and also the length of this episode. The analysis of their article reveals that most moonlighters, in spite of working long hours, tended to be poorer than the average worker. Berman and Cuizon (2004) placed multiple job holdings in the context of health systems and government policies in low and middle-income countries. The paper offered guidance on how policy-makers could deal with both the positive and negative view of multiple job holdings. A bivariate probit model of the decision to work and the decision to hold more than one job was estimated by Averett (2001), where she found that there was no difference in factors that influenced the decision to moonlight either by men or women.

## 3. DATA

The study exploits the Labour Force Survey 2006-07 to understand the dynamics of dual job holding in Pakistani Labour Market. To explore this issue we have restricted this study only to male workers residing in urban areas. The reasons for these restrictions are based on different characteristics of rural labour markets; moreover in many cases females are involved in moonlighting but are under reported thus not included in estimation. To capture the residential effect the representation of four provinces is included in the analysis. Since the main aim of the study is to find determinants of moonlighting and relationship between primary and secondary occupation. Thus nine occupational categories along with total hours spent in the labour market are also included in model specification. The definition of the variables and their magnitude both for single and dual job holder are given in Table 1.

The total sample comprises of 17248 male workers living in urban areas, among those 1.3 percent reported as moonlighters. Average age is high for those with dual jobs holding may be due to increasing responsibilities at higher age. Similarly, 90 percent of the dual job holders are married. The average weekly time spent in labour market is definitely high for moonlighters. The data shows that moonlighters are endowed with

Table 1

*Definition and Mean of the Variables*

| Variables          | Definition   | Single Job           |                   |
|--------------------|--|----------------------|-------------------|
|                    |  | Holders              | Moonlighters      |
| Age                | Age in complete years  | 34.52<br>(11.58)     | 39.94<br>(10.301) |
| Hrwork             | Hours spent during one week in Labour Market (Primary + Secondary) (S.D) | 54.15<br>(10.67)     | 60.73<br>(11.31)  |
| Wkearn             | Monthly income earned from primary occupation (S.D)                      | 1383.99<br>(1562.28) | 1425<br>(1417.26) |
| MS                 | Marital Status   | .6837                | .9056             |
| School             | Number of years of schooling (S.D)                                       | 8.2373<br>(5.4053)   | 8.56<br>(6.02)    |
| Punjab             | Dummy if residence is in Punjab  | .466                 | .4979             |
| Sindh              | Dummy if residence is in Sindh   | .3075                | .1784             |
| Khyber Pakhtunkhwa | Dummy if residence is in Khyber Pakhtunkhwa                              | .1147                | .2940             |
| Balochistan        | Dummy if residence is in Balochistan                                     | .11014               | .0290             |
| Manager            | Dummy if Occupational category is Manager                                | .2736                | .1950             |
| Professional       | Dummy if Occupational category is Professional                           | .0326                | .1161             |
| Technical          | Dummy if Occupational category is Technical Worker                       | .0619                | .1410             |
| Clerks             | Dummy if Occupational category is Clerical Staff                         | .0371                | .0622             |
| Service            | Dummy if Occupational Category is Service                                | .1007                | .0705             |
| Skill              | Dummy if Occupational category is Skilled Worker                         | .0417                | .1244             |
| Craft              | Dummy if Occupational Category is Craftsman                              | .2281                | .0788             |
| Plant              | Dummy if Occupational Category is Plant Operator                         | .0730                | .0663             |
| Elementary         | Dummy if Occupational Category is Elementary                             | .1509                | .1452             |
| Total Sample       |  | 17248                | 241               |

higher number of years of schooling. The Labour Force Survey provides educational information in the form of different levels of schooling, which is converted into a continuous variable with number of years of schooling required for each educational level. The raw data indicate that the incidence of moonlighting is highest in Punjab and lowest in Balochistan. The total proportion of workers is high in Sindh but the practice of moonlighting is higher in Khyber Pakhtunkhwa.

Among the nine occupational categories; managers, technicians and skilled categories have the highest number of moonlighters. The proportion of these categories is low as compared to other categories in overall labour force because these occupation requires specific human capital endowment. The individuals with the specific human capital characteristics are low in supply but demand is high in labour market; thus these people can get involve themselves in multiple jobs in order to utilise their human capital to its maximum level. Thus the overall labour force comprises a small proportion of these occupations but moonlighter are more concentrated in these categories.

#### 4. MODEL AND METHODOLOGY

The moonlighting is supply of labour in more than one job. Even though there can be different motives for dual job holding, but labour economists believe<sup>1</sup> that the most important reason to moonlighting is constraints on working hours in the first job. However the issue becomes complicated once individuals are engaged in two different types of occupation. Thus keeping heterogeneous occupations is also the agenda of this paper.

We start the model using the microeconomic foundation whereby workers drive utility income (earned and non-earned) and leisure. Mathematical it can be stated as,

$$\text{Max } u(Y, l) \quad \dots \quad (1)$$

Subject to:  $h_1 + h_2 = 24 - l$  and  $w_1h_1 + w_2h_2 = Y$

Where  $h_1$ ,  $h_2$ ,  $w_1$ ,  $w_2$ ,  $l$ , and  $Y$  are hours worked and earnings from primary and secondary job<sup>2</sup>, leisure, and total income earned from both jobs. By substituting these constraints in the utility function we will obtain:

$$\text{Max } u(w_1h_1 + w_2h_2, 24-h_1-h_2, l) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

The constraint of minimum working hour has been applied in estimation. Thus only those individuals working more than 36 working hour<sup>3</sup> are included in the estimation. The estimation is based on two models, first is probit model to examine the determinants of moonlighting and second model is estimated for the treatment of endogenous regressor. For the correction of possibility of endogeneity instrumental variable probit model is used, which adopts two-step estimation methodology. First model incorporates the effect of total working hours on moonlighting and second model examines the effect of weekly wages from the main occupation on moonlighting.

##### Model 1

The probability of holding two jobs is estimated through following model specification, where the dependent is a binary variable and thus probit model is used:

<sup>1</sup>Averett (2001), Kimmel and Powell (1999), Krishnan (1990), Paxson and Sicherman (1994), Shishki and Rostker (1976) and Stinson (1990).

<sup>2</sup>“Y” refers only earned income, non-earned income is not included in our model specification.

<sup>3</sup>According to the definition of ILO those working less than 36 hours are considered as part-time workers. Since the purpose of paper is to explore the issue of moonlighting thus we excluded those working less than 36 hours. Reference: <http://www.ilo.org/public/english/protection/condtrav/pdf/infosheets/wt-4.pdf>

$$\log\left(\frac{\text{Prob}(\text{moonlight})}{\text{Prob}(\text{will hold one job only})}\right) = X\beta \quad \dots \quad \dots \quad \dots \quad (3)$$

Or

$$\left(\frac{\text{Prob}(\text{moonlight})}{\text{Prob}(\text{will hold one job only})}\right) = e^{X\beta} \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

$$\text{Prob}\left(\begin{matrix} = 1 \text{ if moonlight} \\ = 0 \text{ otherwise} \end{matrix}\right) = e^{X\beta} / (1 + e^{X\beta}) = [1 + \exp(-X\beta)]^{-1} \quad \dots \quad \dots \quad (5)$$

The variable determining the probability of holding dual jobs include age, age square, marital status, number of years of schooling, four provincial categories and nine occupational categories are included in this model specification.

**Model 2**

When any of the regressors (wages in primary occupation in this case) are endogenous, then estimates are inconsistent [Yatchew and Griliches (1985)]. For this Instrumental Variable Probit (IVP) model method is preferred. The parameters are estimated by maximising the conditional likelihood. This method earlier used by Murphy and Topel (1985) for such type of correction. The following notation has been developed to understand the particular model specification used here.

The original model for the decision of moonlighting is as follows:

$$\text{Pr}(Y=1 \text{ or } Zero) = \beta T + \gamma X + \eta W + \mu \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Where *T* is age, age square, number of years of schooling, *X* is for marital status, provincial dummies and nine occupational variables. *W* is for log of weekly wages earned from main occupation. Since wage is endogenous variable, which it-self is determined by age and schooling, therefore it may lead towards biased estimates. The problem of endogeneity is avoided through a two-step instrumental variable probit model method. In first stage, log of wages are estimated as a function of age, age square and number of years of schooling.

$$W = \delta T + V \quad \dots \quad (7)$$

Where *T* includes age, age square and schooling, *V* is an error term. A new predicted variable is generated (log of weekly wages) based on estimated co-efficient of *T*. In the second stage, the predicted values of log of weekly wages are included in the probit model with rest of demographic, occupational and regional variables. Finally the model (6) gets the form presented in Equation (8). In the final Equation *T* do not enter in the model rather it enters through predicted wages.

$$\text{Pr}(Y=1 \text{ or } Zero) = \gamma X + \eta W_{(\text{predicted})} + \mu \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

The usual probit maximum likelihood procedure is used for the estimation of the parameters.

## 5. EMPIRICAL RESULTS AND ANALYSIS

Table 2 presents the results of both models i.e., Probit and two step IV Probit model. In both models the dependent is a binary variable and shows the decision of an individual that he/she will moonlight or not. The estimated co-efficient of the model 1 shows that age and being married increases the probability of holding two jobs. The probability of married individual to moonlight is .360 percentage points more as compared to singles. As far as schooling is concerned it is not only insignificant but also very small in magnitude, the reason may be that decision of holding a second job is not necessarily influenced by level of education. There are many illiterate workers in labour market those who are engaged in multiple jobs within elementary occupations. Many workers associated with blue-collar low skilled occupations like security guards, gardeners, drivers, chefs etc are holding more than one job. Secondly it is also evident from summary statistics that average years of schooling is 8.2 years for single job holders and 8.5 for those moonlighters with a comparatively high standard deviation, thus labour supply decision or decision of holding more than one job is not influenced by schooling.

Among all the provincial dummies the probability of moonlighting is higher in rest of three provinces as compared to Balochistan. The most plausible reasons are low rate of economic activity in the province and the proportion of professionals, technicians and related categories where chances of moonlighting are high comprises very low in total labour force in Balochistan. Most of the people are concentrated in elementary occupations or craft related activities. The odd ratio for Khyber Pakhtunkhwa is highest; reason may be the established and vibrant business community, huge share of informal sector, trade and related occupational categories.

We have used occupational categorisation according to international classification system of occupation. 'Professional' category is used as base category, the estimated co-efficient shows that the probability of moonlighting is highest for professionals as compared to any other occupation. Annexure A illustrates the sub-categories of professional category; which include science and engineering professionals, health professionals, teaching professionals, business and administration professionals, information and communications technology professionals, legal, social and cultural professionals. The occupational categories require some specific type of education and are high in demand in labour market. Doctors, engineers, lawyers, and business professionals are most popular labour market participants involved in moonlighting. All occupational categories have negative signs and significant except skill category which include occupations related with agriculture and fishery industry; in these occupational categories chances to moonlight are rare.

Another important motive for holding second job is lower wage from primary job as compared to individuals' reservation wage. The wages earned during a week is function of age, experience and schooling; due to the endogenous nature of wage this study used two-step IV Probit model. Many papers propose to use this model in case of endogenous regressors in probit model [see for example: Arendt and Holm (2006)]. In second model the significance and signs of all estimated coefficients remain same; however there are some considerable changes in magnitudes. The log of weekly wages is a predicted variable and it is function of age, age square and number of years of schooling. The log of predicted weekly wages earned from primary occupation are

insignificant and are low in magnitude, which suggest that as the income earned from the primary occupation do not play a significant role in moonlighting decision. The result is also confirmed by summary statistics Table 2 that average monthly earnings from primary occupation of single job holders is almost same of those have dual jobs with a very high standard deviation. Thus results show that decision to moonlight is not influenced by income from primary occupation, which shows that there are some other reasons are more important. The most probable reason is constraint on working hours on primary job.

Table 2

*Probit Result (Dependent Variable: Moonlighting = 1 if Moonlight and Zero Otherwise)*

| Variables                    | Model 1(Probit Model)        | Model 2 (IV Probit Model)    |
|------------------------------|------------------------------|------------------------------|
|                              | Co-efficient<br>(Std.Errors) | Co-efficient<br>(Std.Errors) |
| Age                          | .0361*<br>(.020)             | –                            |
| Age Sq                       | –.00037<br>(.0002)           | –                            |
| MS                           | .3608***<br>(.1021)          | .5645***<br>(.0849)          |
| School                       | .0059<br>(.0057)             | –                            |
| Punjab                       | .6196***<br>(.1372)          | .5635***<br>(.1291)          |
| Sindh                        | .3762**<br>(.1443)           | .3138*<br>(.1366)            |
| Khyber Pakhtunkhwa           | .9621***<br>(.1430)          | .9176***<br>(.1347)          |
| Manager                      | –.7053***<br>(.1128)         | –.6837***<br>(.1116)         |
| Technical                    | –.1969*<br>(.1209)           | –.1741*<br>(.1201)           |
| Clerks                       | –.3454*<br>(.1452)           | –.3503<br>(.1451)            |
| Service                      | –.6232***<br>(.1402)         | –.6047***<br>(.1383)         |
| Skill                        | –.1282<br>(.1384)            | –.0422<br>(.1338)            |
| Craft                        | –.9214***<br>(.1334)         | –.8722***<br>(.1306)         |
| Plant                        | –.6216***<br>(.1463)         | –.5895***<br>(.1440)         |
| Elementary                   | –.5709***<br>(.1303)         | –.5325***<br>(.1271)         |
| Lnwage (predicted)           | –                            | .041<br>(.0810)              |
| Constant                     | –3.25***<br>(.4024)          | –2.967***<br>(.6187)         |
| No. of Observations = 17489  |                              | No. of Observations = 17489  |
| Wald Chi2(15) = 263.74       |                              | Wald Chi2(15) = 391.68       |
| Prob > Chi2 = .0000          |                              | Prob > Chi2 = .0000          |
| Log Likelihood = –1140.03477 |                              | Pseudo R2 = .1097            |
| Pseudo R2 = .1037            |                              | Log Likelihood = –1170.841   |

The details of major occupational groups along with their sub-groups are given in Annexure A. Among those moonlighters in managers' category 46.8 percent are holding their second job in market-oriented agriculture and fishery related occupation. Professionals and technicians are only two primary occupations in which dual job holders are moonlighting within their main occupation. According to summary statistics presented in Table 3, there is very small proportion of clerks in the overall labour market. Within those small numbers of workers in this category those with holding two jobs mostly are engaged in first occupational category. Those in 'service' category are more related with craft and related trade occupations in their secondary jobs. Moonlighters both in 'craft' and 'plant' are mostly associated with 'skill' category for their secondary occupation. Thus those workers who opt for different occupation for moonlight, to investigate the spillover effect may be an interesting future research agenda.

Table 3

*Occupational Association between Primary Occupation and Secondary Occupation*

| Sec-Occupation<br>Main-Occupation | Man-<br>ger_2 | Profes-<br>sional_2 | Tech-<br>nical_2 | Clerk_2 | Service_2 | Skill_2 | Craft_2 | Plant_2 | Elemen-<br>tary_2 |
|-----------------------------------|---------------|---------------------|------------------|---------|-----------|---------|---------|---------|-------------------|
| Manager_1                         | 12.7%         | 3.12%               | 10.63%           | 0%      | 3.12%     | 48.8%   | 17.02%  | 0%      | 4.2%              |
| Professional_1                    | 7.14%         | 67.85%              | 21.42%           | 0%      | 0%        | 0%      | 3.57%   | 0%      | 0%                |
| Technical_1                       | 14.28%        | 14.28               | 37.14%           | 0%      | 0%        | 11.42%  | 11.42%  | 5.71%   | 5.71%             |
| Clerks_1                          | 53.33%        | 0%                  | 6.66%            | 0%      | 6.66%     | 13.33%  | 6.66%   | 13.33%  | 0%                |
| Service_1                         | 11.76%        | 5.88%               | 5.88%            | 0%      | 5.88%     | 11.76%  | 29.41%  | 5.88%   | 23.52%            |
| Skill_1                           | 26.47%        | 0%                  | 5.88%            | 0%      | 0%        | 17.64%  | 0%      | 0%      | 50%               |
| Craft_1                           | 20%           | 0%                  | 5%               | 0%      | 0%        | 45%     | 25%     | 5%      | 0%                |
| Plant_1                           | 31.25%        | 12.5%               | 6.25%            | 0%      | 0%        | 37.5%   | 12.5%   | 0%      | 0%                |
| Elementary_1                      | 11.42%        | 0%                  | 2.85%            | 0%      | 5.71%     | 31.42%  | 0%      | 2.85%   | 45.71%            |

Now coming back to the main research questions described earlier in the study. Overall the results show that the being in certain occupations increases the probability to moonlight. There can be number of reasons for this, for example under utilisation of skills and restriction on number of working hours in their primary occupations. The second main question of the study is to explore the characteristics of the moonlighters, the reveals that average age of moonlighters is 40 years, 90 percent are married, on average they have nine years of schooling and 50 percent of total moonlighters are residing in Punjab. Managers, professionals, technicians and elementary occupations are most popular among the moonlighters, or in other words we can say that moonlighters are concentrated on both ends of the occupational distribution. Lastly, the study finds that managers usually moonlight in their own occupational category or in skill category,<sup>4</sup> professionals moonlight in their own primary occupation, technicians also moonlight in their own occupation but the evidence shows that they also moonlight in managers and professional category.

## 6. CONCLUSION

The study has investigated the dynamics of moonlighters and association between the primary and secondary jobs in Pakistani labour market while exploiting information from *Pakistan Labour Force Survey 2006-07*. Surprisingly the wage rate is not the

<sup>4</sup>Skill category mostly comprises of agriculture related occupations.

motivation for incidence of moonlighting, rather individuals reported as moonlighter earning more as compared to those who are relying on one job only. The last part of the analysis presents the association of occupation between primary and secondary occupation, the occupational association analysis shows that only professionals and technicians are two occupational categories where moonlighters are holding their secondary jobs in the same occupation.

The study is constrained by many limitations like unavailability of information on many important variables for example constraint of hours on primary job etc. But the implications of the study are very important; it open many venues for further research on this topic, for example the effect of moonlighting on productivity on first job, labour market transition, job mobility etc.

### *Annexure A*

#### **INTERNATIONAL STANDARD CLASSIFICATION OF OCCUPATION: MAJOR GROUPS AND SUB-MAJOR GROUPS**

##### **1. Managers**

- 11 Chief executives, senior officials and legislators
- 12 Administrative and commercial managers
- 13 Production and specialised services managers
- 14 Hospitality, retail and other services managers.

##### **2. Professionals**

- 21 Science and engineering professionals
- 22 Health professionals
- 23 Teaching professionals
- 24 Business and administration professionals
- 25 Information and communications technology professionals
- 26 Legal, social and cultural professionals.

##### **3. Technicians and Associate Professionals**

- 31 Science and engineering associate professionals
- 32 Health associate professionals
- 33 Business and administration associate professionals
- 34 Legal, social, cultural and related associate professionals
- 35 Information and communications technicians.

##### **4. Clerical Support Workers**

- 41 General and keyboard clerks
- 42 Customer services clerks
- 43 Numerical and material recording clerks
- 44 Other clerical support workers.

**5. Service and Sales Workers**

- 51 Personal service workers
- 52 Sales workers
- 53 Personal care workers
- 54 Protective services workers.

**6. Skilled Agricultural, Forestry and Fishery Workers**

- 61 Market-oriented skilled agricultural workers
- 62 Market-oriented skilled forestry, fishing and hunting workers
- 63 Subsistence farmers, fishers, hunters and gatherers.

**7. Craft and Related Trades Workers**

- 71 Building and related trades workers, excluding electricians
- 72 Metal, machinery and related trades workers
- 73 Handicraft and printing workers
- 74 Electrical and electronic trades workers
- 75 Food processing, wood working, garment and other craft and related trades workers.

**8. Plant and Machine Operators, and Assemblers**

- 81 Stationary plant and machine operators
- 82 Assemblers
- 83 Drivers and mobile plant operators.

**9. Elementary Occupations**

- 91 Cleaners and helpers
- 92 Agricultural, forestry and fishery labourers
- 93 Labourers in mining, construction, manufacturing and transport
- 94 Food preparation assistants
- 95 Street and related sales and service workers
- 96 Refuse workers and other elementary workers.

**REFERENCES**

- Averett, Susan (2001) Moonlighting: Multiple Motives and Gender Differences. *Applied Economics* 33:11, 1391–141.
- Arendt, J. N and A. Holm (2006) Probit Models with Binary Endogenous Regressors. University of Copenhagen. Department of Economics. Centre for Applied Microeconometrics in its series CAM Working Papers with number 2006-06
- Berman, P. and D. Cuizon (2004) Multiple Public-Private Jobholding of Health Care Providers in Developing Countries: An Exploration of Theory and Evidence. Department for International Development Health Systems Resource Centre.
- Krishnan, Pramila (1990) The Economics of Moonlighting: A Double Self-selection Model. *Review of Economics and Statistics* 72:2, 361–67.

- Kimmel, J. and Powell (1999) Moonlighting Trends and Related Policy Issues in Canada and the United States. *Canadian Public Policy* 25:2, 207–31.
- Kimmel, J and K. S Conway (1995) Who Moonlights and Why? Evidence from the SIPP, Upjohn Institute. (Staff Working Paper 95–40).
- Murphy, Kevin M. and Robert H. Topel (1985) Estimation and Inference in Two-step Econometric Models. *Journal of Business and Economic Statistics* 3:4, 370–379.
- O’Connell, John F. (1979) Multiple Job Holding and Marginal Tax Rates. *National Tax Journal* 32:1, 73–76.
- Paxson, Christina H. and Nachum Sicherman (1994) The Dynamics of Job Mobility and Dual-job Holding. NBER (Working Paper No. 4968).
- Shishki, Robert and Bernard Rostker (1976) The Economics of Multiple Job Holding. *American Economic Review* 66:3, 298–308.
- Stinson, J. F. (1990) Multiple Jobholding up Sharply in the 1980’s. *Monthly Labour Review* 3–10.
- Yatchew, Adonis and Zvi Griliches (1985) Specification Error in Probit Models. *The Review of Economics and Statistics* 67:1, 134–139.

## Employers Size Wage Differential: Does Investment in Human Capital Matter?

ZAFAR MUEEN NASIR and NASIR IQBAL

### I. INTRODUCTION

Wage differential due to employer size is one of the key areas of interest in the labour market research. A strong positive relationship between employer size, measured as firm or plant size, and wages has been found both in developed and developing countries [Masters (1969); Pugal (1980) and Criscuolo (2000)].<sup>1</sup> In literature various theoretical explanations are forwarded to support the existence of wage differentials across the employer size. Neoclassical school of thought explains the existence of wage differential in the context of human capital theory within the framework of the standard competitive model. According to labour quality hypothesis, the large employers hire workers of higher quality thus pay higher wages. There are a number of other explanations also for the existence of employer size wage differential. The larger firms pay higher wages to compensate workers for bad working conditions; earn abnormal profits because of more market power and share their excess profits with their workers; avoid unionisation, and substitute high monitoring cost with wage premium [Lallemand, *et al.* (2005)]. Moreover, larger firms require large number of workers therefore pay higher wages to attract better quality employees with required qualifications [Waddoups (2007)].

A number of reasons explain why larger firm look for higher quality workers for employment. Griliches (1969) and Hamermesh (1980) argue that larger firms are capital intensive so they need qualified and skilled labour. To promote research and development activities, large firm need labour with higher skill and education [Tan and Batra (1997)]. Shapiro and Stiglitz (1984) argues that large firm pay higher wages to attract labour with higher productivity due to existence of strong positive correlation between wages and productivity. Incentive for hard work [Shapiro and Stiglitz (1984)], to decrease the rate of turnover and associated cost of recruiting and training [Salop (1979) and Oi (1983)], complementarities between entrepreneurial and worker ability [Lucas (1978)], and

Zafar Mueen Nasir <zfnasir@yahoo.com> and Nasir Iqbal <nasir@pide.org.pk> are Chief of Research and Staff Economist at Pakistan Institute of Development Economics, Islamabad, respectively.

*Authors' Note:* The authors are thankful to Dr Asma Hyder, Assistant Professor at NUST Business School NUST Islamabad, for her valuable suggestions.

<sup>1</sup>Besides, a number of other studies also reported employer size wage gap in different countries like United State [Brown and Medoff (1989)], Germany [Gerlach and Schmidt (1990); Schmidt and Zimmermann (1991); Gerlach and Huebler (1998)], Great Britain [Main and Reilly (1993)], Japan [Rebick (1993)], Canada [Morissette (1993)], Taiwan [Chuang and Hsu (2004)] and Australia [Waddoups (2007)].

advance technology adopted by large firm [Kremer (1993)] are other reasons for large firms to employ higher quality labours.

In Pakistan, various studies have confirmed the positive relationship between human capital and income of the individuals and have shown that education enhance the earning potential of individuals.<sup>2</sup> However, there are few studies that have analysed the existence of wage differentials. These studies have mainly investigated gender, region and sector-specific aspects of wage differentials. Nasir (1999, 2000) and Hyder and Reilly (2005) examine the wage differential across the public and private sector and found that public sector workers earn higher wages as compare to private sector. Their findings support the hypothesis of human capital theory. Ashraf and Ashraf (1993a, 1993b, and 1996) estimated gender earnings gap and concluded that education explained the major part of earning differentials across gender. There is so far no study which explains the employer size wage differential in Pakistan.

The purpose of the present study is to investigate the employer size wage differential by looking at human capital factors to explain the difference. The study is based on the standard methodology and estimates earning functions on Labour Force Survey (LFS) data for the year 2007-08. The study is an important step to enhance our understanding about human capital theory in explaining the employer size wage differentials in Pakistan. It is organised in the following manner. Conceptual framework is presented in Section 2. Section 3 discusses the data and methodology. Results are discussed in Section 4 and conclusions are summarised in the last section.

## **II. HUMAN CAPITAL AND WAGE DIFFERENTIALS: A CONCEPTUAL FRAMEWORK**

Becker (1962) defines the human capital as the skills, education, health, and training of individuals. These endowments are considered capital because of their similarity with physical capital which yields returns. "All such qualities of a person, such as knowledge, health, skills and experience that affect his or her possibilities of earning current and future money income, psychological income, and income in kind are called human capital" [Kooreman and Wunderlink (1997)]. Neoclassical theory explains that wages are paid on the basis of the marginal product of labour and human capital is a component to judge the productivity of the individual. Human capital theory seeks to explain wage differentials as a consequence of differing human capital stocks that determine an individual's marginal productivity.

Human Capital Theory is mainly based on education because it imparts knowledge and skills [Tilak (1994)]. The direct effect of education is measured in term of pecuniary benefits accrue to the individual [Becker (1962); Mincer (1974); Hungerford and Solon (1987); Tilak (1994); Zuluaga (2007)]. Investment in education increases the ability of the individuals and makes them more productive and efficient [Lockheed, *et al.* (1980) and Jamison and Lau (1982)]. Because in competitive labour market wages paid according to their marginal productivity therefore an individual with better marketable skills have higher productivity and more opportunities in labour market. These lead to higher earnings through good jobs or success in business projects. Training and health are

<sup>2</sup>Nasir and Nazli (2000); Qureshi and Arif (2001); Haq (2005); Jamal (2005); Kurosaki and Khan (2006); Arif and Iqbal (2009) and Awan and Iqbal (2010).

other important and integral parts of human capital. Similar to education, training and health increase productivity of individuals, hence their earnings [Schultz (1961) and Strauss and Thomas (1995)]. Schultz (1961) attributes the difference in earnings between people to the difference in access to education and health.

To explain the phenomenon of employer's size wage differentials based on human capital theory, various explanations are documented in the literature. Most plausible explanation in this context is based on the labour quality theory. Large firms employ workers of higher quality thus pay higher wages [Chuang and Hsu (2004)]. According to this theory, larger firms are more capital intensive; therefore require more skilled workers due to capital skill complementarity [Hamermesh (1980)]. Oi (1983) argues that large firms, being more innovative and capital intensive need more qualified and specialised workers. Secondly, the higher levels of both human and physical capital per worker at larger employers are believed to be due to scale economies and/or preferential access to credit in imperfect capital markets. Thirdly, Oi (1983) and Garen (1985) argue that large plants employ higher quality workers to reduce monitoring costs per unit of labour services. Fourthly, to large firm pay more to reduced the workforce turnover [Oi (1983) and Idson (1996)]. Becker (1975) also argues that firms may reduce their turnover by increasing wages above workers alternative wage. Fifthly, the presence of more able entrepreneurs and of complementarities between entrepreneurial and workers ability imply higher quality workers at larger employers [Lucas (1978)]. Sixthly, greater complexity of tasks induced by the more advanced technology adopted by large employers induces greater skill complementarity between workers and, therefore, higher returns to human capital [Kremer (1993)]. Underpinning all these reasons, there is a common positive relationship between employer size human capital and wages.

The other explanation comes from the theory of compensation wage differential. Large firms tend to be more rigid in organisational structure and rely on rules to discipline their workers [Mellow (1982)]. Large firms also impose greater pressure on workers and thus suppress worker's creativity [Lester (1967)]. As a result, the workers in large firms earn a compensating wage differential for less satisfying work [Masters (1969 and Waddoups (2007)].

### III. METHODOLOGY

Following Becker (1964) and Mincer (1974), we begin with a human capital earning function which indicates that the variation in earnings arises from difference in investment in human capital defined as below:

$$W_i = \alpha_0 + \sum \beta_i X_i + u \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where  $W_i$  represents wage rate while vector  $X_i$  represents all possible human capital factors that affect wages and  $u$  represents all unobservable variables. We extend our model by estimating separate earnings functions for different firm sizes. A semi-log earnings function defined below is estimated: Let the wage equation for each employer size be:

$$W_{ij} = \alpha_j + \gamma'_{ij} X_{ij} + v_{ij} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

$$i = 1, 2, 3, \dots, n \quad j = 1, 2, 3, \dots, m$$

Where  $i$  and  $j$  are indices for the  $i$ th individual and  $j$ th firm size, respectively,  $W_{ij}$  is the wage rate,  $X_{ij}$  represents human capital factor for the  $i$ th worker belongs to  $j$ th firm and  $v$  represents all unobservable variables. Educational endowment is one of the main factors that contribute in human capital enhancement. Education is divided into different level because different levels of education impart different skills and earnings. Five level of education i.e., 0–4, 5–7, 8–9, 10–13, and degree education are included in the earnings function. Similar to formal education, technical education is also included into the model because of its crucial role in shaping the stock of human capital. Experience is an important part of the human capital but information on actual experience is missing in most of the surveys. Age and its squared term are therefore included in the specification as the proxy for experience. The quadratic term of age in the basic human capital model of Becker (1964) and Mincer (1974) captures the diminishing returns to experience with time.

The wage structure may differ due to different endowment of health of the workers. To capture the health of the workers, sick leave is used as a proxy. A dummy variable representing the health of individual is included in the model. Demographic characteristics such as sex and marital status are also used in the model as dummy variables. In addition, the area of residence is used to capture the variations in geographic and regional economic development.

### Decomposition of Wage Differentials

The difference in wages may arise due to two reasons; the difference in endowment and productivity-related personal characteristics of the workers which includes different levels of human capital, occupational difference, and other endowments. More productive workers will get higher compensation relative to the workers, who on average have a lower level of productivity-related characteristics and the wage structure across different sectors, i.e., employees with the same endowments may get different remuneration in different sectors.

Blinder (1973) and Oaxaca (1973) developed a methodology to measure the unequal treatment in wages. According to this framework, discrimination or ‘unequal treatment’ is revealed by differences in the estimated coefficients. To measure the wage differential, the mean of log wages between different sectors is used in calculations. The absolute difference  $D_{ij}$  is calculated as:

$$D_{ij} = LnW_i - LnW_j \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Where  $i$  is the high wage firm and  $j$  is low wage firm. Wage differential equations across group  $i$  and  $j$  are:

$$LnW_i = f_i(X_i) = \sum \beta_i X_i \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

$$LnW_j = f_j(X_j) = \sum \beta_j X_j \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Where  $X_i$  and  $X_j$  are the mean values of the vectors of characteristics of group  $i$  and  $j$  respectively. The gross difference can be expressed as

$$D_{ij} = LnW_i - LnW_j = [f_i(X_i) - f_i(X_j) + f_i(X_j) - f_j(X_j)] \quad \dots \quad \dots \quad (6)$$

Where  $f_i(X_j)$  is the mean wage that employees of group  $j$  would receive if they were paid according to the wage structure of group  $i$ .

$$D_{ij} = [\sum \beta_i X_i - \sum \beta_i X_j] + [\sum \beta_i X_j - \sum \beta_j X_j] \quad \dots \quad \dots \quad \dots \quad (7)$$

$$D_{ij} = \sum \beta_i [X_i - X_j] + \sum [\beta_i - \beta_j] X_j \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

This implies total wage differential is decomposed into two parts. First, ‘endowment differential’ or ‘explained differentials’ which occur due to difference in characteristics of the individuals. Therefore the difference in the average logarithmic earnings of the two groups of workers exists due to the difference in the average amounts of earnings-related characteristics such as education, experience, gender and marital status etc. Second, ‘treatment differentials’ or ‘unexplained differentials’ due to difference in productivity characteristics of the workers. Therefore difference in average logarithmic earnings of the two groups exists due to the rate at which both group compensate their workers having the same characteristics and often used as a measure for discrimination. The size of this term will depend on the difference in the values of the regression coefficients estimated from earnings equations of the two groups. This strategy allows the determination of the part attributable simply to a difference in the structure of pay and a difference in the endowment of the workers which drive a wedge between pay levels in different sectors of employment.

#### IV. DATA CHARACTERISTICS AND DESCRIPTIVE STATISTICS

The data are taken from the Labour Force Survey (LFS) 2007-08. It is a regular feature of the Federal Bureau of Statistics (FBS) since July, 1963. These data provide comprehensive information on characteristics of the workers. The information on earnings, age, education levels, sex, marital status, regions, employer size, occupation, and employment status is particularly important for this study. To capture the number of employees working in the firm, following question is asked to the respondent “How many persons are engaged in the enterprise (including working proprietors, unpaid family workers, and paid employees)?” Respondent chooses one option from the following four options: (i) Number of person upto 5; (ii) 6 to 9; (iii) 10 to 19; and (iv) 20 and more. This is the only information available on the number of employees working in particular enterprises. By using this information; this study develops two categories bases on the firm size i.e. small firm and large firm. In small firm, first two options are merged therefore this category consists of those firms which has maximum nine employees. Large firms category is based on the 10 and more employees. This division is important because of the registration of larger firms (having ten or more workers) with taxation social security related departments. The sample of the study includes only wage employees and not the casual and piece rate workers.

Descriptive statistics shows that the final sample of employed workers with positive earnings consists of 12,913 individuals in which 11,595 (89 percent of the total) individual works in small firms while 1,318 (11 percent of the total) individual works in large firms (Table 1). The data on earnings include both cash and payments in kind. The current value of the in-kind benefits such as free or subsidised housing and transportation

Table 1

*Summary Statistics*

| Characteristics                 | All     | Small Firms | Large Firms |
|---------------------------------|---------|-------------|-------------|
| Number of Observations          | 12,913  | 11,595      | 1,318       |
|                                 |         | Mean        |             |
| Monthly Income                  | 4831    | 4694        | 6031        |
| Log of Monthly Earning          | 8.2251  | 8.1992      | 8.4529      |
| <b>Personal Characteristics</b> |         |             |             |
| Age (Number of Years)           | 30.2487 | 30.2636     | 30.1184     |
| Sex (Male = 1)                  | 0.8903  | 0.8915      | 0.8801      |
| Marital Status (Married= 1)     | 0.5618  | 0.5619      | 0.5615      |
| Literacy (Literate = 1)         | 0.5647  | 0.5588      | 0.6168      |
| <b>Human Capital Background</b> |         |             |             |
| Primary (Primary = 1)           | 0.0415  | 0.0434      | 0.0250      |
| Middle (Middle = 1)             | 0.1952  | 0.2013      | 0.1419      |
| Matric (Matric = 1)             | 0.1238  | 0.1248      | 0.1153      |
| Intermediate (Intermediate = 1) | 0.1241  | 0.1219      | 0.1426      |
| Degree (Degree = 1)             | 0.0387  | 0.0356      | 0.0660      |
| Professional Degree (Prof = 1)  | 0.0364  | 0.0265      | 0.1237      |
| Training (Yes= 1)               | 0.0147  | 0.0140      | 0.0212      |
| Health (No Sick Leave = 1)      | 0.7685  | 0.7837      | 0.6351      |
| <b>Region</b>                   |         |             |             |
| Urban (Urban = 1)               | 0.6521  | 0.6530      | 0.6434      |

Source: LFS 2007-08.

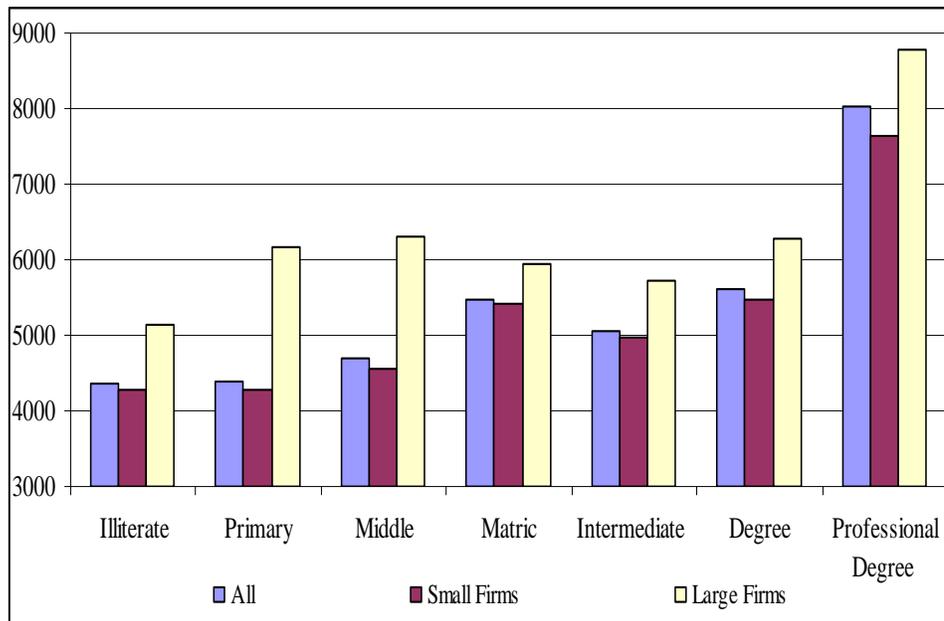
is included in the overall earnings reported in the survey. Average monthly earning of the all individual is Rs 4,831 while average monthly earning of the individuals works in small firm (Rs 4,694) is less than the average monthly earning of the workers employed in large firm (Rs 6,031). The statistics reveals that the average age of the sample is about 30.25 years (30.26 and 30.11 for small and large firms respectively). Literacy rate is higher among the worker employed in large firms (0.62 percent) as compare to small firms (0.56 percent).

Human capital variables show very interesting results. Proportion of individuals with low level of education like primary, middle and matric is high in small firm (0.04, 0.20 and 0.12) respectively as compare to large firm (0.02, 0.14 and 0.11 respectively) while the proportion of individuals with high level of education like intermediate, degree and professional degree is higher is larger firms (0.14, 0.06 and 0.12 respectively) as compare to smaller firms (0.12, 0.03 and 0.03 respectively). Very few professional are working in small firms. These findings confirms the human capital theory with the hypothesis that large firm employed worker with higher quality. In literature one of the main reasons that explain the wage differentials concept among the employer size is the quality of the worker. Worker with higher quality capital works in large firm and rewarded on the basic of their marginal productivity. Training, an important component of human capital, indicates that the proportions of workers with training are higher in larger firms than smaller firms (Table 1).

## V. WAGE DIFFERENTIALS AND HUMAN CAPITAL

Wage differentials among the workers are calculated on the basis of their human capital potentials for both categories of firms. Wage effect of education is higher in larger firm than smaller firm. With the similar education, individual earn more in larger firm as compare to smaller firms. Earning is also function of successive level of education. Results shows that earnings increase when the education of the individual increase from one category i.e. primary to other category i.e. middle. Wage effect is twice when an individual has some professional degree as compare to primary pass workers (Figure 1).

**Fig. 1. Average Monthly Earnings of Workers by their Human Capital Potential**



Source: LFS 2007-08.

Experience significantly affects the earnings of individuals and the association of earnings with age signifies the role of experience for higher earnings. It is interesting to note that although there are significant differences in compensation for workers across the employer size, yet the age earnings profiles follow the life-cycle pattern in both categories where income increases with age for some time, reaches at the peak and then declines. Some interesting observations can be made on the basis of these age-earnings profiles. The workers in the larger firms start at a higher level of earnings and reach a higher peak as compared to the smaller firms. They attain the highest level of earnings (Rs 7371) in the age group 51–60. The highest increase in earnings is observed when workers jump from age group of 21–30 to age group of 31–40 in larger firms. The sharp decline in the earnings experienced by the all employees afterwards after age group of 51–60, is due to the retirement benefits, which are much lower than the regular job benefits (Table 2).

Table 2

*Average Monthly Earnings of Workers by Age Group*

| Age Group    | All  | Small Firm | Large Firm |
|--------------|------|------------|------------|
| 10 to 20     | 3512 | 3421       | 4545       |
| 21 to 30     | 4870 | 4750       | 5729       |
| 31 to 40     | 5671 | 5484       | 7205       |
| 41 to 50     | 5747 | 5605       | 7047       |
| 51 to 60     | 5839 | 5708       | 7371       |
| 61 and Above | 5105 | 4963       | 6865       |
| All          | 4831 | 4695       | 6032       |

Source: LFS 2007-08.

The age earning profiles of workers, in the smaller firms, shows lower earnings at the start and remain low than bigger firms for all age group. In small firm, earnings increase very smoothly with the successive age group till the age group 51–60, when their earnings reach the peak and start declining afterwards. The decline in the earnings of the workers employed in smaller firms is sharp unlike the workers employed in larger firms (Table 2).

Wage differentials are calculated for various types of individual characteristics based on employer size. Results shows that male worker earn more in large firms as compare to small firm. Similarly, monthly earning of male worker is also higher than the female worker. Married workers earn more as compare to their unmarried counterpart. Married workers enjoy higher salaries in larger firms than smaller firms. Person with technical education earn higher wages in both type of firms but comparatively higher in larger firms (Table 3).

Table 3

*Average Monthly Earnings of Workers by their Characteristics*

| Characteristics       | All  | Small Firm | Large Firm |
|-----------------------|------|------------|------------|
| Male                  | 5082 | 4958       | 6184       |
| Female                | 2794 | 2528       | 4912       |
| Married               | 5476 | 5346       | 6615       |
| Unmarried             | 4005 | 3859       | 5285       |
| Literate              | 5201 | 5028       | 6583       |
| Illiterate            | 4351 | 4273       | 5144       |
| Technical Training    | 5656 | 5482       | 6662       |
| No Technical Training | 4819 | 4683       | 6018       |
| Urban                 | 4981 | 4796       | 6641       |
| Rural                 | 4549 | 4505       | 4932       |

Source: LFS 2007-08.

## VI. RESULTS AND DISCUSSION

Table 4 displays the traditional log wage regression with firm size dummy and separate regression by firm-size groups. The results of column 1 show that even after controlling for the worker's attributes, human capital attributes and regional dummy, the firm-size variable remains positive and highly significant. The Chow test is also used which reveals that there are structural differences in these categories and a single equation does not explain the differences in earnings. For this reason, separate equations are estimated for both types of firms. Estimated coefficients display importance of human capital which varies across firm-size. Overall results show that education does have a positive and significant effect which increases with firm size. Attainment of five year education rather than no education has positive but insignificant impact on earning across the firm size. There are very interesting findings on return to education at different level of education between the both categories. Wage effect of middle education is higher in small size firms (22 percent and significant) than large size firm (20 percent and insignificant). Similarly, for matric and intermediate, returns on education are higher in small firms than large firms (Table 4). But, return to education is higher in larger firm

Table 4

*Coefficients of Ordinary Least Square Estimates for Different Sectors*  
(Dependent Variable = Log Monthly Earnings)

| Variables                    | Full Sample              | Small Firms              | Large Firms              |
|------------------------------|--------------------------|--------------------------|--------------------------|
| Age                          | 0.06***<br>(0.00245)     | 0.06***<br>(0.00255)     | 0.05***<br>(0.00908)     |
| Age Square                   | -0.0006***<br>(3.06e-05) | -0.0007***<br>(3.16e-05) | -0.0005***<br>(0.000117) |
| Sex (male = 1)               | 0.78***<br>(0.0183)      | 0.82***<br>(0.0192)      | 0.53***<br>(0.0613)      |
| Marital Status (Married = 1) | 0.006<br>(0.0153)        | -7.87e-05<br>(0.0162)    | 0.087*<br>(0.0453)       |
| Primary                      | 0.044<br>(0.0289)        | 0.034<br>(0.0297)        | 0.158<br>(0.117)         |
| Middle                       | 0.088***<br>(0.0154)     | 0.087***<br>(0.0160)     | 0.081<br>(0.0564)        |
| Matric                       | 0.172***<br>(0.0183)     | 0.176***<br>(0.0191)     | 0.114*<br>(0.0610)       |
| Intermediate                 | 0.114***<br>(0.0185)     | 0.114***<br>(0.0194)     | 0.107*<br>(0.0590)       |
| Degree                       | 0.180***<br>(0.0304)     | 0.156***<br>(0.0330)     | 0.191**<br>(0.0817)      |
| Professional Degree          | 0.509***<br>(0.0326)     | 0.456***<br>(0.0385)     | 0.520***<br>(0.0725)     |
| Health                       | 0.00588*<br>(0.0171)     | 0.00963**<br>(0.0199)    | 0.00311***<br>(0.0147)   |
| Urban                        | 0.0721***<br>(0.0120)    | 0.0596***<br>(0.0125)    | 0.190***<br>(0.0402)     |
| Firm Size                    | 0.196***<br>(0.0188)     |                          |                          |
| Constant                     | 6.236***<br>(0.0406)     | 6.200***<br>(0.0422)     | 6.764***<br>(0.145)      |
| Observations                 | 12913                    | 11595                    | 1318                     |
| R-squared                    | 0.237                    | 0.238                    | 0.168                    |

Standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

with degree and professional education than smaller firms. This supports the argument that large firms require workers of high quality and often regard education as an indicator of potential productivity. Hence, they tend to hire and pay greater rewards to educated workers. This confirms the human capital theory which envisage bigger role for education and training in larger firms.

The coefficients of variable age (proxy for experience) in all three categories are statistically significant but its square term bears negative and statistically significant coefficient, implying diminishing returns on experience after a specific age. However the effect of experience is greater in small size firms than large size firms. This means that firm specific human capital is more important than general human capital across the firm size. Health of the workers also plays significant role on earnings of worker according to the firm size. The higher earnings associated with age, education, and health provides clear support to the human capital theory in the firm size [Becker (1964) and Mincer (1974)]. As consistent with most studies, male or married workers in general earn higher wages than female or single wage workers.

## VII. DECOMPOSITION ANALYSIS

The decomposition analysis presented in Table 5 reveals very important results. The positive sign of 'explained or endowment differentials' shows the better characteristics of the workers implied in large firms. This is quite oblivious because those with better human capital variables and characteristics take the initiative to join large firms. The treatment differentials or unexplained part has positive sign and larger in magnitude.

Table 5

### *Oaxaca Decomposition*

| Wage Differentials          | Explained or<br>Endowment Differentials | Unexplained or<br>Treatment Differentials | Total  |
|-----------------------------|---|---|--------|
| $LnW_{LARGE} - LnW_{SMALL}$ | 0.0562                                  | 0.1975                                    | 0.2537 |

## VIII. CONCLUDING REMARKS AND POLICY OPTIONS

The study on employer size wage differential based on LFS 2007-08 data clearly shows that human capital investment has a bigger role in determining wages in the larger firms as compared to smaller firms. The human capital is measured as investment on education, training, experience and health. When the wage differential between large and small firms of 0.2537 is decomposed into difference due to endowment and due to wage structure, the human capital factors explained almost 6 percent difference in the earnings. This clearly indicates the importance of human capital investment for larger firms. It may be noted here that larger firms not only pay higher wages but also provide higher benefits such as social security and paid holidays. The main policy implications emanating from the analysis are the higher investment in skills which increase opportunities for workers in the labour market for higher wages and for jobs with good characteristics especially in large size firms. The main reason is the higher productivity associated with skills due to human capital. The government policy towards education and skills formation needs

serious reforms and better allocations of funds so that people get chance to enhance their skill level.

### REFERENCES

- Arif, G. M. and N. Iqbal (2009) Infrastructure and Poverty Nexus: The Case of Rural Pakistan. In Socio-economic Challenges Faces by Pakistan, Proceeding of National Conference, Islamic International University, Islamabad
- Ashraf, B. and J. Ashraf (1996) Evidence on Gender Wage Discrimination from the 1984-85 HIES: A Note. *Pakistan Journal of Applied Economics* 12.
- Ashraf, J. and B. Ashraf (1993a) Estimating the Gender Wage Gap in Rawalpindi City. *Journal of Development Studies* 24.
- Ashraf, J. and B. Ashraf (1993b) An Analysis of the Male-Female Earning Differential in Pakistan. *The Pakistan Development Review* 32:4, 895–904.
- Awan, M. S. and N. Iqbal (2010) Determinants of Urban Poverty: The Case of Medium Sized City in Pakistan. Pakistan Institute of Development Economics, Islamabad. (PIDE Working Paper No. 60).
- Becker, G. S. (1962) Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy* 70, Supplement.
- Becker, G. S. (1964) *Human Capital*. New York: National Bureau of Economic Research.
- Becker, G. S. (1975) *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. (2nd edition). Chicago and London: The University of Chicago Press.
- Blinder, A. S. (1973) Wage Discrimination: Reduced Form and Structural Variables. *Journal of Human Resources* 8, 436–55
- Brown, C. and J. Medoff (1989) The Employer Size-Wage Effect. *Journal of Political Economy* 97, 1027–59.
- Chuang, Y. and P. Hsu (2004) Employer Size-Wage Differentials in Taiwan. *Small Business Economics* 23, 285–297.
- Criscuolo, C. (2000) Employer Size-Wage Effect: A Critical Review and an Econometric Analysis. Università degli Studi di Siena, Dipartimento Di Economia Politica. (Working Paper 277).
- Garen, J. (1985) Worker Heterogeneity, Job Screening, and Firm Size. *Journal of Political Economy* 93, 715–739.
- Gerlach, K. and O. Hubler (1998) Firm Size and Wages in Germany—Trends and Impacts of Mobility. *Empirica* 25, 245–261.
- Gerlach, K. and E. M. Schmidt (1990) Firm Size and Wages. *Labour* 4, 27–49.
- Griliches, Z. (1969) Capital-skill Complementarity. *Review of Economics and Statistics* 51, 465–468.
- Hamermesh, D. S. (1980) Commentary. In John J. Siegfried *The Economics of Firm Size, Market Structure, and Social Performance*. Washington, DC: Fed. Trade Comm.
- Haq, R. (2005) An Analysis of Poverty at the Local Level. *The Pakistan Development Review* 44:4.
- Hyder, A. and B. Reilly (2005) The Public and Private Sector Pay Gap in Pakistan: A Quantile Regression Analysis. *The Pakistan Development Review* 44:3, 271–306.

- Hungerford, T. and G. Solon (1987) Sheepskin Effects in the Returns to Education. *Review of Economics and Statistics* 69, 175–177.
- Idson, T. L. (1996) Employer Size and Labour Turnover. *Research in Labour Economics* 15, 273–304.
- Jamal, H. (2005) In Search of Poverty Predictors: The Case of Urban and Rural Pakistan. *The Pakistan Development Review* 44 :1.
- Jamison, D. T. and L. I. Lau (1982) *Farmer Education and Farm Efficiency*. Baltimore: The John Hopkins University Press (for World Bank).
- Kooreman, P. and S. Wunderlink (1997) *Economics of Household Behaviour*. St. Martins Press.
- Kremer, M. (1993) The O-Ring Theory of Economic Development. *Quarterly Journal of Economics* 108, 551–576.
- Kurosaki, T. and H. Khan (2006) Human Capital, Productivity, and Stratification in Rural Pakistan. *Review of Development Economics* 10:1.
- Lallemant, T., R. Plasman, and F. Rycx (2005) Why do Large Firms Pay Higher Wages? Evidence from Matched Worker-firm Data. *International Journal of Manpower* 26, 705–723.
- Lester, R. (1967) Pay Differentials by Size of Establishment. *Industrial Relations* 7, 57–67.
- Lockheed, M., D. Jamison, and L. Lau (1980) Farmer Education and Farm Efficiency: A Survey. *Economic Development and Cultural Change* 29, 37–76.
- Lucas, R. E. (1978) On the Size Distribution of Business Firms. *The Bell Journal of Economics* 9, 508–523.
- Main, B. G. M. and B. Reilly (1993) The Employer Size-wage Gap: Evidence for Britain. *Economica* 60, 125–142.
- Masters, S. H. (1969) Wages and Plant Size: An Inter-industry Analysis. *The Review of Economics and Statistics* 51, 341–345.
- Mellow, W. (1982) Employer Size and Wages. *The Review of Economics and Statistics* 64:3, 495–501.
- Mincer, J. (1974) *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research.
- Morrisette, R. (1993) Canadian Jobs and Firm Size: Do Smaller Firms Pay Less? *Canadian Journal of Economics* 26, 159–174.
- Nasir, Z. M. (2000) Earnings Differential between Public and Private Sectors in Pakistan. *The Pakistan Development Review* 39: 2, 111–130.
- Nasir, Z. M. (1999) Do Private Schools Make Workers More Productive. Pakistan Institute of Development Economics, Islamabad. (Mimeographed).
- Nasir, Z. M. and H. Nazli (2000) Education and Earnings in Pakistan. Pakistan Institute of Development Economics. (Research Report No. 177).
- Oaxaca, R. (1973) Male-Female Earning Differentials in Urban Labour Market *International Economic Review* 11, 693–709.
- Oi, W. (1983) Heterogeneous Firms and the Organisation of Production. *Economic Inquiry* 21, 147–171.
- Pugal, T. A. (1980) Profitability, Concentration and the Interindustry Variation in Wages. *Review of Economics and Statistics* 62, 248–253.

- Qureshi, S. K. and G. M. Arif (2001) Profile of Poverty in Pakistan 1998–99. Pakistan Institute of Development Economics, Islamabad. (MIMAP Technical Paper Series No. 5).
- Rebick, M. E. (1993) The Persistence of Firm-Size Earnings Differentials and Labour Market Segmentation in Japan. *Journal of the Japanese and International Economies* 7, 132–156.
- Salop, S. C. (1997) A Model of Natural Rate of Unemployment. *American Economic Review* 69, 117–125.
- Schmidt, C. M. and K. F. Zimmermann (1991) Work Characteristics, Firm Size and Wages. *The Review of Economics and Statistics* 73:4, 705–710.
- Schultz, T. W. (1961) Investments in Human Capital. *American Economic Review* 51, 1–17.
- Shapiro, C. and J. E. Stiglitz (1984) Equilibrium Unemployment as a Worker Discipline Device. *American Economic Review* 74, 433–444.
- Strauss, J. and D. Thomas (1995) Human Resources: Empirical Modelling of Household and Family Decisions. In J. Behrman, and T. N. Srinivasan (eds.) *Handbook of Development Economics*. Vol. III (Elsevier Science B.V), 1883–2005.
- Tan, H. and G. Batra (1997) Technology and Firms Size-Wage Differentials in Colombia, Mexico and Taiwan (China). *World Bank Economic Review* 11, 59–83.
- Tilak, J. B. G. (1994) *Education for Development in Asia*. New Delhi: Sage Publications.
- Waddoups, C. J. (2007) Employer Size-wage Effects in Australia. *Labour* 21, 809–835.
- Zuluaga, B. (2007) Different Channels of Impacts of Education on Poverty: An Analysis for Colombia Center for Economic Studies, Colombia. (Discussions Paper Series (DPS) 07.02).

# Nominal Frictions and Optimal Monetary Policy

ADNAN HAIDER and DRISSI RAMZI

## 1. INTRODUCTION

The modern modeling research on macroeconomics combines micro-foundations of both households and firms optimisation problems and with a large collection of both nominal and real (price/wage) rigidities that provide plausible short-run dynamic macroeconomic fluctuations with a fully articulated description of the monetary-cum-fiscal policy transmission mechanism; see, for instance, Christiano, *et al.* (2005) and Smets and Wouters (2003). The key advantage of this area of research over traditional reduce form macroeconomic models, is that the structural interpretation of their parameters allows to overcome the famous Lucas critique (1976). Traditional models contained equations linking variables of interest of explanatory factors such as economic policy variables. One of the uses of these models was therefore to examine how a change in economic policy affected these variables of interest, other things being equal. Based on these advantages there has been a growing interest in academics, international policy institutions and central banks in developing small-to-medium, even large-scale, both closed and open economy DSGE models based on new-Keynesian framework. In using DSGE models for practical purposes and to recommend how central banks and policy institutions should react to the short-run fluctuations, it is necessary to first examine the possible sources, as well as to evaluate the degree of nominal and real rigidities present in the economy. As price stability is the primary objective of every central bank so it is an important task to model inflation dynamics with its associated nominal rigidities using DSGE models carefully.

Therefore the core objective of this paper is to consider various nominal frictions, especially price stickiness with its alternative representations of the inflation dynamics, each one having formal microeconomic foundations. To learn dynamics of this friction associated with each representation we considered four competing closed economy DSGE models: a standard Calvo type pricing model; Hernandez's (2004) state-dependent pricing model; Mankiw and Reis (2002) standard sticky information model; and a mixed version of sticky price-information model. Each model incorporates various other standard New-Keynesian features such as habit formation, costs of adjustment in capital accumulation and variable capacity utilisation. While in the standard Calvo (1983) model, some prices are exogenously fixed for certain periods and the Phillips curve associated it performs badly to reproduce the gradual and delayed effects of monetary shocks on inflation. Mankiw and Reis (2002) propose to replace it with a Sticky

Adnan Haider <04phd2009@pide.edu.pk> is PhD Scholar at Pakistan Institute of Development Economics, Islamabad, Pakistan. Drissi Ramzi <rdrissi@esg.fr> is Research Assistant at CERESG, ESG Business School, France.

*Authors' Note:* Views expressed here are those of the authors and not necessarily of the institutions, they attached with.

information model. In that last specification, firms face some frictions while updating their information sets to determine the optimal flexible price.

However, in the two cases, the frequency of price revisions is constant and without cost. Price-setters cannot respond to shocks in the economy between price revisions. In such a context, literature on state-dependent pricing [e.g. Dotsey, *et al.* (1999)] allows firms either to evaluate in every period if it is convenient to change their price contracts or to keep them unchanged given a random cost. So we also simulate the performance of the Hernandez's (2004) model which combines state-dependent and time-dependent features in the firms pricing scheme is investigated as a natural extension of the Calvo model. Finally for each model, the Ramsey allocation has been computed, giving a natural benchmark for welfare comparisons.

The remainder of the paper is structured as follows. Section 2 gives an outline of Common theoretical framework. In Section 3 the main different responses observed across each specification essentially by the nature of nominal rigidities. The methodologies and empirical setup are discussed in Section 4. Section 5 describes the estimation results and finally we bring to a close in Section 6 with concluding remarks and possible model extensions.

## 2. COMMON THEORETICAL FRAMEWORK

The following relationships are common to all models in the specification of the economy. These specifications are similar to Christiano, *et al.* (2005) and Smets and Wouters (2003). The main features of the closed economy DSGE model are habit formation in consumption, capital adjustment costs and a large number of shocks essential for the fit with data. Such a common framework is a mean to obtain comparable New Keynesian Phillips curves and to explain the main different responses observed across each specification essentially by the nature of nominal rigidities.

### 2.1. Households Preferences

The economy is inhabited by a representative household ( $h$ ) who derives its utility from consumption  $C_t$ , and leisure  $1-L_t$ . At time  $t$ , its preferences are described by an intertemporal utility function:

$$U_t(h) = E_t \left( \sum_{j=0}^{\infty} \beta^j [U_1(C_t, H_t) - U_2(L_t)] e_{t+j}^B \right)$$

Where,

$$U_1(C_t, H_t) = \frac{1}{1-\zeta_c} (C_{t+j}(h) - \nu C_{t+j-1}(h))^{1-\zeta_c} \quad \text{and}$$

$$U_2(L_t) = \frac{\varepsilon_{t+j}^L \xi}{1+\zeta_L} (L_{t+j}(h))^{1+\zeta_L}$$

Where  $\beta_t \in (0,1)$  is the intertemporal discount factor which describe rate of time preferences,  $\zeta_c$  is the inverse of the elasticity of intertemporal substitution in

consumption and  $\zeta_L$  is the inverse of wage elasticity of labour supply. We introduce external habit formation for the optimisation household as  $H_t = \nu C_{t+j-1}(h)$  with degree of intensity indexed by  $\nu$ , where  $C_{t+j-1}$  is the aggregate part of consumption index. Utility also incorporates a consumption preference shock  $\varepsilon_{t+j}^B$  and a labour supply shock  $\varepsilon_{t+j}^L$ .  $\xi$  is the scale parameter. As usual, it is assumed that,  $\zeta_c > 0$  and  $\zeta_L > 1$ .

Each household  $h$  maximises its utility function under the following budgetary constraint:

$$\frac{B_t(h)}{P_t(1+i_t)} + C_t(h) + I_t(h) = \frac{B_{t-1}(h)}{P_t} + \frac{(1-\tau_{w,t})W_t(h)L_t(h) + A_t(h) + T_t(h)}{P_t} + r_t^k u_t(h)K_t(h) - \Phi(u_t(h))K_t(h)$$

Where  $B_t(h)$  is a nominal bond,  $W_t(h)$  is the nominal wage,  $A_t(h)$  is a stream of income coming from state contingent securities,  $T_t(h)$  and  $\tau_{w,t}$  are government transfers and time-varying labour tax respectively, and  $r_t^k u_t(h)K_t(h) - \Phi(u_t(h))K_t(h)$  represents the return on the real capital stock minus the cost associated with variations in the degree of capital utilisation. As in Christiano, *et al.* (2005), the income from renting out capital services depends on the level of capital augmented for its utilisation rate. The cost of capacity utilisation is zero when capacity are fully used ( $\Phi(1) = 0$  and  $\Phi'(1), \Phi''(1) \geq 0$ ).

Separability of preferences and complete financial markets ensure that households have identical consumption plans. The first order condition related to consumption expenditures is given by:

$$\lambda_t = \varepsilon_t^B (C_t - \nu C_{t-1})^{-\zeta_c} - \beta \nu E \left[ \varepsilon_{t+1}^B (C_{t+1} - \nu C_t)^{-\zeta_c} \right] \quad \dots \quad \dots \quad \dots \quad (1)$$

Where  $\lambda_t$  is the Lagrange multiplier associated with the budget constraint. First order conditions corresponding to the quantity of contingent bonds implies that:

$$\lambda_t = (1+i_t)\beta E_t \left[ \lambda_{t+1} \frac{P_t}{P_{t+1}} \right] \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where  $i_t$  is the one-period-ahead nominal interest rate.

## 2.2. Labour Supply and Staggered Wage Settings

Each household is a monopoly supplier of a differentiated labour service. For the sake of simplicity, we assume that he sells his services to a perfectly competitive firm which transforms it into an aggregate labour input using the following technology:

$$L_t = \left[ \int_0^1 L_t^{h \frac{1}{\mu^w}} dh \right]^{\mu^w}$$

The household faces a labour demand curve with constant elasticity of substitution:

$$L_t(h) = \left[ \frac{W_t(h)}{W_t} \right]^{\frac{-\mu w}{\mu w - 1}} L_t$$

Where:

$$W_t = \left[ \int_0^1 W_t(h)^{\frac{1}{1-\mu w}} dh \right]^{1-\mu w}$$

is the aggregate wage rate.

Households set their wage on a staggered basis. Each period, any household faces a constant probability  $1 - \alpha_w$  of changing its wage. In such a case, the wage is set to  $\tilde{w}_t$  which is the same for all suppliers of labour services, taking into account that it will not be re-optimised in the near future. Otherwise, wages are adjusted following an indexation rule on past inflation and central bank objective:

$$W_t(h) = \left( \frac{P_{t-1}}{P_{t-2}} \right)^{\zeta_w} \left( \frac{\bar{P}_t}{\bar{P}_{t-1}} \right)^{1-\zeta_w} W_{t-1}^h$$

$\pi_t = \frac{P_t}{P_{t-1}}$  denotes one plus the GDP deflator inflation rate while  $\bar{\pi}_t = \frac{P_t}{P_{t-1}}$  denotes one

plus the inflation objective of the central bank and  $\zeta_w$  is fraction of wage.

Notice that among the fraction of wage setters, which cannot re-optimize in period  $t$ ; each nominal wage appears with the same frequency as in the  $t-1$  distribution after controlling for the common indexation on inflation rates. This property crucially hinges on the fact that each wage has an equal probability of being adjusted in a given period.

Consequently, the dynamics of the aggregate wage index is given by:

$$\begin{aligned} W_t^{\frac{1}{1-\mu w}} &= \int_0^1 W_t(h)^{\frac{1}{1-\mu w}} dh \\ &= \alpha_w \left[ \pi_{t-1}^{\zeta_w} \bar{\pi}^{1-\zeta_w} \right]^{\frac{1}{1-\mu w}} \int_0^1 W_{t-1}(h)^{\frac{1}{1-\mu w}} dh + (1 - \alpha_w) (W_t^*)^{\frac{1}{1-\mu w}} \\ &= \alpha_w \left[ \pi_{t-1}^{\zeta_w} \bar{\pi}^{1-\zeta_w} W_{t-1} \right]^{\frac{1}{1-\mu w}} + (1 - \alpha_w) (W_t^*)^{\frac{1}{1-\mu w}} \end{aligned}$$

Each household chooses  $\tilde{W}_t$  in order to maximise:

$$E_t \sum_{j=0}^{\infty} (\beta \alpha_w)^j \left\{ \begin{array}{l} (1 - \tau_{w,t+j}) L_{t+j}(h) \lambda_{t+j} \frac{W_t^*}{P_t} \frac{P_t}{P_{t+j}} \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\zeta_w} \bar{\pi}^{j(1-\zeta_w)} \\ - \varepsilon_{t+j}^B \varepsilon_{t+j}^L \zeta \left( \frac{(L_{t+j}^h)^{1+\zeta_L}}{1+\zeta_L} \right) \end{array} \right\}$$

Given that the demand for differentiated labour service for wage setters who cannot re-optimize after period  $t$ , becomes:

$$\begin{aligned} L_{t+j}(h) &= \left[ \frac{W_{t+j}(h)}{W_{t+j}} \right]^{\frac{-\mu w}{\mu w - 1}} L_{t+j} \\ &= \left[ \frac{W_t^*}{P_t} \right]^{\frac{-\mu w}{\mu w - 1}} \left( \frac{P_t}{P_{t+j}} \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\zeta_w} \bar{\pi}^{f(1-\zeta_w)} \right)^{\frac{-\mu w}{\mu w - 1}} \left( \frac{W_{t+j}}{P_{t+j}} \right)^{\frac{-\mu w}{\mu w - 1}} L_{t+j} \end{aligned}$$

Thus, the first order condition for the re-optimized wage verifies:

$$E_t \sum_{j=0}^{\infty} (\beta \alpha_w)^j \left\{ \begin{array}{l} (1 - \tau_{w,t+j}) \lambda_{t+j} \frac{W_t^*}{P_t} \frac{P_t}{P_{t+j}} \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\zeta_w} \bar{\pi}^{j(1-\zeta_w)} \\ - \mu_w \varepsilon_{t+j}^B \varepsilon_{t+j}^L \zeta (L_{t+j}^h)^{\zeta_L} \end{array} \right\} = 0$$

Let us denote  $\tilde{w}_t$  as the real wage. The previous equation can therefore be rewritten as:

$$\frac{W_t^*}{P_t} = \left[ \mu_w \frac{Z_{W1,t}}{Z_{W2,t}} \right]^{\frac{\mu w - 1}{\mu w(1+\zeta_K) - 1}}$$

With

$$\begin{aligned} Z_{W1,t} &= \varepsilon_t^B \varepsilon_t^L L_t^{1+\zeta_L} w_t \\ &+ \alpha_w \beta E_t \left[ \left( \frac{\pi_{t+1}}{\pi_t^{\zeta_w} \bar{\pi}^{1-\zeta_w}} \right)^{\frac{\mu w(1+\zeta_K)}{\mu w - 1}} Z_{W1,t+1} \right] \dots \dots \dots (3) \end{aligned}$$

and

$$\begin{aligned} Z_{W2,t} &= (1 - \tau_{w,t}) \lambda_t L_t w_t^{\frac{\mu w}{\mu w - 1}} \\ &+ \alpha_w \beta E_t \left[ \left( \frac{\pi_{t+1}}{\pi_t^{\zeta_w} \bar{\pi}^{1-\zeta_w}} \right)^{\frac{1}{\mu w - 1}} Z_{W2,t+1} \right] \dots \dots \dots (4) \end{aligned}$$

Accordingly, the aggregate wage dynamics leads to the following relation.

$$w_t^{1-\mu_w} = (1-\alpha_w) \left[ \mu_w \frac{Z_{W1,t}}{Z_{W2,t}} \right]^{\frac{-1}{\mu_w(1+\zeta_k)-1}} + \alpha_w w_{t-1}^{1-\mu_w} \left[ \frac{\pi_t}{\pi_{t-1}^{\xi_w} \bar{\pi}^{1-\xi_w}} \right]^{\frac{-1}{1-\mu_w}} \dots \quad (5)$$

**2.3. Investment Dynamics**

As in Smets and Wouters (2003), we introduce a delayed response of investment observed in the data. Capital producers combine existing capital,  $K_t$ , leased from the entrepreneurs to transform an input  $I_t$ , gross investment, into new capital according to:

$$K_{t+1} = (1-\delta)K_t + \left[ 1 - S \left( \frac{I_t E_t^I}{I_{t-1}} \right) \right] I_t \dots \dots \dots \quad (6)$$

Where  $I_t$  is gross investment,  $\delta$  is the depreciation rate and the adjustment cost function  $S(\bullet)$  is a positive function of changes in investment.  $S(\bullet)$  equals zero in steady state with a constant investment level ( $S(1) = 0$ ). In addition, we assume that the first derivative also equals zero around equilibrium, so that the adjustment costs will only depend on the second-order derivative ( $S''(\bullet)$ ) as in Christiano, *et al.* (2005). We also introduced a shock to the investment cost function, which is assumed to follow a first-order autoregressive process with an IID-Normal error term:  $E_t^I = \rho_I E_{t-1}^I + \eta_t^I$ .

Households choose the capital stock, investment and the capacity utilisation rate in order to maximise their intertemporal utility function subject to the intertemporal budget constraint and the capital accumulation. The first-order conditions result in the following equations for the real value of capital, investment and the capacity utilisation rate:

$$Q_t = E_t \left[ \beta \frac{\Lambda_{t+1}}{\Lambda_t} \left( Q_{t+1} (1-\delta) + R_{t+1}^k CU_{t+1} - \Phi(CU_{t+1}) \right) \right] E_t^Q \dots \dots \quad (7)$$

The value of installed capital depends on the expected future value taking into account the depreciation rate and the expected future return as captured by the rental rate times the expected rate of capital utilisation.

$$1 = Q_t \left[ 1 - S \left( \frac{I_t}{I_{t-1}} \right) - \frac{I_t}{I_{t-1}} S' \left( \frac{I_t}{I_{t-1}} \right) \right] E_t^I + \beta E_t \left[ Q_{t+1} \frac{\Lambda_{t+1}}{\Lambda_t} \left( \frac{I_{t+1}}{I_t} \right) S'' \left( \frac{I_{t+1}}{I_t} \right) E_{t+1}^I \right] \dots \dots \dots \quad (8)$$

$$R_t^K = \Phi'(CU_t) \dots \dots \dots \quad (9)$$

Where,  $R_t^K$  is rental rate of capital and  $E_t^I$  can be interpreted as a shock to the relative price of investment while  $E_t^Q$  accounts for fluctuations of the external finance risk premium.

**2.4. Firms Behaviour**

Intermediate goods are produced with a Cobb-Douglas technology as follows:

$$Y_t(h) = E_t^A (CU_t(h)K_{t-1}(h))^\alpha L_t(h)^{1-\alpha} - \Omega \quad \forall h \in (0,1)$$

Where  $E_t^A$  is an exogenous technology parameter and  $\Omega$  is a fixed cost. Firms are monopolistic competitors and produce differentiated products an aggregate final good that may be used for consumption and investment. This production is obtained using a continuum of differentiated intermediate goods with the following Dixit and Stiglitz (1977) production technology:

$$Y_t = \left[ \int_0^1 Y_t(z)^{1/\mu} dh \right]^\mu \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (10)$$

Where  $\mu = \frac{\theta_P}{\theta_P - 1}$  and  $\theta_P > 1$  is the elasticity of substitution between differentiated

goods. The representative final good producer maximises profits  $P_t Y_t - \int_0^1 P_t(z) Y_t(z) dh$

subject to the production function (10), taking as given the final good price  $P_t$  and the prices of all intermediate goods. The first order condition for this problem is:

$$Y_t(z) = \left[ \frac{P_t(z)}{P_t} \right]^{\frac{-\mu}{\mu-1}} Y_t \quad \forall z \in (0,1) \quad \dots \quad \dots \quad \dots \quad (11)$$

Finally, as the sector is perfectly competitive, the zero profit condition holds and the expression for  $P_t$  is:

$$P_t = \left[ \int_0^1 P_t(z)^{1/1-\mu} dh \right]^{1-\mu}$$

**2.5. Government**

Public expenditures  $\overline{G}$  are subject to random shocks  $E_t^G$ . The government finances public spending with labour tax, product tax and lump-sum transfers are expressed as:

$$P_t \overline{G} E_t^G - \tau_{W,t} W_t L_t - \tau_t P_t Y_t - P_t T T_t = 0 \quad \dots \quad \dots \quad \dots \quad \dots \quad (12)$$

The government also controls the short term interest rate  $R_t$ . Monetary policy is specified in terms of an interest rate rule: the monetary authority follows generalised Taylor rules which incorporate deviations of lagged inflation and the lagged output gap defined as the difference between actual and flexible-price output. Such reaction functions also incorporate a non-systematic component:  $E_t^G$ .

### 3. PRICE SETTING MODELS AND OPTIMAL MONETARY POLICY

This section presents the baseline version of the standard Calvo, State Dependent Pricing (SDP) and the Sticky Information (SI) models of price setting as different nominal rigidities modelling strategies. Furthermore, optimal monetary policy principle is also included in this section.

#### 3.1. Models Based on Price Stickiness

In this section we describe two competing models based on price stickiness; (a) a standard Calvo (1983) type price stickiness model, and (b) a recent extension by Hernandez's (2004): state dependent pricing model. Both these models capture the fundamental notion of staggered price mechanism and translate them into New Keynesian Phillips curve.

##### 3.1.1. Standard Calvo (1983) Model

In each period, firms receive a random signal with constant probability  $1 - \alpha_p$  that allows them to change the price  $p_t^*$ . This probability is independent across firms and time. The average duration of a rigidity period is  $\frac{1}{1 - \alpha_p}$ . If a firm cannot re-optimize its price, the

price evolves according to the following simple rule:  $p_t(h) = \Pi_{t-1}^{\xi_p} \bar{\Pi}_t^{1-\xi_p} p_{t-1}(h)$ .

Firms that are allowed to change their price maximise expected profit:

$$E_t \left[ \sum_{j=0}^{\infty} \alpha_p^j \Xi_{t,t+j} \left( (1 - \tau_{t+j}) \bar{p}_t(h) Y_{t+j}(h) \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\xi_p} \left( \frac{\bar{P}_{t-1+j}}{P_{t-1}} \right)^{1-\xi_p} - MC_{t+j} P_{t+j} (Y_{t+j}(h) + \Omega) \right) \right]$$

Where,

$$Y_{t+j}(h) = \left( \frac{\bar{P}_t(h)}{P_t} \right)^{-\frac{\mu}{\mu-1}} \left[ \frac{P_t}{P_{t+j}} \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\xi_p} \left( \frac{\bar{P}_{t+j}}{\bar{P}_t} \right)^{1-\xi_p} \right]^{\frac{\mu}{\mu-1}} Y_{t+j}$$

and

$$\Xi_{t,t+j} = \beta^j \frac{\Lambda_{t+j} P_t}{\Lambda_t P_{t+j}}$$

is the marginal value of one unit of money to the household.  $MC_{t+j}$  is the real marginal cost and  $\tau_t$  is a time-varying tax on firm's revenue. Due to our assumptions on the labour market and the rental rate of capital, the real marginal cost is identical across producers.

$$MC_t = \frac{W_{R,t}^{(1-\alpha)} R_t^{k\alpha}}{E_t^A \alpha (1-\alpha)^{(1-\alpha)}}$$

The first order condition for the optimal nominal reset price  $p_t^*$  is:

$$E_t \left[ \sum_{j=0}^{\infty} \alpha_p^j \Xi_{t,t+j} Y_{t+j}(h) P_{t+j} \left( (1 - \tau_{t+j}) \frac{\tilde{p}_t(h)}{P_t} \frac{P_t}{P_{t+j}} \left( \frac{P_{t-1+j}}{P_{t-1}} \right)^{\xi_p} \left( \frac{\bar{P}_{t-1+j}}{\bar{P}_{t-1}} \right)^{1-\xi_p} \right) - \mu MC_{t+j} \right] = 0$$

In this study, the aggregate price level which incorporates rule of thumb price setters evolves according to:

$$P_t^{1-\mu} = \alpha_p \left( \Pi_{t-1}^{\xi_p} \bar{\Pi}_t^{1-\xi_p} P_{t-1}(h) \right)^{\frac{1}{1-\mu}} + (1 - \alpha_p) (\tilde{p}_t(h))^{\frac{1}{1-\mu}}$$

This price setting scheme can be written in the following recursive form:

$$\frac{\tilde{p}_t(h)}{P_t} = \mu \frac{Z_{1,t}}{Z_{2,t}}$$

Where,

$$Z_{1,t} = \Lambda_t MC_t Y_t + \alpha_p \beta E_t \left[ \left( \frac{\Pi_{t+1}}{\Pi_t^{\xi_p} \bar{\Pi}_{t+1}^{1-\xi_p}} \right)^{\frac{\mu}{1-\mu}} Z_{1,t+1} \right] \dots \dots \dots (13)$$

and

$$Z_{2,t} = (1 - \tau_t) \Lambda_t Y_t + \alpha_p \beta E_t \left[ \left( \frac{\Pi_{t+1}}{\Pi_t^{\xi_p} \bar{\Pi}_{t+1}^{1-\xi_p}} \right)^{\frac{1}{1-\mu}} Z_{2,t+1} \right] \dots \dots \dots (14)$$

Accordingly, the aggregate price dynamics leads to the following relation:

$$1 = \alpha_p \left( \frac{\Pi_t}{\Pi_{t-1}^{\xi_p} \bar{\Pi}_t^{1-\xi_p}} \right)^{\frac{1}{1-\mu}} + (1 - \alpha_p) \left( \mu \frac{Z_{1,t}}{Z_{2,t}} \right)^{\frac{1}{1-\mu}} \dots \dots \dots (15)$$

The above specification of Calvo price for which,  $\xi_p = 0$  is considered as a standard Calvo.

**3.1.2. An Extension: State Dependent Pricing Model**

Hernandez’s (2004) model gives an explicit role for the average frequency of price revisions in the inflation-output relation, by including state dependent

fluctuations. To be more precise, it combines state-dependent and time-dependent features in the firms' pricing scheme. Firms are allowed to choose a higher probability of price revisions. In that case, they have to pay a lump sum cost which is random as in Dotsey, *et al.* (2004). There are two kinds of monopolistic firms  $j \in [L, H]$ . The first one revises prices with the lower probability  $(1 - \alpha_H)$  in each period but as soon as they receive the random signal of price revision, they have the possibility to benefit from faster price revisions  $(1 - \alpha_H)$  by paying the cost  $\xi$ , with the probability  $\lambda_t$ . If not, they can set a new price without cost but with the lower probability. The second one always adjusts prices with the higher probability and without cost.

The profit maximisation program respectively in the two cases is written as follows, supposing  $\tau_L > 0$  and  $\tau_H = 0$ :

If  $z \in L$  then:

$$\begin{aligned} \max_{p_{j,t}(z)} D_{0j,t} &= (1 - \tau_j)d(p_{j,t}(z), S_t) + \beta\alpha_j E_t \frac{\Lambda_{t+1}}{\Lambda_t} D_{1j,t+1}(p_{j,t}(z), S_{t+1}) \\ &+ \beta(1 - \alpha_j) E_t \frac{\Lambda_{t+1}}{\Lambda_t} \lambda_{t+1} (D_{0H,t+1}(S_{t+1}) - \Xi_{t+1}) \\ &+ \beta(1 - \alpha_j) E_t \frac{\Lambda_{t+1}}{\Lambda_t} (1 - \lambda_{t+1}) D_{0L,t+1}(S_{t+1}) \end{aligned}$$

Where;

$$\begin{aligned} D_{1j,t+i}(S_{t+i}) &= (1 - \tau_j)d(p_{j,t}(z), S_{t+i}) + \beta\alpha_j E_t \frac{\Lambda_{t+1+i}}{\Lambda_{t+i}} D_{1j,t+1}(p_{j,t}(z), S_{t+1+i}) \\ &+ \beta(1 - \alpha_j) E_t \frac{\Lambda_{t+1+i}}{\Lambda_{t+i}} \lambda_{t+1+i} (D_{0H,t+1+i}(S_{t+1+i}) - \Xi_{t+1+i}) \\ &+ \beta(1 - \alpha_j) E_t \frac{\Lambda_{t+1+i}}{\Lambda_{t+i}} (1 - \lambda_{t+1+i}) D_{0L,t+1+i}(S_{t+1+i}) \end{aligned}$$

and the real profits:

$$d(p_{j,t}(z), S_t) = \left[ \frac{\tilde{p}_{j,t}(z)}{P_t} - (MC_t + \Omega) \right] \left( \frac{\tilde{p}_{j,t}(z)}{P_t} \right)^{-\frac{\mu}{\mu-1}} Y_t$$

If  $z \in H$  then:

$$\begin{aligned} \max_{p_{H,t}(z)} \bar{D}_{0H,t}(S_t) &= (1 - \tau_H)d(p_{H,t}(z), S_t) + \beta\alpha_H E_t \frac{\Lambda_{t+1}}{\Lambda_t} \bar{D}_{1H,t+1}(p_{H,t}(z), S_{t+1}) \\ &+ \beta(1 - \alpha_H) E_t \left[ \frac{\Lambda_{t+1}}{\Lambda_t} \bar{D}_{0H,t+1}(S_{t+1}) \right] \end{aligned}$$

Where;

$$\begin{aligned} \bar{D}_{1H,t+i}(S_{t+i}) = & (1 - \tau_H)d(p_{H,t}(z), S_{t+i}) + \beta\alpha_H E_t \frac{\Lambda_{t+1+i}}{\Lambda_{t+i}} \bar{D}_{1H,t+1+i}(p_{H,t}(z), S_{t+1+i}) \\ & + \beta(1 - \alpha_H) E_t \left[ \frac{\Lambda_{t+1+i}}{\Lambda_{t+i}} \bar{D}_{0H,t+1+i}(S_{t+1+i}) \right] \end{aligned}$$

The first order condition in both cases gives the same optimal price:

$$\tilde{p}_{j,t} = \mu \frac{Z_{1,t}}{Z_{2,t}}$$

Where;

$$Z_{1,t} = MC_t Y_t P_t^{\mu-1} + \alpha_j \beta \left[ \frac{\Lambda_{t+1}}{\Lambda_t} Z_{1,t+1} \right]$$

and

$$Z_{2,t} = Y_t P_t^{\mu-1} + \alpha_j \beta \left[ \frac{\Lambda_{t+1}}{\Lambda_t} Z_{2,t+1} \right]$$

Knowing that, the probability of  $j$  choosing  $(1 - \alpha_H)$  is:

$$\lambda_t = 1 - \exp(-b[D_{0H,t} - D_{0L,t}])$$

and the conditional expected random cost is:

$$E_t \Xi_{t+1} = E_t \frac{1}{\lambda_{t+1}} \left[ \frac{1}{b} - (1/b + D_{0H,t+1} - D_{0L,t+1}) \cdot \exp(-b[D_{0H,t+1} - D_{0L,t+1}]) \right]$$

Let  $V_t$  be the mass of all firms  $z \in L$  that chose before and up to  $t$   $(1 - \alpha_H)$  and have not changes their price since that time. Consider  $\mu_t$ , the mass of firms that choose  $(1 - \alpha_L)$  at  $t$  and  $\bar{\mu}$ , the mass of firms in  $L$ .

The dynamics of  $V_t$  and  $\mu_t$  is given by the following equations:

$$\begin{aligned} V_t &= V_{t-1} + \lambda_t(1 - \alpha_L)\mu_{t-1} - (1 - \lambda_t)(1 - \alpha_H)V_{t-1} \\ \mu_t &= \bar{\mu} - V_t \end{aligned}$$

With for initial conditions, the steady state values of  $\mu_t$  and  $V_t$ , respectively  $\mu_0$  and  $V_0$ .

In this standard version, the aggregate price level evolves according to:

$$P_t = \left[ \int_0^1 (p_t(z))^{1/\mu} dz \right]^{1-\mu} = \left[ \bar{\mu}_0 P_{L,t}^{1/\mu} + (1 - \bar{\mu}_0) P_{H,t}^{1/\mu} \right]^{1-\mu}$$

Where;

$$P_{L,t} = \left[ \frac{1}{\bar{\mu}_0} \int_0^{\mu_t} (P_t(s))^{1/1-\mu} ds \right]^{1-\mu}$$

$$\alpha_L P_{L,t-1}^{1-\mu} + \frac{1}{\bar{\mu}_0} [(1-\alpha_L)\mu_{t-1} - (V_t - V_{t-1})] (\tilde{P}_{L,t})^{1-\mu}$$

and

$$P_{H,t} = \left[ \frac{1}{1-\bar{\mu}_0} \int_{\mu_t}^1 (P_t(s))^{1/1-\mu} ds \right]^{1-\mu}$$

$$\alpha_H P_{H,t-1}^{1-\mu} + \frac{1}{1-\bar{\mu}_0} [(1-\alpha_H)(1-\mu_{t-1}) + (V_t - V_{t-1})] (\tilde{P}_{H,t})^{1-\mu}$$

With  $V_t - V_{t-1}$ , the mass of firms  $z \in L$  choosing  $(1 - \alpha_H)$  at  $t$ .

### 3.2. The Sticky Information Model

In each period, a randomly chosen fraction of agents updates their information set. To be more precise, prices are flexible in the sense that firms are allowed to change them in any periods, but at a different level than in a full information environment while they do not have the same information available about the state of the world. Therefore, prices fixed based on different information coexist in the economy. This model has the property that its modeling does not depend on the value of the steady state of inflation.

At  $t$ , firms choose the price  $p_t^*$  using all current information. Define  $P_t$ , the overall price index. The optimal price is determined by the solution of the profit maximisation problem:

$$\max_{p_t(h)} E_{t-j} [(1 - \tau_t) p_t(h) Y_t(h) - MC_t P_t (Y_t(h) + \Omega)]$$

where  $Y_t(h)$  is the demand schedule:

$$Y_t(h) = \left( \frac{p_t^*(h)}{P_t} \right)^{-\frac{\mu}{\mu-1}} Y_t$$

The first order condition of this program gives the following relationship between the optimal price  $p_t^*(h)$  and the real marginal cost  $MC_t$ :

$$p_t^*(h) = \frac{\mu}{1 - \tau_t} MC_t P_t$$

Lets consider the hybrid specification with backward looking agents as in Gali and Gertler (1999) by adding rule of thumb price setters.

Then the aggregate price level is given by:

$$(P_t)^{1-\frac{\mu}{\mu-1}} = \alpha_p \left( P_{t-1} \Pi_{t-1}^{\xi_p} \bar{\Pi}^{1-\xi_p} \right)^{1-\frac{\mu}{\mu-1}} + (1-\alpha_p) \sum_{j=0}^{+\infty} \left( (1-\alpha)^j \cdot E_{t-j}(p_t^*(h))^{1-\frac{\mu}{\mu-1}} \right)$$

In each period, firms face a constant probability  $(1-\alpha_p)$  of receiving a signal that allows them to change their price.

The last equation can be rewritten as follows:

$$(P_t)^{1-\frac{\mu}{\mu-1}} = \alpha_p \left( P_{t-1} \Pi_{t-1}^{\xi_p} \bar{\Pi}^{1-\xi_p} \right)^{1-\frac{\mu}{\mu-1}} + (1-\alpha_p) \alpha \sum_{j=0}^{+\infty} \left( (1-\alpha)^j \cdot \left[ \mu E_{t-j} \left( \frac{P_t MC_t}{(1-\tau_t)} \right) \right]^{1-\frac{\mu}{\mu-1}} \right)$$

Some manipulations allow us to obtain the stationary version of the previous equation which symbolises the non linear Sticky information Phillips curve:

$$\left( \frac{P_t}{P_{t-J}} \right)^{1-\frac{\mu}{\mu-1}} = \alpha_p \left( \frac{P_{t-1}}{P_{t-J}} \Pi_{t-1}^{\xi_p} \bar{\Pi}^{1-\xi_p} \right)^{1-\frac{\mu}{\mu-1}} + (1-\alpha_p) \alpha \sum_{j=0}^{+\infty} \left( (1-\alpha)^j \cdot \left[ \mu E_{t-j} \left( \frac{MC_t}{(1-\tau_t)} \frac{P_t}{P_{t-J}} \right) \right]^{1-\frac{\mu}{\mu-1}} \right)$$

Knowing that:

$$\frac{P_t}{P_{t-J}} = \prod_{s=0}^{J-1} \Pi_{t-s}$$

For computational reasons, the scheme truncates the infinite horizon in the age distribution of information sets, such as agents set their prices based on information outdates by  $J=12$  periods (that is to say 3 years). Therefore, this parameterisation leads us

to divide the previous Phillips curve by the parameter:  $\omega = \sum_{j=0}^J \alpha(1-\alpha)^j$

### 3.3. Market Equilibrium

Aggregate demand is given by:

$$Y_t = C_t + I_t + \bar{G} \varepsilon_t^G + \Psi(u_t) K_{t-1}$$

Market clearing condition on goods market is given by:

$$\begin{aligned} \int_0^1 Y_t(z) dz &= \varepsilon_t^A \int_0^1 (u_t K_{t-1}(z))^\alpha (L_t(z))^{1-\alpha} dz - \Omega \\ &= \varepsilon_t^A (u_t)^\alpha \int_0^1 (K_{t-1}(z)) \left( \frac{L_t(z)}{K_{t-1}(z)} \right)^{1-\alpha} dz - \Omega \end{aligned}$$

Or

$$\Delta_{p,t} Y_t = \varepsilon_t^A (u_t K_t)^\alpha (L_t)^{1-\alpha} - \Omega$$

$$\text{With: } \Delta_{p,t} = \int_0^1 \left( \frac{p_t(z)}{P_t} \right)^{-\frac{\mu}{\mu-1}} dz$$

It measures the price dispersion due to the staggered price setting. As in the case of the aggregate price index, we can show that this price dispersion index under Calvo contracts and sticky information (SI) contracts has respectively the following dynamics:

$$\begin{aligned} \Delta_{p,t}^{Calvo} &= \alpha_p \int_0^1 \left( \frac{p_{t-1}(z) P_{t-1}}{P_t} \pi_{t-1}^{\xi_p} \bar{\pi}^{1-\xi_p} \right)^{-\frac{\mu}{\mu-1}} dz + (1-\alpha_p) \left( \frac{P_t^*}{P_t} \right)^{-\frac{\mu}{\mu-1}} \\ &= \alpha_p \Delta_{p,t-1} \left( \frac{\pi_t}{\pi_{t-1}^{\xi_p} \bar{\pi}^{1-\xi_p}} \right)^{\frac{\mu}{\mu-1}} + (1-\alpha_p) \left( \mu \frac{Z_{1,t}}{Z_{2,t}} \right)^{-\frac{\mu}{\mu-1}} \end{aligned}$$

$$\Delta_{p,t}^{SDP} = \left[ \bar{\mu}_0 \left( \frac{P_{L,t}}{P_t} \right)^{-\frac{\mu}{\mu-1}} + (1-\bar{\mu}_0) \left( \frac{P_{H,t}}{P_t} \right)^{-\frac{\mu}{\mu-1}} \right]$$

$$\Delta_{p,t}^{SI} = \alpha_p \Delta_{p,t-1} \left( \frac{\pi_t}{\pi_{t-1}^{\xi_p} \bar{\pi}^{1-\xi_p}} \right)^{\frac{\mu}{\mu-1}} + (1-\alpha_p) \frac{P_{t-J}}{P_t} \alpha \sum_{j=0}^J (1-\alpha) E_{t-j} \left( \mu MC_t \frac{P_t}{P_{t-J}} \right)^{-\frac{\mu}{\mu-1}}$$

The aggregate unconditional welfare is defined by:

$$u_t = \int_0^1 u_t(h) dh$$

We already mentioned that all household have the same consumption plans. Consequently:

$$u_t = E_t \sum_{j=0}^{\infty} \beta^j \left[ \frac{1}{1-\zeta_C} (C_{t+j} - \nu C_{t-1+j})^{1-\zeta_C} - \frac{\varepsilon_{t+j}^L \zeta}{1+\zeta_L} L_{t+j}^{1+\zeta_L} \Delta_{w,t+j} \right] \varepsilon_{t+j}^B \quad \dots \quad (16)$$

Where;

$$\Delta_{w,t} = \int_0^1 \left( \frac{W_t(h)}{W_t} \right)^{-\frac{(1+\zeta_L)\mu w}{\mu w-1}} dh$$

As for the price dispersion index:

$$\Delta_{w,t} = \alpha_w \Delta_{w,t-1} \left( \frac{w_t}{w_{t-1}} \frac{\pi_t}{\pi_{t-1}^{\xi_w} \bar{\pi}^{1-\xi_w}} \right)^{\frac{(1+\zeta_L)\mu_w}{\mu_w-1}} + (1-\alpha_w) w_t \left( \mu_w \frac{Z_{W1,t}}{Z_{W2,t}} \right)^{\frac{(1+\zeta_L)\mu_w}{\mu_w(1+\zeta_L)-1}} \quad (17)$$

### 3.4. Optimal Monetary Policy (Main Principle)

The optimal monetary policy or the Ramsey policy under commitment consists in maximising the intertemporal households' welfare ( $U_t$ ) subject to a set of non-linear structural constraints of the model.

To be more precise, a Ramsey equilibrium is a competitive equilibrium such that:

- (i) Given a sequence of shocks, prices, policy instrument and quantities  $P_t$ ;  $R_t$ ;  $Q_{t=0}^{\infty}$  it maximises the representative agent lifetime utility,  $U_t$ .
- (ii)  $i_t > 0$ .

In order to analyse essentially the macroeconomic stabilisation properties of the monetary policy, we assume subsidies on labour and goods markets are offsetting first order distortions. In that case, the flexible price equilibrium is Pareto optimal. The Ramsey policy problem is written using an infinite horizon Lagrangian:

$$L = U_t + E_t \lambda_r \sum_{j=0}^J \beta^j (i_{t+j} - \bar{i})^2 + \lambda (\text{Model Constraints}) \quad \dots \quad (18)$$

Where  $\lambda_r$  is the weight associated to the cost on nominal interest rate fluctuations. We introduce an interest rate objective in this problem in order to make the Ramsey policy operational. The first order conditions to this problem are obtained using the symbolic toolbox of Matlab 2008.

## 4. THE EMPIRICAL SETUP

This section briefly outlines the empirical setup by illustrating data, choice of priors and estimation methodology used in this paper. We adopted the empirical approach outlined in Smets and Wouters (2003) and estimate our augmented DSGE models with sticky prices-information and wages employing Bayesian inference methods. This involves obtaining the posterior distribution of the parameters of the model based on its log-linear state-space representation and assessing its empirical performance in terms of its marginal likelihood. In the following we briefly sketch the adopted approach and describe the data and the prior distributions used in its implementation. We then present our estimation results in next coming section.

### 4.1. Data

We consider 7 key macro-economic quarterly time series from 1973q1 to 2004q4: output, consumption, investment, hours worked, real wages, GDP deflator inflation rate, and 3 month short-term interest rate. Euro area data are taken from Smets and Wouters (2003) and Euro-stat official website. Concerning the euro area, employment numbers

replace hours. Consequently, as in Smets and Wouters, hours are linked to the number of people employed  $e_t$  with the following dynamics:

$$e_t = \beta E_t e_{t+1} + \frac{(1 - \beta \alpha_e)(1 - \alpha_e)}{\alpha_e} (t_t^* - e_t)$$

Aggregate real variables are expressed per capita by dividing with working age population. All the data are detrended before the estimation. Since the model has implications for the log-deviations from the steady-state of all these variables, so we pre-process the data before the estimation stage.

## 4.2. Choice of Priors

In the overall, the set of priors corresponds to the ones in Smets and Wouters (2003) (see Tables 2 to 5).

### 4.2.1. Common Parameters

The discount factor  $\beta$  is calibrated to 0.99, which implies annual steady state real interest rates of 4 percent. The depreciation rate  $\delta$  is equal to 0.0025 per quarter. Markups are 1.3 in the goods market and 1.5 in the labour market. The steady state is consistent with labour income share in total output of 70 percent. Shares of consumption and investment in total output are respectively 0.65 and 0.18.

### 4.2.2. Calvo and State Dependent Pricing based Model Parameters

Two additional parameters ( $\alpha_p$  and  $\xi_p$ ). The parameter  $\alpha_p$  which determines the probability that firms are allowed to change their price, has a prior mean of 0.75 and a standard deviation of 0.0084. Regarding the hybrid specification, the parameter of partial indexation to lagged inflation follows a Beta-distribution.

### 4.2.3. Sticky Information based Model Parameters

Lets suppose the same prior for the previous parameters in that case and consider  $\alpha$  which is the probability to receive new information about the state of the economy, follows a Beta-distribution with the mean of 0.75 and the standard deviation of 0.0512. This parameter value is also consistent with Mankiw and Reis (2002).

## 4.3. Bayesian Estimation Approach

In empirical literature, there are numerous strategies used to determine the parameters of new-Keynesian DSGE models. These ranging from pure calibration, e.g., Kydland and Prescott (1982), Monacelli (2003), over generalised method of moments (GMM) for estimation of general equilibrium relationships, e.g., Christiano and Eichenbaum (1992), to full-information based maximum likelihood estimation as in Altug (1989), Mcgrattan (1994), Leeper and Sims (1994), Kim (2000) and Irland (2000). Other studies also proposed mixed strategies like limited-information based methods to explore a key question whether a DSGE model matches the data with some certain dimensions. For example, Canova (2002) and Christiano, *et al.* (2005) used minimum

distance based criterion to estimate VAR and DSGE model impulse response functions. Further methodological debate can be referred using the following studies by Diebold (1998), Ruge-Murcia (2003) and Tovar (2008).

Other than these proposed estimation and calibration strategies, this study uses another estimation approach called Bayesian estimation approach. This alternative approach is a combination of calibration and estimation of selected model parameters. The fundamental advantage of this approach is a better adoption of the model to the conditions in the given economy, [see e.g., Smets and Wouters (2003)].

In any empirical modeling exercise, there are three possible sources of uncertainty; the model itself; the parameterisation condition of the model and the data. The debate on the issue of uncertainty is the most important as it provides a difference between frequentist (classical) and Bayesian approach. In classical approach the probability of the occurrence of an event, i.e., the measurement of uncertainty is associated with its frequency. However, in Bayesian approach, the probability of an event is determined by two components; the subjective belief (prior) and the frequency of that event. For further detail on this notion, [see for instance Gelman (2006) and Koopman, *et al.* (2007)].

The seminal work on DSGE modeling used this approach started with the study by Landon-Lane (1998), DeJong, *et al.* (2000), Schorfheide (2000) and Otrok (2001). This approach has been generalised by Lubik and Schorfheide (2005) who estimate a DSGE model without providing restrictions to the determinacy region of the parameter space. Almost all recent studies on DSGE model have used this approach, e.g., Smets and Wouters (2003), Laforte (2004), Onatski and Williams (2004), Ratto, *et al.* (2008), Adolfson, *et al.* (2008) and Kolasa (2008).

In practical sense, we try to fit out referenced model, which consists in placing a prior distribution  $p(\Gamma)$  on structural parameters  $\Gamma$ , the estimate of which are then updated using the data  $Y^T$  according to the Bayes rule:

$$p(\Gamma / Y^T) = \frac{p(Y^T / \Gamma)}{p(Y^T)} \propto L(\Gamma / Y^T) p(\Gamma) \quad \dots \quad \dots \quad \dots \quad \dots \quad (19)$$

Where  $p(Y^T / \Gamma) = L(\Gamma / Y^T)$  is the likelihood function  $p(\Gamma / Y^T)$  is the posterior distribution of parameters and  $p(Y^T)$  is the marginal likelihood defined as:

$$p(Y^T) = \int p(Y^T / \Gamma) p(\Gamma) d\Gamma \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (20)$$

Any DSGE model forms a linear system with rational expectations, the solution to which is of the form:

$$R_t = B_1(\Gamma)R_{t-1} + B_2(\Gamma)\mu_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (21)$$

$$\mu_t = B_3(\Gamma)\mu_{t-1} + B_4(\Gamma)\varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (22)$$

Where  $R_t$  is a vector of endogenous variables,  $\mu_t$  is a vector of stochastic disturbances and  $\varepsilon_t$  is a vector of innovations to stochastic shocks and coefficient matrices  $A_j$  depending on

the parameters of the model. The measurement Equations (21) and (22) linking observable variables used in the estimation with endogenous variables can be written as:

$$Y^T = CR_t \quad \dots \quad (23)$$

Where,  $C$  is the deterministic matrix. The Equations (21), (22) and (23) form the state-space representation of the model. The likelihood of which can be evaluated using Kalman filter. The analytical solution of the whole system may not be obtain in general, however the sequence of posterior draws can be obtain using Markov-Chain-Monte-Carlo (MCMC) simulation methodology. This methodology is briefly discussed in Lubik and Schorfheide (2005), Gelman, *et al.* (2006) and Koopman, *et al.* (2007). For our estimation setup the random walk Metropolis-Hastings algorithm is used to generate Morkov-Chains (MC) for the model parameters.

## 5. EMPIRICAL RESULTS

The Bayesian framework as discussed in previous section is used in order to compare the purely forward looking and hybrid Calvo to the baseline and the hybrid specifications of a truncated Sticky Information model, under the assumption that the models have equal prior probabilities.

### 5.1. Model Comparison Based on Marginal Densities

The following Table 1 reports the marginal densities for the all pricing models. The model with the highest marginal density is the standard Calvo model over the other specifications. In the overall, it dominates the sticky information for all specifications in terms of marginal densities.

Table 1

#### *Model Comparison*

| Marginal Density                  | Laplace Appr. | Metropolis | Acceptation Rates |
|-----------------------------------|---------------|------------|-------------------|
| Model                             |               |            |                   |
| State-Dependent                   | -467.549      | -466.673   | 0.36954           |
| Standard Calvo                    | -472.703      | -471.660   | 0.28976 – 0.28845 |
| Hybrid Calvo                      | -473.223      | -472.247   | 0.27243 – 0.27305 |
| Mixed Standard Sticky Info (J=12) | -514.784      | -515.292   | 0.23582           |
| Mixed Hybrid Sticky Info (J=12)   | -518.912      | -519.466   | 0.19194           |
| Standard Sticky Info (J=12)       | -591.869      | -592.952   | 0.21310           |
| Hybrid Sticky Info (J=12)         | -515.399      | -515.796   | 0.28529           |

*Table Key:* The Mixed Hybrid SI with 22 lags gives the Marginal Density -514.2014 (Laplace Approximation).

In the literature, the motivation for including inertia is largely empirical and justified theoretically with an assumption that a fixed proportion of firms has backward-looking price setting behaviour. Empirically the adequacy of this model, which nests the pure forward-looking sticky price model and inherits the good properties of backward-looking behaviour, to data is controversial. In this study using Bayesian estimation, the introduction of indexation to lagged inflation is not a necessary condition to reproduce

plausible inflation dynamics as in the standard Calvo model, [see for instance Laforte (2004); Paustian and Pytlarczyk (2006)].

Some researchers criticise all models built on the sticky price hypothesis because they would not be at odds with the facts and the hybrid models would be even worse than the standard ones [see for example, Mankiw and Reis (2002)]. They advise to replace this specification by Sticky Information contracts that prevent inflation to jump immediately after shocks. However under such pricing, the fit is poor and regarding the Hybrid curve, all expected inflation is integrated in the price path such as the scheme of indexation is again of little interest. Moreover, the extension of the maximum age of outdated information sets from 12 to 22 quarters does not improve very much the performance of the Sticky Information models such as we consider 12 quarters represent a good approximation of the infinite sum in terms of contracts duration. In the overall, the introduction of indexation, under mixed SI models, does not by itself add more persistence in the two specifications and basically, the choice of the price structure seems to be much more important.

## 5.2. Model Comparison Based on Posterior Distribution

Tables A1 to A7 of Appendix-A,\* present information about the posterior distributions of the two pricing schemes, under different assumptions. In the standard case (without indexation), while most of estimated parameters are quite similar, the estimated degree of wage indexation is significantly high in the Sticky Information model under Calvo wage contracts (0.76) and low in the Calvo model (0.21).

In the same way, the variance of wage markup is 0.40 in SI model vs 0.19 in Calvo model. We can also note an important difference across the pricing regarding the persistence degree of the preference shock and its variance (respectively in Calvo and SI : 2.54 vs 1.95 and 5.30 vs 9.34).

As a result, the Sticky information assumption has different implications for some key parameters including the ones in the policy instrument. The degree of inertia is slightly smaller in that this model as opposed to the Calvo specification. This shows that model parameters are highly sensitive to both specifications; therefore, it is difficult to conclude the degree of robustness of each model specification. As both models can produce an important degree of persistence such as the choice of Sticky Price against Sticky Information is not sufficient to determine dynamics properties of two key variables inflation and output.

## 5.3. Model Comparison Based on Impulse Responses

Figures B1 to B8 of Appendix-B compare the models' estimated impulse responses of main variables after one percent increase in key structural shocks, showing the 90 percent posterior bands and the median of the posterior densities. Figures B1 show the responses after a productivity shock. Across both Calvo models, the propagation of the shock is consistent, though in the hybrid version, the inflation displays a 'hump-shaped' curvature after the few initial impact. As opposed to the SI model, the Calvo models can

\* For detail results of this Appendix (Tables A1 to A7) please contact the authors via email: rdrissi@esg.fr

bring down the policy instrument slightly longer below its steady state in the short run. In the overall, the short run responses are much stronger under the Sticky information pricing due to its volatile short run dynamics for the nominal variables. Indeed, after an initial boost, the variables more quickly come back towards the long-run values.

Regarding the responses of output and inflation to a Monetary Policy shock (Figure B2), both specifications lead to a hump-shaped response of inflation (except for the pure FL Calvo model). First of all, the standard Calvo model exposes an immediate response of inflation. Mankiw and Reis (2002) criticise in the fixed prices models, the absence of delay in the inflation reaction. While it seems to be only a feature related to the fixed prices forward looking models, the hybrid Calvo reproduce a reaction of inflation less delayed than the response of the Sticky Information model. Moreover, this last specification respect the condition of a more delayed response of inflation than Output while in the Calvo models the response of inflation is faster. Indeed, the peak slightly occurs before the one of Output.

Besides, in the Smets and Wouters (2003) model under Calvo contracts, the price markup shock is dominant in the inflation driving. In the Sticky Information models, such shocks lead to responses less persistent into the main selected variables, returning more quickly to their Steady State than in the Calvo models (Figures B3 and B4). Paustian and Pytlarczyk (2006) show the estimation of a Calvo model without markup shock induces a marginal likelihood lower and advance one explanation for the poor fit could be the inability of Sticky Information models to match the volatility of inflation as well as the persistence of inflation and real wages. Indeed, such non structural shocks play an important role in the inflation persistence, in particular for the model comparison.

#### **5.4. Welfare Comparison Based on Optimal Monetary Policy**

In this section, the Ramsey allocation is computed by solving the first order approximation of the equilibrium conditions. Figures B1 and B2 refer to the responses of aggregates after an efficient supply shock. Concerning the productivity shock, the Ramsey allocation generates a stronger and faster response of real variables and real wage in the Calvo Model but weaker and slower in the SI model. The associated interest rate path is much more accommodative in the short term but reverts very quickly to its initial level.

In the overall, for both models, over longer horizons, the response of real variables becomes significantly closer in both monetary regimes. Regarding the labour supply shock, in the Calvo model, the hump-shaped downward under the Ramsey policy stimulated output, consumption and investment and leaves quasi-unchanged inflation and real wages. Under Sticky Information pricing, the effect is weaker and the hump-shaped stimulates all the aggregates. By contrast, the estimated rule is not supportive enough to prevent a decrease in real wage and inflation, above all in the SI model where the interest rate is close to the steady state value.

Turning now to efficient demand shocks, the increase in consumption after a preference shock, is more limited under the Ramsey policy than the alternative rule, and the contraction in investment is stronger. In the Calvo model, the output decreases in short term under the Ramsey allocation while inflation and real wage are almost fully stabilised while in the SI model, the output is stabilised and the real wage decreases in short term. Under estimated rule, such a shock is expansionary on output and upward pressures emerge on real wages and inflation.

For the others demand shocks, the differences noted above are less pronounced. The responses of output, consumption, investment and real wages to an investment shock or a government spending shock are relatively similar under Ramsey policy and the estimated rule, even if the inflation response is much more muted in the Ramsey allocation (see Figures B4 and B5 in Appendix).

Figures B6 to B8 refer to inefficient shocks. The transmission of price markup shocks to the economy is not strongly different under both monetary regimes which suggest a similar inflation/output tradeoff for this type of shock. However, in the case of wage markup and external finance premium shocks, the Ramsey policy is much more restrictive. It delivers lower real variables and more stable inflation. In the overall, compared with the estimated Taylor rule, the Ramsey policy accommodates more strongly the efficient supply shocks, leans more against efficient demand shocks. In addition, the optimal policy is much more responsive to labour market shocks than the estimated rule which incorporates only goods market variables such as inflation and output.

## 6. CONCLUSION

This paper considers a closed economy version of DSGE model with various nominal frictions vis-à-vis monetary-cum-fiscal blocks to seek the basic query that how monetary policy impacts while in the presence of nominal frictions, like price stickiness, staggered wages, etc. Using Bayesian Simulation techniques, we estimate the model for the closed economy. Our simulation results show that despite the apparent similarities these frictions, their responses to shocks and fit to data are quite different and there is no agreement on their relative performance. Both these hypotheses can produce an important degree of persistence such as the choice of Sticky Price against Sticky Information is not sufficient to determine dynamics properties of two key variables inflation and output. Hence, as a result, monetary authorities cannot afford to rely on a single reference model which contains few nominal frictions of the economy but need to model a large number of alternative ways available when they take their decision of optimal monetary policy.

APPENDIX B

MODEL IMPULSE RESPONSES

Fig. B1. Dynamic Responses to a Productivity Shock

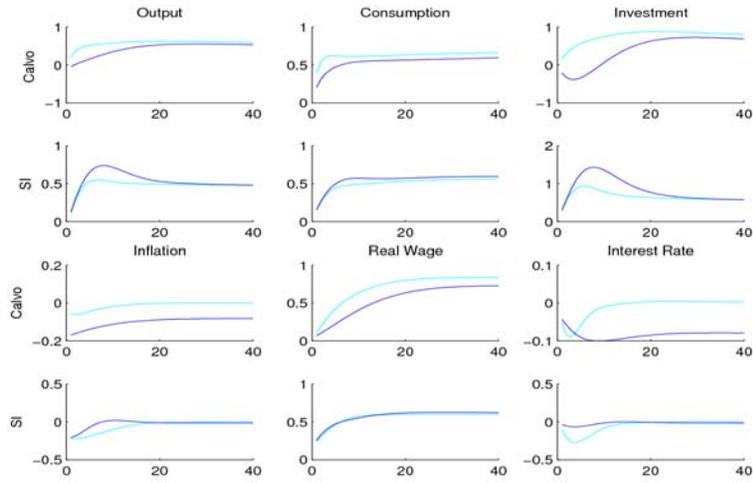
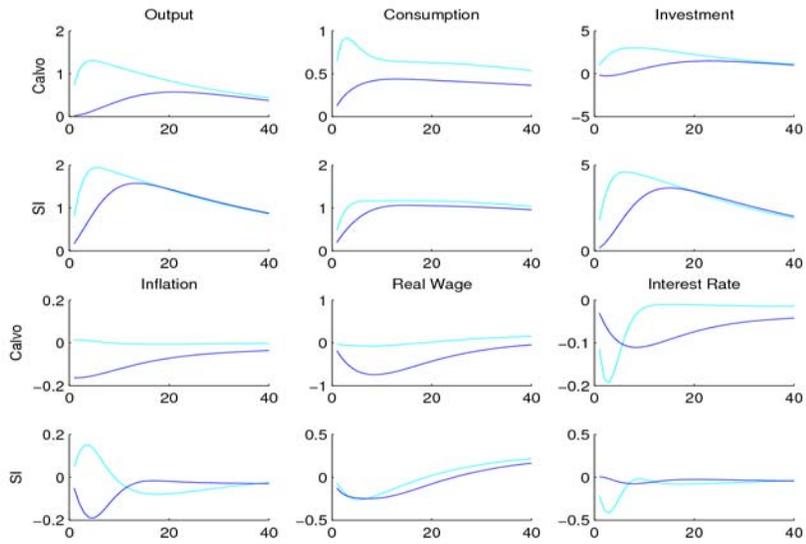
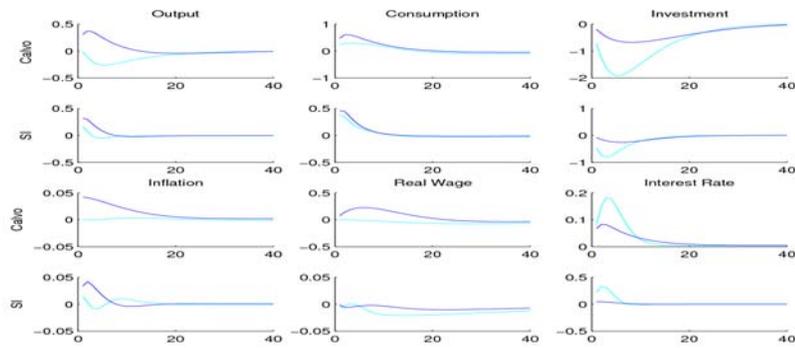


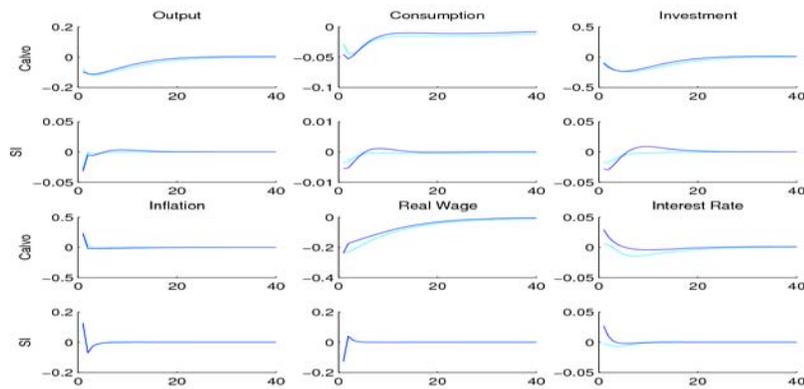
Fig. B2. Dynamic Responses to a Labour Shock



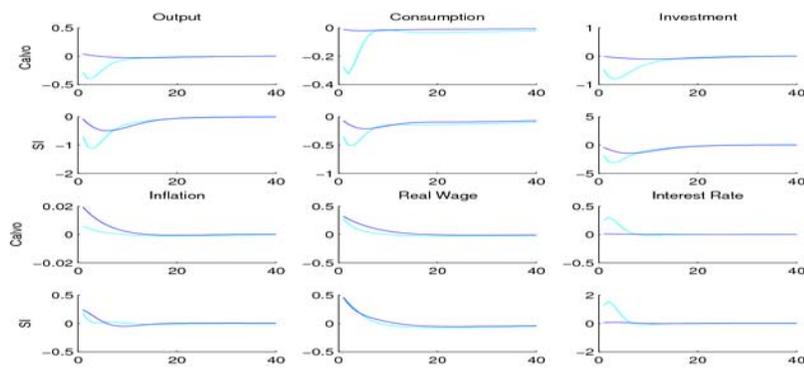
**Fig. B3. Dynamic Responses to a Preference Shock**



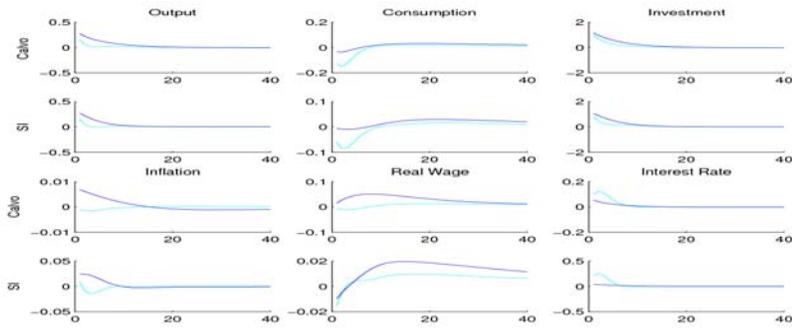
**Fig. B4. Dynamic Responses to a Price Markup Shock**



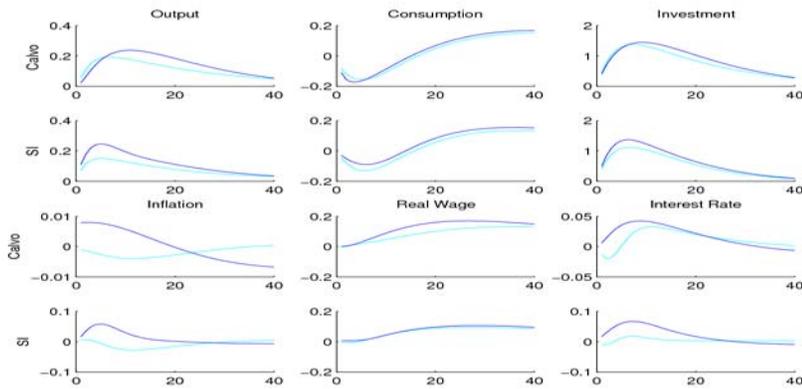
**Fig. B5. Dynamic Responses to a Wage Markup Shock**



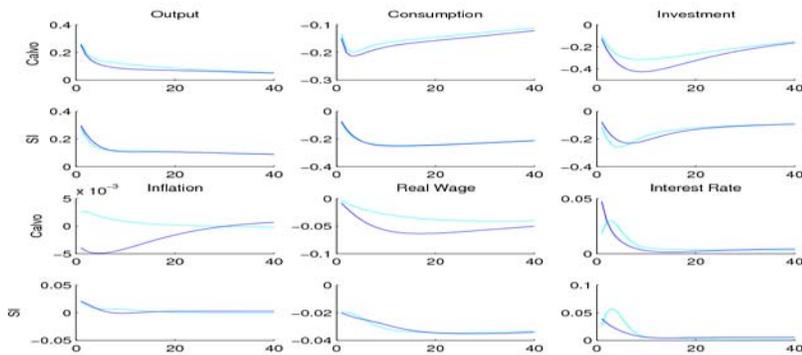
**Fig. B6. Dynamic Responses to an External Finance Premium Shock**



**Fig. B7. Dynamic Responses to an Investment Shock**



**Fig. B8. Dynamic Responses to a Government Spending Shock**



## REFERENCES

- Adolfson, M., S. Laséen, J. Linde, and M. Villani (2007a) RAMSES: A New General Equilibrium Model for Monetary Policy Analysis. Risksbank, *Economic Review* 2.
- Adolfson, M., S. Laséen, J. Linde, and M. Villani (2007b) Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through. *Journal of International Economics* 72, 481–511.
- Adolfson, M., S. Laséen, J. Linde, and M. Villani (2008) Evaluating an Estimated New Keynesian Small Open Economy Model. *Journal of Economic Dynamics and Control* 32, 2690–2721.
- Altug, S. (1989) Time-to-Build and Aggregate Fluctuations: Some New Evidence. *International Economic Review* 30, 889–920.
- Calvo, G. A. (1983) Staggered Price Setting in a Utility-Maximising Framework. *Journal of Monetary Economics* 12, 383–398.
- Canova, F. (2007) *Methods for Applied Macroeconomic Research*. Princeton University Press.
- Christiano, L. J., M. Eichenbaum, and C. L. Evans (1997) Sticky Price and Limited Participation Models Of Money: A Comparison. *European Economic Review* 41, 1201–1249.
- Christiano, L. J., M. Eichenbaum, and C. L. Evans (1998) *Monetary Policy Shocks: What Have We Learned And To What End?* In J. B. Taylor and M. Woodford (eds.) *Handbook of Macroeconomics*. Amsterdam, North-Holland.
- Christiano, L., and M. Eichenbaum (1992) Current Real-Business Cycle Theories and Aggregate Labour-Market Fluctuations. *American Economic Review* 82, 430–45.
- Christiano, L., M. Eichenbaum and C. Evans (2005) Nominal Rigidities and the Dynamic Effects to a Shock of Monetary Policy. *Journal of Political Economy* 113, 1–45.
- Clarida, R., J. Gali and M. Gertler (1999) The Science of Monetary Policy: A New Keynesian Perspective. *Journal of Economic Literature* 37, 1661–1707.
- Dejong, D., B. Ingram, and C. Whiteman (2000) A Bayesian Approach to Dynamic Macroeconomics. *Journal of Econometrics* 98, 201–223.
- Dib, A., M. Gammoudi and K. Moran (2008) Forecasting Canadian Time Series with the New Keynesian Model. Canadian Economics Association. *Canadian Journal of Economics* 41, 138–165.
- Diebold, F. X. (1998) The Past, Present, and Future of Macroeconomic Forecasting. *Journal of Economic Perspectives* 12, 175–192.
- Dotsey, M., R. King and A. Wolman (1999) State Dependent Pricing and General Equilibrium Dynamics of Money and Output. *Quarterly Journal of Economics* 114, 655–690.
- Gali, J. and M. Gertler (1999) Inflation Dynamics: A Structural Econometric Analysis. *Journal of Monetary Economics* 44, 195–222.
- Gali, J. and M. Gertler (2007) Macroeconomic Modeling for Monetary Policy Evaluation. *Journal of Economic Perspectives* 21, Fall Issue.
- Gelman, A., J. B. Carlin, H. S. Stern, and D. B. Rubin (2006) *Bayesian Data Analysis*. (Second Edition) Text in Statistical Science, Chapman and Hall.
- Geweke, J. (1995) Monte Carlo Simulation and Numerical Integration. Federal Reserve Bank of Minneapolis. (Research Department Staff Report 192).

- Geweke, J. (1999) Using Simulation Methods for Bayesian Econometric Models: Inference, Development and Communication. *Econometric Reviews* 18, 1–73.
- Goodfriend, M. (2007) How the World Achieved Consensus on Monetary Policy. *Journal of Economic Perspectives* 21, Fall Issue.
- Goodfriend, M. and R. King (1997) The New Neoclassical Synthesis and the Role of Monetary Policy. *NBER Macroeconomics Annual* Vol. 1997.
- Haider, A. and S. U. Khan (2009) A Small Open Economy DSGE Model for Pakistan. *The Pakistan Development Review* (Forthcoming).
- Hernandez, K. (2004) Inflation and Output Dynamics with State Dependent Frequency of Price Change. Boston College, USA. (Working Paper).
- Ireland, P. N. (2004) Technology Shocks In The New Keynesian Model. (NBER Working Paper No. W10309).
- Justiniano, A. and B. Preston (2004) Small Open Economy DSGE Models: Specification, Estimation and Model Fit. Columbia University. (Manuscript).
- Keen, B. D. (2006) Sticky Price and Sticky Information Price Setting Models: What is the Difference? University of Oklahoma. (Working Paper).
- Kiley, M. T. (2007) A Quantitative Comparison of Sticky-Price and Sticky-Information Models of Price Setting. *Journal of Money, Credit and Banking* 39:S1, 101–125.
- Kim, J. (2000) Constructing and Estimating a Realistic Optimising Model of Monetary. *Journal of Monetary Economics* 45, 329–359.
- Kolasa, M. (2008) Structural Heterogeneity or Asymmetric Shocks? Poland and the Euro Area Through the Lens of a Two-Country DSGE Model. National Bank of Poland. (Working Paper No. 49).
- Koop, G., D. J. Poirier, and J. L. Tobias (2007) *Bayesian Econometric Methods*. Cambridge University Press.
- Kwapil, C., J. Baumgartner, and J. Scharler (2005) The Price-Setting Behaviour of Austrian Firms Some Survey Evidence. European Central Bank. (Working Paper Series No. 464).
- Kydland, F. E. and E. C. Prescott (1982) Time to Build and Aggregate Fluctuations. *Econometrica* 50, 1345–1370.
- Kydland, F. E. and E. C. Prescott (1996) The Computational Experiment: An Econometric Tool. *Journal of Economic Perspectives* 10, Winter Issue.
- Landon-Lane, J. (1998) Bayesian Comparison of Dynamic Macroeconomic Models. PhD Dissertation, University of Minnesota.
- Leeper, E. and C. Sims (1994) Toward a Modern Macroeconomic Model Usable for Policy Analysis. In Stanley Fischer and Julio Rotemberg (eds.) *NBER Macroeconomics Annual*. Cambridge, MA.: MIT Press.
- Liu, P. (2006) A Small New Keynesian Model of the New Zealand Economy. Reserve Bank of New Zealand. (Discussion Paper Series, No. 03/06).
- Lubik, T., and F. Schorfheide (2005) A Bayesian Look at New Open Economy Macroeconomics. In M. Gertler, and K. Rogoff (eds.) *NBER Macroeconomics Annual* 313–336.
- Lucas, J. R. (1976) Econometric Policy Evaluation: A Critique. In K. Brunner and A. Meltzer (eds.) *The Phillips Curve and Labour Markets*. North Holland.
- Lucas, J. R. and T. J. Sargent (1979) After Keynesian Macroeconomics. Federal Reserve Bank of Minneapolis. *Quarterly Review* 3, 1–16.

- Mankiw, G. N. (2006) The Macroeconomist as Scientist and Engineer. *Journal of Economic Perspectives* Fall Issue, 20, 29–461.
- Mankiw, N. G., and R. Reis (2002) Sticky Information versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve. *Quarterly Journal of Economics* 117, 1295–1328.
- Mcgrattan, E. (1994) The Macroeconomic Effects of Distortionary Taxation. *Journal of Monetary Economics* 33, 573–601.
- Monacelli, T. (2003) Monetary Policy in a Low Pass-Through Environment. European Central Bank, (Working Paper No. 227).
- Onatski, A. and N. Williams (2004) Empirical and Policy Performance of a Forward-Looking Monetary Model. Princeton University. (Mimeographed.)
- Otrok, C. (2001) On Measuring the Welfare Cost of Business Cycles. *Journal of Monetary Economics* 47, 61–92.
- Paustian, M. and E. Pytlarczyk (2006) Sticky Contracts or Sticky Information? Evidence from an Estimated Euro Area Model. (Mimeographed.)
- Ratto, M., W. Roeger and In 'T Veld (2008) QUEST III: An Estimated Open-Economy DSGE Model of the Euro Area with Fiscal and Monetary Policy. *Economic Modeling* (Forthcoming Issue).
- Romer, D. (1993) The New Keynesian Synthesis. American Economic Association, *Journal of Economic Perspective* 7, 5–22.
- Romer, D. (2006) *Advanced Macroeconomics*. Third Edition. New York.: McGraw-Hil.
- Ruge-Murcia, F. (2003) Methods to Estimate Dynamic Stochastic General Equilibrium Models. *Cahier* 17–2003.
- Smets, F., and R. Wouters (2003) Monetary Policy in an Estimated Stochastic Dynamic General Equilibrium Model of the Euro Area. *Journal of the European Economic Association* 1, 1123–1175.
- Tovar, E. C. (2008) DSGE Models and Central Banks. Bank for International Settlements, (BIS Working Paper No. 258.)
- Woodford, M. (2003) *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton University Press.

## Single Stock Futures Trading and Stock Price Volatility: Empirical Analysis

SAFI ULLAH KHAN and SYED TAHIR HIJAZI

### 1. INTRODUCTION

A large number of studies examine the relationship between futures trading volume and the price volatility in the underlying asset or market. Conflicting results, however, has been obtained to the effect that futures trading may increase or decrease volatility in the underlying market. Among the previous studies on the issue of the futures market-volume and spot market price volatility, Schwert (1990) finds that, at the time of high volatility for the S&P500 index, stock market and futures volume are also found to be high. Smith (1989), on the other hand, observes no effect by S&P500 futures volume on the changes in the volatility of S&P500 index returns. Similar results were also reported by Darat and Rehman (1995) for S&P500 stock index returns. Board, *et al.* (2001) applied the Stochastic Volatility (SV) model to the daily stock price data of London Stock Exchange and the FTSE 100 contracts traded on LIFE. The authors report evidence contrary to the hypothesis that futures trading volume destabilises the spot market, or that an increase in trading volume in one market relative to the other market destabilises the spot market. Overall, their results indicate that contemporaneous futures trading, after adjusting for the effects of information arrival and time trends, does not destabilise the spot market.

Some studies even find a negative relationship between S&P500 futures volume and the spot price volatility [see e.g., Santoni (1987); Brown-Hruska and Kuserk (1995)]. Bessimender and Seguin (1992) adopted an estimation procedure proposed by Schwert (1990) by iterating between a pair of regression equations which describe the evolution of the mean and volatility of the process in terms of the exogenous and lagged endogenous variables. The authors include three trading activity variables (spot trading volume, futures trading volume and open interest in the augmented conditional return standard deviation (volatility) equation. The authors observe that the expected (i.e. informationless) S&P500 futures trading activity is negatively related to equity volatility, when the spot-trading activity variables were included in the model. These findings led the authors to conclude that futures trading improve liquidity provision and depth in the equity markets, and reject the theories supporting the hypothesis of the destabilising effect of the futures trading.

Safi Ullah Khan <safiullah75@yahoo.com> is Assistant Professor, Institute of Management Sciences, Kohat University of Science and Technology, Kohat. Syed Tahir Hijazi <info@ucp.edu.pk> is Pro-Rector and Dean, University of Central Punjab, Lahore.

In contrast to these studies, Yang, Balyeat, and Leatham (2005) find that unexpected futures trading volume is positively related to price volatility in the underlying market for most of commodity futures markets selected. Using a GARCH model, Kyriacou and Sarno (1999) finds that contemporaneous and lagged futures volume for the FTSE 100 has increased spot market volatility. Ellueca and Lafuente (2003) examine the contemporaneous relations between trading volume and return in the Spanish stock index futures market, using a non-parametric approach for hourly return and futures trading activity variables. The total futures volume were decomposed in to expected (informationless trading activity) and unexpected (shocks in trading activity) components. The study documents a positive relation between price volatility and unexpected component of trading volume. The authors attribute this relationship to the arrival of new information (unexpected trading activity). This paper tests whether trading in SSFs contracts has an impact on price volatility of the underlying stocks following the introduction of the SSFs trading in the Pakistan's stock market. This study presents fresh evidence on the futures trading-volatility relationship in Pakistan's equity market using the most recent data of the single stock futures contracts introduced on the Karachi Stock Exchange. Specifically, the study examines the impact of futures trading on the level of price volatility of the underlying stocks. Specifically, single stock futures trading activity variables namely SSFs volume and open interest were included in the analysis to examine whether these futures trading activity variables have any role on the return volatility of the underlying stocks. The study documents a significant decrease in return volatility for the SSFs-underlying stocks following the introduction of single stock futures contracts on the Karachi Stock Exchange. The multivariate analysis in which the spot trading volume, the futures trading volume and open interest were partitioned into news and informationless components, the estimated coefficient of expected futures volume component is statistically significant and negatively related to volatility, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility of the SSFs-underlyned stocks associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivates trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivates markets provide a medium for destabilising speculation.

Finally, the SSFs-listed stocks are grouped with a sample non-SSFs stocks to conduct cross-sectional analysis for comparing return volatility behaviour in the post-futures period. After accounting for the effects of a number of determinants of volatility, sufficient evidence is found to support that, this multivariate test, like the previous analysis, provides no evidence that the volatility of the SSFs-underlying stocks is positively related to the introduction of the single stock futures trading in the Pakistan's stock market. Rather, the negative binary coefficient indicates that, overall, there is a decrease in return volatility for the SSFs-underlying stocks in the post-futures period.

The rest of the paper is organised as follows. Second section describes the data, followed by the description of the control group. The fourth section provides an in-depth analysis of the methodology used in the paper. The last section will provide an analysis of the data and conclude the paper.

## 2. DATA DESCRIPTION

Trading in SSFs on the KSE commenced in July 2001. The sample period of this study begins June 1, 1999 and ends June, 2008.<sup>1</sup> Presently, 44 stocks have SSFs contracts written on them and traded on the Karachi Stock Exchange. The final data sample consists of 28 stocks, which possesses a complete set of two years data of daily price observations and trading volume on either side of the futures listing dates. Daily closing share prices are obtained from the online database of Karachi Stock Exchange for each stock for a period of two years on either side of the SSFs listing date, yielding more than 500 daily observations per stock for each of the sub-periods.

## 3. CONTROL PORTFOLIO

There may be other factors, besides the SSFs listing, that have also affected the price performance characteristics of the stocks. Such factors may include, for instance, that firm-specific and/or industry-specific factors or changes in the macroeconomic factors that may have occurred at the time of SSFs initiation or during the sample period that have changed the dynamics of the market. Our tests, therefore, may mistakenly attribute such a change, if it occurred, to the introduction of SSFs contracts. It is therefore, necessary to study a sample of non-SSFs stocks to separate the effects of SSFs-initiation from other effects of other factors. Following the methodology of McKenzie, Brailsford and Faff (2001), such a control mechanism is undertaken using control portfolio of similar stocks that did not have SSF introduced. In case the SSFs-introduced stocks behave differently to the control portfolio in the post SSFs period, this mechanism will strengthen the conclusions drawn in respect of the impact of introduction of SSFs contracts. The control group sample consisted of 28 stocks.

## 4. EMPIRICAL ANALYSIS

This section tests the hypothesis that trading activity in the single stock futures contracts has an impact on the spot market price volatility of the underlying stocks following the SSFs trading initiation in the Pakistan's stock market. To this end, we use a measure of daily stock return volatility by adopting a procedure introduced by Schwert (1989), and further followed by other studies [e.g., Bessimender and Seguin (1992, 1993); Wang (2002)]. The method entails iterating between the following two sets of equations. The conditional mean and conditional volatility equations are given by:

$$R_t = \alpha + \sum_{j=1}^n \gamma_j R_{t-j} + \sum_{i=1}^4 \rho d_i + \sum_{j=1}^n \eta_j \hat{\sigma}_{t-j} + U_t \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

$$\hat{\sigma}_t = \beta + \sum_{i=1}^4 \theta_i d_i + \sum_{j=1}^n \eta_j \hat{\sigma}_{t-j} + \sum_{j=1}^n \varpi_j U_{t-j} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where  $R_t$  is the daily stock return,  $d_i$  corresponds to the four dummies for days of the week to account for the extensively documented phenomenon of differing mean daily

<sup>1</sup>Selection of data from two years prior to the commencement of SSFs trading constitutes the pre-SSFs period for those stocks for which SSFs were introduced in July 2001. There ten such stocks. Moreover, other stocks that had SSFs introduced on different dates for which pre-SSFs and post-SSFs periods were selected at different time periods during the sample interval, stretching up to June 2008.

returns [French (1980); Gibson and Hess (1984); Keim and Stambaugh (1984)].<sup>2</sup>  $U_t$  is the residuals (unexpected returns) from Equation (1),  $\sigma$  is the estimated conditional volatility of returns at time  $t$ , and given by;

$$\sigma = |U_t| \sqrt{\frac{\pi}{2}} \quad \dots \quad (3)$$

$R_{t-i}$  (lagged returns) in Equation (2) as regressors allows for short term shifts in expected returns. Equation (2) estimates conditional standard deviation (volatility) by regressing it on daily dummies (for days of the week), lagged volatility estimates and lagged raw residuals from Equation (1). Lagged standard deviation estimates in the Equation (2) accounts for the persistence of volatility shocks [French, Schwert, and Stambaugh (1987); Bessimender and Seguin (1992); Wang (2002)].

To obtain volatility estimates, Equation (1) is first estimated without the lagged standard deviation estimates to obtain residuals from the regression. The residuals obtained are the unexpected returns. These residuals are transformed by Equation (3) to obtain estimates of conditional volatility, and then we estimate Equation (2). The process is then iterated with volatility estimates (lagged) as regressors in Equation (1).

To examine relation between volatility and trading activity, we include spot trading volume, futures trading volume and open interest as activity variables. Open interest provides an additional measure of trading activity. Iteration is, therefore, between Equation (1) and an augmented Equation (4):<sup>3</sup>

$$\hat{\sigma}_t = \beta + \sum_{i=1}^4 \theta_i d_i + \sum_{j=1}^n \eta_j \hat{\sigma}_{t-j} + \sum_{j=1}^n \varpi_j U_{t-j} + \sum_{k=1}^m \mu_k A_k + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad (4)$$

Where  $A_k$  is the  $m$  trading activity variables, i.e., spot trading volume, SSFs volume and open interest.

Many studies [e.g. Chen, Firth and Rui (2001) and Gallent, Rossi, and Tauchman (1992)] document evidence of time trends in trading volumes series. To mitigate any effects, therefore, of secular growth in volume, we first generate a “detrended” activity series by deducting 100-day moving average from the original series.<sup>4</sup> Each “detrended” activity series is then decomposed into expected (fitted values from ARIMA model) and unexpected (Actual minus expected values) components using an appropriate ARIMA (p, I, q) specification. The number of lags for ARIMA model were selected for each activity series on the basis of Akaike information criterion and Schwarz information criterion. The decomposition of each activity series into expected and unexpected components helps us to evaluate the effect of each component separately on the price volatility. The unexpected component of the detrended series represents daily activity shock, whereas, the expected component represents activity which can be forecasted, though highly variable across days. Slower adjustment changes are captured by the 100-day moving average series. Partitioning the spot trading volume, futures trading volume and open

<sup>2</sup>The day-of-the week effect refers to returns not being homogenously distributed over the trading days of the week. The main findings have been lowest and on average negative returns on Mondays and large returns on Fridays as compared to other days of the week [French (1980)].

<sup>3</sup>Bessimender and Seguin (1992) also included these three activity variables.

<sup>4</sup>The same procedure was also followed by Bessimender and Seguin (1992).

interest into expected, unexpected and moving average series result in nine variables, which were included in the augmented Equation (4).

#### 4.1. Spot Trading Volume and Stock Return Volatility

Initially, we estimate Equations (1) and (4) with the spot trading volumes as the only activity variable. These empirical results are reported in the first column of the Table 1. As the table reports that all of the estimated coefficients for daily dummies are significant, indicating that the model has adequately captured the seasonal effects. Estimated coefficient on the unexpected component of the trading volume is positive and highly significant. Moreover, this coefficient is also larger than the estimated coefficients on the expected trading volume and the moving average volume. This implies that surprises (unexpected component) in the spot trading volume convey more information, and thus are more important in explaining equity volatility than either the variations in the anticipated (expected trading volume and moving average) level of trading activity. These results are in line with the findings of many empirical studies conducted in other markets. For instance, Patti (2008) finds positive relation of price volatility to expected an unexpected components of trading volume for the Indian stock market. The author also documents that an unexpected component of trading volume has greater impact on trading volume than the expected volume.

Table 1

*Regression of Daily Return Standard Deviation Estimates  
on Spot Trading Volume and Futures Trading Dummy*

FUTDUMMY denotes a dummy variable which is equal to one for post- SSFs period and zero otherwise, for each stock. The table reports results for two regressions. Column (1) contains results for the regression model without dummy variable and the column (2) reports results for the dummy variable regression model.

| Variable                       | (1)         |             | (2)         |             |
|--------------------------------|-------------|-------------|-------------|-------------|
|                                | Coefficient | t-Statistic | Coefficient | t-Statistic |
| Intercept                      | 0.014       | 22.65*      | 0.014       | 20.98*      |
| FUTDUMMY                       |             |             | -0.001      | -1.77**     |
| <b>Daily Dummies</b>           |             |             |             |             |
| Tuesday                        | 0.011       | 18.90*      | 0.012       | 17.65*      |
| Wednesday                      | 0.009       | 15.69*      | 0.010       | 14.66*      |
| Thursday                       | 0.010       | 15.88*      | 0.010       | 14.81*      |
| Friday                         | 0.009       | 14.85*      | 0.009       | 14.00*      |
| <b>Trading Volumes</b>         |             |             |             |             |
| Expected                       | 0.024       | 7.98*       | 0.027       | 5.48*       |
| Expected*FUTDUMMY              |             |             | -0.065      | -1.03       |
| Unexpected                     | 0.043       | 17.32*      | 0.059       | 15.21*      |
| Unexpected*FUTDUMMY            |             |             | -0.027      | -5.53*      |
| Moving Average                 | -0.021      | -1.20       | -0.039      | -1.44       |
| Moving Average*FUTDUMMY        |             |             | 0.028       | 0.78        |
| 10 Lagged Volatility Estimates | 0.377       | 23.08*      | 0.176       | 22.92*      |
| Lagged Unexpected Returns      | 0.041       | 5.57*       | 0.021       | 2.95*       |
| Durbin Watson                  | 2.00        |             | 2.00        |             |
| Adjusted R <sup>2</sup>        | 0.11        |             | 0.11        |             |
| <b>Diagnostic Checks</b>       |             |             |             |             |
| LB-Q(36)                       | Estimate    | P-value     |             |             |
|                                | 34.379      | 0.546       |             |             |
| LB-Q <sup>2</sup> (36)         | 25.226      | 0.91        |             |             |

Note: \* (\*\*) represents statistical significance at 0.01 (0.05) level, LB-Q(k) and LB-Q<sup>2</sup>(k) are the portmanteau Ljung-Box Q test statistics for testing the joint significance of autocorrelation of standardised residuals and squared residuals for lags 1 to k respectively.

#### 4.2. SSFs Trading and Stock Price Volatility

As an initial econometric examination of the single stock futures trading on the equity volatility of the underlying stocks in the spot market, we include a dummy variable in Equation (4) that takes on a value equal to one for post-SSFs period (two years time period, with almost 500 observations for each stock), and equal to zero for the pre-SSFs period, containing almost same number of observations compared to post-SSFs period. We also allow the regression intercept and the slope coefficients on volume variables to shift subsequent to the introduction of the SSFs trading.

Empirical results of Equation (4) are reported in the second column of Table 1. Notable result of this analysis is that the observed change in the slope coefficient associated with the unanticipated spot trading volume is negative and highly significant (at 1 percent significance level). This implies that the spot volume shocks are associated with smaller price movements subsequent to the introduction of the SSFs trading. Similarly, the estimated coefficient for the slope dummy on the moving average volume is negative though it is not statistically significant. Again, this also implies a reduction in the magnitude of the relation subsequent to the introduction of the SSFs. In contrast, the estimated coefficient for the shift in the regression intercept subsequent to the introduction of SSFs trading is negative and statistically significant.

These findings are consistent with the view that stock return volatility (equity volatility) has been reduced, and market depth (as measured by the volume of shares required to move prices) has been increased by the introduction of SSFs trading. There may have been other changes in the overall financial and capital markets in Pakistan, or even some of the sectors/stock specific factors, during the period examined in the study, and these reductions in equity volatility need not be solely attributable to the introduction of SSFs trading in Pakistan's stock market.

#### 4.3. SSFs Trading Activity Variables and Stock Price Volatility

Evidence on the relation between Single Stock Futures trading and stock price volatility reported in the prior section is not entirely conclusive, at least in part, because the introduction of single stock futures trading constitutes but a single event. To further augment the specificity of the evidence, this study further examines the relation between stock price volatility and levels of futures trading activity by including SSFs trading volume and open interest.<sup>5</sup> Following the methodology adopted by Besseminder and Seguin (1992), for each trading date, futures volume and open interest are summed across contracts to obtain aggregate futures activity.

We again decompose each trading activity (spot trading volume, SSFs trading volume and open interest) in to three additive components namely moving average, expected and unexpected components using the same methodology as discussed in the previous section. Empirical results of estimating (4) with these activity series are reported in the Table 2. Inclusion of SSFs-trading variables does not change the sign of coefficient estimates on the expected and unexpected components of the spot-trading variables. The coefficient estimate for unexpected SSFs-trading volume, like that for unexpected spot-

<sup>5</sup>Open interest is the sum total of all outstanding long and short positions of futures contracts that have not been closed out, at the end of the trading day.

Table 2

*Regression of Daily Return Standard Deviation Estimates  
on Spot Trading Volume and Futures Trading Volume*

Both spot and futures trading volumes for each stock are de-trended by subtracting 100 day moving average volume from each series before partitioning into expected and unexpected components. Test statistics are in parenthesis.

| Variable                    | Coefficient | t-Statistic         | Prob. |
|-----------------------------|-------------|---------------------|-------|
| Intercept                   | 0.012559    | (5.84)*             | 0.000 |
| <b>Daily Dummies</b>        |             |                     |       |
| Tuesday                     | 0.008801    | (4.16)*             | 0.000 |
| Wednesday                   | 0.00912     | (4.40)*             | 0.000 |
| Thursday                    | 0.007306    | (3.43)*             | 0.001 |
| Friday                      | 0.004645    | (2.08)**            | 0.038 |
| <b>Trading Activity</b>     |             |                     |       |
| <b>Spot Volumes</b>         |             |                     |       |
| Expected                    | 0.0223      | (5.95)*             | 0.000 |
| Unexpected                  | 0.0317      | (12.07)*            | 0.000 |
| Moving Average              | 0.0381      | (0.98)              | 0.327 |
| <b>SSFs Futures Volume</b>  |             |                     |       |
| Expected                    | -0.0190     | (3.27)*             | 0.001 |
| Unexpected                  | 0.0456      | (3.12)*             | 0.002 |
| Moving Average              | -0.0194     | (0.02)              | 0.983 |
| <b>SSFs Open Interest</b>   |             |                     |       |
| Expected                    | -0.0264     | (-0.54)             | 0.587 |
| Unexpected                  | -0.0370     | -0.32               | 0.748 |
| Moving Average              | 0.0654      | 0.84                | 0.401 |
| Lagged Volatility Estimates | 0.254868    | (5.42)*             | 0.000 |
| Lagged Unexpected Return    | 0.141833    | (3.48)*             | 0.001 |
| Durbin-Watson               | 2.03        | Adj. R <sup>2</sup> | 0.25  |

trading volume, is positive and significant, and is larger in magnitude than the spot-trading volume coefficient. As Besseminder and Seguin (1992) points out that, this positive coefficient implies that information shocks move prices and generate trading in both markets.

Unlike the results for the expected (i.e., informationless) component of the spot volume, the coefficient estimate for the expected SSFs-volume is negative and significant, indicating decreased stock price volatility when expected SSFs-volume is high. On the other hand, coefficient estimates on the expected and unexpected components of the open interest are negative, but neither is statistically different from zero. These empirical results are in line with the study of Besseminder and Seguin (1992) for S&P500 Index. Contrary to the findings of their study in case of moving average, estimated coefficient on all three moving average series (spot-trading volume, SSFs-

volume and open interest) are statistically insignificant, indicating that long-term variations may not be relevant for explaining volatility in Pakistan's equity market.

To summarise, empirical evidence indicates that equity volatility is positively related to spot-trading activity, whether expected (informationless trading) or unexpected, and to the contemporaneous futures trading shocks. Whereas, the partial effects on equity volatility of expected and moving average (though insignificant in case of moving average) are negative, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivatives trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivatives markets provide a medium for destabilising speculation.

#### 4.4. Cross-sectional Analysis

Finally, following the methodology of Galloway and Miller (1997), SSFs-listed stocks are grouped with non-SSFs stocks and the behaviour of the return volatility is examined surrounding the introduction of single stock futures trading. The regression model takes the following form:

$$\hat{\sigma}_t = \beta_1 + \sum_{i=1}^4 \theta_i d_i + \sum_{j=1}^n \eta_j \hat{\sigma}_{t-j} + \beta_2 LNVOL_t + \beta_3 LN(Firm)_t + \beta_4 FUTDUMY_t + \varepsilon_t \quad \dots \quad (5)$$

where  $\hat{\sigma}_t$  is the post-futures period daily volatility estimate;  $LN(Firm)$  is the natural logarithm of equity value of the firm;  $LNVOL$  is the natural logarithm of spot trading volume, coefficients for days of the week, lagged volatility estimates and a binary variable ( $FUTDUMY$ ) that is equal to one for the SSFs-listed stocks and 0 for the non-SSFs stocks.

We are mainly interested in estimating  $\beta_4$  regression coefficient in Equation (5) which would indicate whether the stock price volatility of the SSFs-underlying stocks behaves in a different way than that of non-SSFs stocks in the post-SSFs trading period, while accounting for other factors known to influence stock price volatility. When this coefficient is negative (positive), this implies that the average stock price volatility of the SSFs-listed stock is lower (higher) than that of the matching non-SSFs listed stocks in the post-futures period.

In addition to the binary variable, three control variables were also incorporated in the Equation (5). First, as argued by Galloway and Miller (1997), if the introduction of futures trading improves the liquidity of the underlying stocks with a resulting decline in stock price volatility, this effect is more evident in case of smaller firms with less liquid stocks. In this case, the estimated coefficient,  $\beta_3$ , is expected to be negative (i.e.,  $\beta_3 < 0$ ). Consequently, the firm's market value of equity is included in the model to account for this "size effect". Second, a voluminous body of literature exists that documents a positive contemporaneous relationship between trading volume and stock return volatility. We therefore, expect the coefficients on expected (informationless) and

unexpected trading volumes to be positive (i.e.,  $\beta_2 > 0$ ). Thus the expected and unexpected components of spot trading volume of the underlying stocks and that of control group stocks is employed to control for this positive return volatility-volume effect. Table 3 presents results for the regression Equation (5). The estimated coefficients for the control variables have the expected signs and are statistically significant. However, our primary interest lies in the coefficient estimate,  $\beta_4$ , of the binary variable. The coefficient estimate ( $\beta_4$ ) is negative and highly statistically significant. This multivariate test, like the previous analysis, provides no evidence that the volatility of the SSFs-underlying stocks is positively related to the introduction of the single stock futures trading in the Pakistan's stock market. Rather, the negative binary coefficient indicates that, overall, there is a decrease in return volatility for the SSFs-underlying stocks in the post-futures period. Thus the evidence tends to support the notion that the single stock futures trading had a negative impact on the level of price volatility for the underlying stocks.

Table 3

*Cross-sectional Analysis: OLS Regression Results*

Dependent variable is the post-futures stock price volatility. Explanatory variables are: the natural logarithm of the firm's market value equity value, the natural logarithm of the spot trading volume for both SSFs-listed and sample of control group stocks, coefficients for daily dummies, lagged volatility estimates, and a binary variable equal to one if the firm is SSFs-listed, and zero if the firm belongs to a control group.

| Variable                      | Coefficient  | t-Stat       | p-value |
|-------------------------------|--------------|--------------|---------|
| Intercept                     | 0.027        | 10.401*      | 0.000   |
| <b>Daily Dummies</b>          |              |              |         |
| D2                            | 0.024        | 9.274*       | 0.000   |
| D3                            | 0.023        | 9.042*       | 0.000   |
| D4                            | 0.023        | 8.965*       | 0.000   |
| D5                            | 0.022        | 8.447*       | 0.000   |
| FUTDUMY                       | -0.006       | -9.603*      | 0.000   |
| LOGVOL                        | 0.001        | 11.267*      | 0.000   |
| LNFV                          | -0.001       | -9.085*      | 0.000   |
| <b>Lagged Volatility</b>      |              |              |         |
| $\sigma(-1)$                  | 0.184        | 21.729*      | 0.000   |
| $\sigma(-2)$                  | 0.088        | 10.191*      | 0.000   |
| $\sigma(-3)$                  | 0.094        | 10.890*      | 0.000   |
| $\sigma(-4)$                  | 0.048        | 5.537*       | 0.000   |
| $\sigma(-5)$                  | 0.030        | 3.492*       | 0.001   |
| $\sigma(-6)$                  | 0.018        | 2.073*       | 0.038   |
| $\sigma(-7)$                  | 0.036        | 4.155*       | 0.000   |
| $\sigma(-8)$                  | 0.028        | 3.277*       | 0.001   |
| $\sigma(-9)$                  | 0.029        | 3.418*       | 0.001   |
| $\sigma(-10)$                 | 0.034        | 4.061*       | 0.000   |
| <b>Lagged Unexpected (-1)</b> | <b>0.026</b> | <b>3.54*</b> |         |
| Adj. R                        | 0.14         | D-Watson     | 2.006   |

## 5. CONCLUSION

This study tests the hypothesis that increases in futures market trading activity has an impact on the equity volatility of the underlying stocks by using a measure of daily stock return volatility by following a procedure suggested by Schwert (1989). Spot trading volume, SSFs trading volume and open interest analyse the relation between stock price volatility and trading activity variables. The data consists of daily closing prices of the underlying stocks, spot trading volume, SSFs volume and open interest for the period July, 2001 to February, 2008. The study examines whether the effect of spot volume, futures volume and open interest on the spot price volatility of the underlined is homogeneous by partitioning the three trading activity variables into expected and unexpected components by an appropriate ARMA specification and allowing each component (expected, unexpected and moving average series) to have a separable effect on observed spot price volatility of the underling stocks.

We adopt Schwert's (1989) procedure for volatility estimation and including the trading activity variables of the two markets in the volatility regression equation. The results show that stock price volatility of the underlying stocks is positively related to both the expected and unexpected components of the spot trading volume. However, the unexpected component of the volume has a greater impact on the equity volatility than the expected (informationless) volume. This analysis confirms the findings of many other studies showing a positive relationship between spot trading volume and spot price volatility. Equity volatility is also positively related to the contemporaneous futures shocks (unexpected component of futures volume). Expected futures volume is statistically significant and negatively related to volatility, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivatives trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivatives markets provide a medium for destabilising speculation.

## REFERENCES

- Bessimender, H. and P. J. Seguin (1992) Futures Trading Activity and Price Volatility. *Journal of Finance* 47, 2015–34.
- Bessimender, H. and P. J. Seguin (1993) Price Volatility, Trading Volume, and Market Depth: Evidence from Futures Markets. *Journal of Financial and Quantitative Analysis* 28:1, 21–40.
- Board, J., S. Gleb, and C. Sutcliffe (2001) The Effect of Futures Market Volume on Spot Market Volatility. *Journal of Business Finance and Accounting* 2:7, 799–819.
- Brown, H. S. and G. Kuserk (1995) Volatility, Volume and Notion of Balance in the S&P 500 Cash and Futures Markets. *The Journal of Futures Markets* 15:6, 193–227.
- Chen, G. M., M. Firth and O. M. Rui (2001) The Dynamic Relations between Stock Returns, Trading Volume and Volatility. *The Financial Review* 38, 153–74.
- Darat, A. F. and S. Rehman (1995). Has Futures Trading Activity Caused Stock Price Volatility. *The Journal of Futures Markets* 15, 537–56.

- French, D. (1980) Stock Returns and Weekend Effect. *Journal of Financial Economics* 8, 56–69
- French, K. R., G. W. Schwert, and R. F. Stambaugh (1987) Expected Stock Returns and Volatility. *Journal of Financial Economics* 19, 3–29.
- Gallent, A. R., P. E. Rossi, and G. Tauchen (1992) Stock Prices and Volume. *Review of Financial Studies* 5, 192–242.
- Galloway, T. M. and J. Miller (1997) Index Futures Trading and Stock Return Volatility: Evidence Form the Introduction of Mid-Cap 400 Index Futures. *The Financial Review* 32:4, 845–876.
- Gibbons, M. and P. Hess (1981) Day of the Week Effects and Asset Returns. *Journal of Business* 54, 579–596.
- Illueca, E. J. and A. Lafuente (2003) The Effect of Spot and Futures Trading on Stock Index Market Volatility: A Nonparametric Approach. *The Journal of Futures Markets* 23:9, 841–862.
- Keim, D. and R. Stambaugh (1984) A Further Investigation of the Week-End Effect in Stock Returns. *Journal of Finance* 39, 819–834.
- Kyriacou, K. and L. Sarno (1999) The Temporal Relationship between Derivatives Trading and Spot Market Volatility in UK: Empirical Analysis and Monte Carlo Evidence. *The Journal of Futures Market* 19:3, 245–267.
- Mckenzie, M. D., T. J. Brailsford, and R. F. Faff (2001) New Insight into the Impact of the Introduction of Futures Trading on Stock Price Volatility. *The Journal of Future Markets* 21:3, 237–55.
- Patti, P. C. (2008). The Relationship between Price Volatility, Trading Volume and Market Depth: Evidence from an Emerging Indian Stock Index Futures Market. *South Asian Journal of Management* 15:20, 25–47.
- Santoni, G. J. (1987) Has Programmed Trading Made Stock Prices More Volatility? *Federal Reserve Bank of St. Louis Review* 18–29.
- Schwert, G. W. (1989) Why Does Stock Market Volatility Change Over Time? *Journal of Finance* 44, 1115–53.
- Schwert, G. W. (1990) Stock Volatility and the Crash of '87. *Review of Financial Studies* 3, 77–102.
- Smith, C. W. (1989) Market Volatility: Causes and Consequences. *Cornell Law Review* 74, 953–62.
- Wang, C. (2002) Information, Trading Demand and Futures Price Volatility. *The Financial Review* 37, 295–316.
- Yang, J., R. B. Balyeat, and D. J. Leatham (2005) Futures Trading Activity and Commodity Cash Price Volatility. *Journal of Business Finance and Accounting* 32:1 and 2, 297–324.

## **Empirical Investigation of Debt-Maturity Structure: Evidence from Pakistan**

ATTAULLAH SHAH and SHAHID ALI KHAN

### **1. INTRODUCTION**

Capital structure theories suggest many ways in which firms can adjust overtime to the target debt ratio in order to optimise the cost of capital and maximise the wealth of shareholders. In doing so, a firm can use different mixes of equity, debt, and hybrid securities. These areas of capital structure have already been extensively researched—both theoretically and empirically [e.g., Hatfield, *et al.* (1994); Haris and Raviv (1991); Lewis and Sappington (1995); Miao (2005)]. Recent developments in corporate finance research show that the optimal capital structure decision is not limited only to choosing what percentage of debt or equity should be used, but the decision also has to involve the choice of short-term or long-term debt [Leland and Toft (1996); Myers (1977); Yi (2005)].

In developed markets, firms can easily choose between short or long-term debts as per their requirements of optimal debt maturity structure. They are not constrained by the availability of either type of debt as the banking industry and capital markets are both developed and competitive. Unfortunately, firms operating in developing countries are not that lucky. Because of less developed capital markets and instable interest rates, firms in developing countries usually find it difficult to use long-term debt. Besides these obvious reasons, we need to know empirically what factors influence the debt maturity choice in developing countries like Pakistan.

As far as we know, there is no formal study to empirically examine the determinants of debt-maturity structure of Pakistani firms. In a study on determinants of capital structure of Pakistani listed firms, Shah and Hijazi (2004) report greater percentage of short-term debt in the total debt of the listed firms. Similarly, Booth, *et al.* (2001) and Demirguc-Kunt and Maksimovic (1999) document higher percentage of short-term debt in developing countries. How higher is the percentage of the short-term debt in Pakistani listed firms and what are the determinants of debt maturity structure in Pakistan? This study aims to answer these questions.

This study contributes to the empirical literature by presenting evidence for the first time on how listed firms in Pakistan make their choices between long-term and short-term debt. The empirical literature is rich on capital structure decisions but not on

debt-maturity decisions. This study contributes to the empirical literature by presenting evidence for the first time on how listed firms in Pakistan make their choices between long-term and short-term debt. The empirical literature is rich on capital structure decisions but not on debt-maturity decisions. There is a need to add empirical evidence to the literature on the debt-maturity choices not only from the methodological standpoint but also from the view of including detailed analysis of large data sets of individual countries, especially from developing ones. In this regard, the study contributes to empirical literature by using all relevant models of dynamic panel data. Tools like Generalised Methods of Moments (GMM) rarely have been used in debt-maturity research. Ozkan (2000) is one notable study that used GMM for the first time in debt-maturity research. The assumption that firms swiftly change the maturity structures of their debts may not hold true in situations where costs of adjustments are higher. If this assumption does not hold true, then the use of a static model will not be appropriate. Our results justify the use of dynamic models in the debt-maturity research because firms included in the sample find it costly to adjust instantly to their target debt-maturity structure, which causes delays in the adjustment process.

The paper is organised as follows. Section one introduces the paper. Section 2 presents a summary of literature related to debt maturity-structure. Section 3 describes the data and discusses the dependent and explanatory variables. Section 4 presents various specification choices of the potential model for our analysis. Results from alternative specifications are presented in Section 5. Section 6 concludes the paper.

## 2. RELATED LITERATURE

The basic objective behind any capital structure decision is to optimise the cost of capital. Corporate finance literature suggests that maturity of debt can play a significant role in lowering the cost associated with debt financing. Four underlying theories explain why a firm will have a specific debt-maturity structure. These theories are the agency cost theory, the signaling and liquidity risk theory, the maturity matching and the tax-based model.

Myers (1977) says that a firm may pass up some profitable investment opportunities in the presence of risky debt. This is known as an under-investment problem. But if the maturity of debt is short, such problems will not arise as the firm will pay the debt before the growth option expires. This suggests that if a firm has more growth opportunities, it will have more short-term debt. Consistent with the above, Barclay, *et al.* (2003), Guedes and Opler (1996) and Varouj, *et al.* (2005) all find an inverse relationship between the proxy for growth opportunities and corporate debt-maturity.

Myers (1977) suggests another solutions to the under-investment problem. He proposes to match the maturity of a firm's debts to that of its assets. The maturity matching ensures that debt payments correspond to the fall in the value of existing assets. It means that maturity of assets should be matched with the maturity of debt. With a different argument, Stohs and Mauer (1996) also recommend maturity matching. They say that when a firm has longer maturity of assets as compared to the maturity of its debts, the cash flow from its assets will not be sufficient to meet the debt obligation. Demircuc-Kunt and

Maksimovic (1999) add another aspect of asset maturity in relation to debt maturity. They suggest that fixed assets facilitate borrowing by serving as collateral.

The agency model suggests that smaller firms have higher agency costs because the potential conflict of risk shifting and claim dilution between shareholder and bondholders is more severe in these firms [Smith and Warner (1979)]. This agency cost can be controlled with short-term debt Barnea, *et al.* (1980). Moreover, the information asymmetry problem is severe with small firms, as they find it costly to produce and distribute information about themselves [Pettit and Singer (1985)]. Because of information asymmetry, their access to capital market for long-term debt remains limited. The large fixed cost of flotation of fixed securities relative to the small size of the firm is another impediment that stops small firms approaching the capital market [Easterwood and Kadapakkam (1994)]. Examining the maturity of firm's liabilities in thirty developed and developing countries during 1980-1991, Demirguc-Kunt and Maksimovic (1999) find that large firms have higher long-term debt ratios as compared to that of small firms.

The signalling model suggests that firms generate signals to the outside world about their credit quality or their cash flows when they use a specific type of financing option. [Flannery (1986)] says debt maturity can reduce the costs of information asymmetry between firm managers and investors. He theoretically proves that if bond market investors cannot isolate good firms from bad ones, good firms will consider their long-term debt to be under-priced and will, therefore, issue short-term debt. Conversely in the same circumstances, bad firms will sell over-priced bonds. Flannery (1986) further argues that debt maturity serves as a signalling device. Short-term financing subjects a firm to more frequent monitoring; hence only good-quality firms will be more willing than bad-quality firms to use short-term debt. Highlighting the relevance of transaction costs of debt, Mitchell (1991) argues that low quality firms have no option but to use long-term debt because they will find it difficult to roll over short-term debt as it would subject them to transaction costs which may not be the case for high-quality firm. Furthermore, financially strong firms can use more of short-term debt as they are better equipped to face refinancing risk and the interest risk of short-term debt [Jun and Jen (2003)]. Guedes and Opler (1996) find empirical support for the above argument and report that financially sound firms use more short-term nonconvertible debt as compared to firms that have low credit ratings. Goswami, *et al.* (1995) adds another aspect of temporal distribution of information asymmetry. They say that a firm issues long-term debt when information asymmetry is related to uncertainty of long-term cash flows. However, firm will issue short-term debt when informational asymmetry is randomly distributed across short and long-term debt.

Tax-based model, suggested by Brick and Ravid (1985), states that after adjusting for the default risk, a firm will preferably make use of long-term debt when the interest rate is expected to slope upward, because long-term debt will reduce the estimated tax expenses. The basic assumption of their model was that the leverage decision is made before the debt maturity decision. Lewis (1990) says that taxes will not impact a firm's value when optimal capital structure and debt maturity structure are determined at the same time. Kane, *et al.* (1985), using dynamic model, predict that optimal debt maturity will increase when contracting costs increase, the benefits of tax-shields decreases, and the volatility of firm worth decreases.

### 3. DATA AND METHODOLOGY

#### Data

Data for the study has been taken from “Balance Sheet Analysis of Joint Stock Companies Listed on the Karachi Stock Exchange (1999-2004)”, a publication of Statistics Department of State Bank of Pakistan. The book contains six years data of balance sheets and income statements of non-financial firms.

For our analysis, we first selected firms for which data was available in all six years. Second, care was taken not to include public utility firms, because they are regulated differently. There were many firms with negative equity. All such firms were excluded from the analysis, as capital structure and debt-maturity structure decisions in these firms are influenced by the financial constraints they face. Similarly, firms that had accumulated-losses in all six years were excluded. All outliers with 3 standard deviations from the mean value were removed. Initially, we included all six years in our analysis. However, the construction of some variables required calculation of yearly change, and because of this, the year 1999 was dropped. Resultantly, we were left with a panel of 266 firms and five years.

#### Dependent and Independent Variables

##### *Dependent Variable*

Empirically, several proxies have been used for debt-maturity. For example, some studies have used the ratio of liabilities maturing in (i) 5 years (ii) 1 year to total liabilities [(Ozkan (2000)]. Others have used the ratio of debt maturing in more than 3 years to total debt [Barclay and Smith (1995); Varouj, *et al.* (2005). Our data source i.e., the Balance Sheet Analysis book published by the State Bank of Pakistan does not provide data on different maturities of debt. Given this limitation, our measure of debt-maturity, denoted by DEMA, is as follows:

$$DEMA = \frac{\text{Debt Maturing in more than one year}}{\text{Total debt}}$$

#### Independent Variables

##### *Growth*

Following the under-investment hypothesis, we expect a negative relation between growth and debt-maturity. To measure growth, either market-value or book-value based approach can be used. Though many research studies on debt maturity structure use market-to-book ratio, we use the proxy of annual percentage increase in total assets for growth. The reason for this is that our data comes from the years 1999 to 2004. The Karachi Stock Exchange experienced a boom in 2002 and onward where share prices for a majority of companies increased dramatically. If we use market-value based proxy it will unnecessarily indicate that the listed companies experienced abnormal growth in 2002 and onward. In comparison, the book-value approach provides a consistent measure of growth.

### **Size**

Agency theory suggests that agency costs are higher for small firms. These costs can be controlled with the help of short-term financing. This suggests positive relationship between size firm and maturity structure of debt. The same positive relationship is suggested by information asymmetry hypothesis. Furthermore, fixed flotation costs of long-term securities make access to capital market difficult for small firms that again suggest a positive relationship between maturity of debt and size of the firm. Our proxy for the size of firm is the natural log of total asset.

### **Asset Maturity**

Stohs and Mauer (1996) say when a firm has longer maturity of assets than the maturity of its debt, the cash flow from its assets will not be sufficient to meet the debt obligation. On the other hand, if a firm finances its short-term assets with longer maturity debt, then the funds will remain useless in periods of low activity. This suggests that asset maturity has a positive relationship with debt maturity. We use two proxies for assets' maturity; (a) Assmat, which is obtained by dividing net fixed assets on annual depreciation charge and (b) Oppcycle, which is a ratio of net sales to net fixed assets. The first proxy will capture the maturity of fixed assets, and the second proxy, as argued by Demircug-Kunt and Maksimovic (1999) is a descriptor of the firm's operating cycle. It captures the yearly fluctuations in operational activities. A high ratio of Oppcycle will show that the firm may need short-term financing to support sales.

### **Firm Quality**

Information asymmetry that may exist between managers and investors usually results in under pricing of long-term securities. In order to reduce this cost of information asymmetry, Flannery (1986) argue that good firms will prefer to issue short-term debt. Furthermore, only good quality firms will be willing to subject themselves to frequent monitoring that comes after short-term financing. This suggests an inverse relationship between debt maturity and firm quality. Following Barclay and Smith (1995), we use abnormal future earning as a proxy of a firm's quality. It is assumed that a higher-quality firm will have positive future abnormal profit. Abnormal profit can be defined as follows:

$$Quality = \frac{Earning_{t+1} - Earning_t}{Earning_t}$$

### **Tax Rate**

In model developed by Kane, *et al.* (1985), an optimal mix of long-term and short-term debt is determined by a trade-off that exists between three factors. These factors are bankruptcy costs, flotation costs of debt, and the benefits of tax-shields. They argue that debt-maturity increases with flotation costs and decreases with tax-shield benefits of debt. Our measure of tax rate is as follows:

$$Tax Rate = \frac{Annual Tax Expense}{Taxable Income}$$

Table 1 summarises the independent variables, their measures, and expected relationship with the dependent variable DEMA. Table 2 shows descriptive statistics for variables which are included in our analysis. Further, Table 3 shows means of independent variable grouped by industries.

Table 1

*Independent Variables and Their Relationship with Dependent Variable*

| Variables    | Measure                      | Expected Sign |
|--------------|------------------------------|---------------|
| Growth       | %age change in assets        | Negative      |
| Size         | Log of assets                | Positive      |
| Assmat       | Fixed assets/depreciation    | Positive      |
| Opcycle      | Sales/fixed assets           | Negative      |
| Firm Quality | Earnings in [(t + 1) – t]/ t | Negative      |
| Tax          | Tax charge/taxable income    | Negative      |

Table 2

*Descriptive Statistics of Selected Variables*

| Variables | Observations | Mean  | Std. Dev. | Min    | Max   |
|-----------|--------------|-------|-----------|--------|-------|
| DEMA      | 1330         | 0.21  | 0.21      | 0.00   | 0.91  |
| Growth    | 1330         | 0.12  | 0.25      | -0.70  | 2.32  |
| Assmat    | 1330         | 12.72 | 7.88      | 0.00   | 53.49 |
| Size      | 1330         | 6.76  | 1.46      | 1.63   | 11.08 |
| Quality   | 1330         | 0.31  | 3.00      | -30.00 | 26.33 |
| Opcycle   | 1330         | 3.97  | 4.72      | 0.01   | 36.70 |
| Tax       | 1330         | 0.27  | 1.19      | 0.00   | 29.00 |

Table 3

*Means of Selected Variables by Industries*

|         | Textile | Chemical | Engineering | Sugar | Paper | Cement | Power | Misc. |
|---------|---------|----------|-------------|-------|-------|--------|-------|-------|
| DEMA    | 0.25    | 0.15     | 0.11        | 0.14  | 0.15  | 0.40   | 0.23  | 0.16  |
| Growth  | 0.14    | 0.10     | 0.14        | 0.13  | 0.10  | 0.06   | 0.06  | 0.08  |
| Assmat  | 12.86   | 11.33    | 11.05       | 14.83 | 9.42  | 17.24  | 11.09 | 14.43 |
| Size    | 6.76    | 6.78     | 6.43        | 6.51  | 5.83  | 7.62   | 8.08  | 5.99  |
| Quality | 0.46    | 0.23     | 0.24        | -0.41 | -0.06 | 0.98   | 0.03  | 0.53  |
| Opcycle | 2.55    | 5.74     | 7.09        | 2.56  | 6.57  | 1.38   | 6.24  | 6.62  |
| Tax     | 0.19    | 0.25     | 0.40        | 0.69  | 0.23  | 0.16   | 0.17  | 0.18  |

**4. MODEL SPECIFICATION**

Studying phenomenon like capital structure or debt maturity structure where a choice has to be made between two options, one has to make certain assumptions about the way the choice is made. In case of debt maturity structure, available options are whether (i) to use debt of short maturity (ii) or to use debt of long maturity. If firms can

instantly switch between these options and there are no costs of switching over or adjustments to reach the target debt maturity structure, we can adopt static model for analysis. However, if firms experience delays in the process of adjustments then the use of static model will be inappropriate. As reported by Antoniou, *et al.* (2006) and Ozkan (2000), firms do experience delays in the process of adjustment which implies that their actual debt maturity structure may not be the desired debt maturity structure. This is why we prefer to use partial adjustment model:

$$DEMA_{it} = \alpha DEMA_{i,t-1} + \sum_{k=1}^k \beta_k X_{it} + \lambda_i + \lambda_t + e_{it} \quad \dots \quad \dots \quad \dots \quad (1)$$

$DEMA_{it}$  is debt maturity ratio of firm  $i$  in time  $t$ .  $X_{it}$  represents various independent variables as discussed in the previous section.  $\lambda_i$  is a dummy variable that capture firm specific effects that do not change over time.  $\lambda_t$  is dummy variable for year specific effects that do not change across firms like macroeconomic factors.  $e_{it}$  is the normal error term that is assumed to be serially uncorrelated with zero mean.

As shown in Bond (2002), the individual effects ( $\lambda_i$ ) are assumed to be stochastic. If so, these effects will be correlated with the lagged dependent variable  $DEMA_{i,t-1}$ . In such a case the OLS estimator of  $\alpha$  and  $\beta_k$  are inconsistent and the estimator of  $\alpha$  are biased upward because the lagged variable  $DEMA_{i,t-1}$  is positively correlated with the error term defined as  $(\lambda_i + e_{it})$ . Within Group estimator can remove this inconsistency by transforming the variables such that observations are expressed as deviations from group means. The transformation removes the individual effects  $\lambda_i$ . However, such transformation invites a correlation between the error term  $\frac{-e_{t-1}}{T-1}$  and the lagged dependent variable  $\frac{-DEMA_{it-1}}{T-1}$  and the resultant estimate of  $\alpha$  is heavily biased downward. [Bond (2002)] says that OLS and the Within Group estimates are biased in opposite directions and help in evaluating a candidate consistent estimate that will lie between the two. Instead of using the Within Group estimate, the firm specific effects can be removed with taking the first difference of the Equation (1).

$$\Delta DEMA_{it} = \alpha \Delta DEMA_{i,t-1} + \sum_{k=1}^k \beta_k \Delta X_{it} + \Delta \lambda_t + \Delta e_{it} \quad \dots \quad \dots \quad (2)$$

However, in the above model too, the error terms  $\Delta e_{it}$  are correlated through terms  $DEMA_{i,t-1}$  and  $e_{i,t-1}$ . To overcome this weakness, Anderson and Hsiao (1982) developed a model (AH 2SLS) where  $\Delta DEMA_{i,t-2}$  or  $DEMA_{i,t-2}$  are used as instruments for the first difference of the lagged dependent variable. The instruments are correlated with  $DEMA_{i,t-1}$  but uncorrelated with  $\Delta e_{it}$ . However, AH 2SLS method does not use all possible moment conditions. Further precision in the estimates can be obtained through a method of Generalised Methods of Moments (GMM), a technique suggested by Arrelano and Bond (1991). Under this method, all available moments can be used by using the orthogonality conditions which are present between the lagged values of dependent

variable and error terms. Arrelano and Bond (1991) GMM is also called difference GMM. However, Blundell and Bond (2000) demonstrate that the difference GMM value is biased downward in the presence of finite sample bias which is expected when the series is highly persistent. They suggest that one should examine the time series properties of each series when using GMM estimator for dynamic panel data models. After investigation if the individual series turn out to be persistent, then instruments available in first differences tend to be less powerful. In contrast, system GMM which was introduced by Arellano and Bover (1995) and later extended by Blundell and Bond (1998) significantly smaller finite sample bias and works with a good deal of precision when estimating autoregressive parameters in persistent series. In our case, after investigation we found that the variables Size, Assmat, and Opcycle showed persistence.<sup>1</sup> Therefore, we report the results of system GMM technique alongside the results of OLS, Within Group regression, Anderson Hsiao 2SLS, and difference GMM.

## 5. RESULTS

Table 4 presents five alternative estimation procedures starting from a basic OLS in levels, the Within Group (WG), Anderson - Hsiao 2SLS regression, difference GMM and finally system GMM. The first two columns of the table show names of the selected variables and hypothesized signs. In rest of the columns, coefficients and p-values are reported under each specification method. The heteroskedasticity robust standard errors are reported in parenthesis below each coefficient value. In all models there are 266

Table 4

### *OLS in Level, Within Group, AH 2SLS, GMM Difference and System GMM*

| Variables           | Predic-<br>ted Sign | OLS               |          | Within Group      |          | AH 2SLS           |          | GMM Difference    |          | GMM System        |          |
|---------------------|---------------------|-------------------|----------|-------------------|----------|-------------------|----------|-------------------|----------|-------------------|----------|
|                     |                     | Coeff:            | p-values |
| DEMA <sub>t-1</sub> | +                   | 0.7010<br>(.029)  | 0.00     | 0.1076<br>(.037)  | 0.00     | 0.6847<br>(.129)  | 0.00     | 0.4739<br>(.077)  | 0.000    | 0.5871<br>(.076)  | 0.00     |
| Growth              | -                   | 0.0528<br>(.02)   | 0.01     | 0.0019<br>(.018)  | 0.92     | 0.0301<br>(.03)   | 0.31     | 0.0213<br>(.023)  | 0.350    | 0.0202<br>(.021)  | 0.35     |
| Assmat              | +                   | 0.0025<br>(.001)  | 0.00     | 0.0043<br>(.001)  | 0.00     | 0.0051<br>(.002)  | 0.00     | 0.0063<br>(.003)  | 0.032    | 0.0060<br>(.002)  | 0.00     |
| Size                | +                   | 0.0088<br>(.003)  | 0.00     | 0.0761<br>(.023)  | 0.00     | -0.0088<br>(.033) | 0.79     | 0.1184<br>(.078)  | 0.129    | 0.0304<br>(.015)  | 0.04     |
| Quality             | -                   | -0.0015<br>(.001) | 0.28     | 0.0011<br>(.001)  | 0.47     | 0.0017<br>(.002)  | 0.38     | 0.0026<br>(.002)  | 0.254    | 0.0017<br>(.002)  | 0.47     |
| Opcycle             | -                   | -0.0034<br>(.001) | 0.00     | -0.0042<br>(.002) | 0.00     | -0.0013<br>(.003) | 0.63     | 0.0002<br>(.003)  | 0.939    | -0.0035<br>(.002) | 0.03     |
| Tax                 | -                   | -0.0040<br>(.002) | 0.01     | 0.001<br>(.002)   | 0.71     | -0.0106<br>(.002) | 0.00     | -0.0092<br>(.002) | 0.000    | -0.0074<br>(.001) | 0.00     |
| No. of Firms        |                     | 266               |          | 266               |          | 266               |          | 266               |          | 266               |          |
| No. of Obs          |                     | 1,330             |          | 1,330             |          | 1,330             |          | 1,330             |          | 1,330             |          |
| Wald (joint)        |                     | 2175(7)           | 0.00     | 32.12(7)          | 0.00     | 5.25(9)           | 0.00     | 60.98(7)          | 0.00     | 478(10)           | 0.00     |
| Wald (time)         |                     | 10.97(3)          | 0.01     | 5.857             | 0.11     | 4.96(2)           | 0.01     | 9.94(3)           | 0.02     | 11.99(3)          | 0.01     |
| Sargan Test         |                     | -                 |          | -                 |          | -                 |          | 31.59(37)         | 0.72     | 54.94(56)         | 0.52     |
| Difference          | Sargan              | -                 |          | -                 |          | -                 |          | -                 |          | -                 | 0.22     |
| AR(1)               |                     | -0.27             | 0.79     | (3.84)            | 0.00     | -4.76             | 0.00     | -4.7600           | 0.00     | -6.1600           | 0.00     |
| AR(2)               |                     | 0.33              | 0.74     | -6.6800           | 0.00     | 1.080             | 0.28     | 0.3600            | 0.72     | 0.9100            | 0.36     |

<sup>1</sup>Regressing each variable on its one period lagged values yielded the coefficient values of 0.8099 for size, 0.6547 for Assmat, 0.7693 for Opcycle, .0150 for Quality, .0396 for Tax, and 0.0835 for Growth.

firms and 1330 observations, however, usable observations vary according to estimation method. We use Sargan test of overidentifying restrictions to check the validity of instruments set. The null hypothesis of the test is that there is no correlation between instruments and the error term. AR(1) and AR(2) test whether first and second order serial correlation in the residuals exist or not. All models have time dummies to capture the effect of macro-economic shocks. The joint significance of these dummies is tested by Wald test. All GMM models were estimated using `xtabond2` command written by Roodman (2006) for Stata.

In OLS estimation, the lagged dependent variable  $DEMA_{i,t-1}$  is treated as exogenous and firm fixed effects are not captured. As discussed in the previous section, the dependent variable which is lagged one period is correlated with the error term and the resultant coefficient is biased upward. The WG estimator purges the fixed effects by transforming the observations as deviation from group means. However, this estimator too is biased but now in opposite direction of OLS. The OLS and the WG coefficients of the dependent variable  $DEMA_{i,t-1}$  are 0.7010 and 0.1076 respectively. The AH difference regression gives  $\alpha$  value 0.6847 that is in between the OLS and WG.

Estimating the regression with GMM technique, we first need to account for the problem of endogeneity and exogeneity of the explanatory variables because the valid set of instruments depends upon the relationship between the transformed error term  $e_{it}$  and explanatory variables  $X_{it}$ . Following the approach of Blundell, *et al.* (1992), we examine the possibility whether the  $X_{it}$  variables are predetermined with respect to  $e_{it}$ . If a specific explanatory variable  $x_{it}$  is correlated with  $\Delta e_{it}$  and the  $e_{it}$  is serially uncorrelated, then adding instrument dated  $t-1$  will cause the estimate of the coefficient of  $x$  variable to fall. Similarly, the possibility of strict exogeneity of  $X_{it}$  variables with respect to  $e_{it}$  can be examined by including present as well as lagged values dated  $t-1$ ,  $t-2$ , and earlier of  $X_{it}$  variable in the instruments set. Again if the coefficient estimates of the  $X$  variables fall, then the variable cannot be considered as exogenous. As a result of this procedure, we found that the variables `Opcycle` and `Tax` were exogenous and including present as well as lagged values of them to the instrument set gave desirable results. For other explanatory variables, instrument set dated  $t-1$  was found to give better coefficient estimates and efficient standard errors, suggesting no measurement errors in them. However, they were not strictly exogenous. For the lagged dependent variable  $DEMA_{i,t-1}$ , instruments dated  $t-2$  and earlier were found valid and efficient. The Sargan test of overidentifying restriction clearly accepts the validity of the instruments in both of the GMM models. The AR(1) test indicates that there is first order serial correlation in the residuals, however, AR(2) test provides evidence that second order serial correlation is absent. The difference Sargan test accepts the validity of the additional level instruments at any conventional level in the system GMM estimation.

Further precision is obtained with the GMM technique which gives the  $\alpha$  value below the value under OLS and AH 2SLS estimation, but well above the Within Group estimator. The difference GMM gives  $\alpha$  value of 0.4739; however, system GMM produces a higher value of 0.5871 for  $\alpha$ . The difference GMM estimates of coefficients for other variables too are barely higher than the Within Group estimates. This observation provides some evidence of finite sample bias associated with weak instruments in the presence of persistent series. For this reason, the system GMM results are our preferred results.

In all of the above models, the  $\alpha$  value is positive and significant. The adjustment coefficient,  $\gamma = (1-\alpha)$ , is close to 0.5. It means that there is adjustment process and firms face difficulty in instantly adjusting toward their target debt maturity structure. Because of the problems associated with OLS, WG, and AH regressions as discussed previously, we mainly focus on GMM models for our analysis. All the explanatory variables have the predicted signs in all models except the Growth and Quality variables; however, they are insignificant in almost all models.

The variable Growth is insignificant at any conventional level in all models except in OLS. The finding suggests that growth (measured by annual percentage increase in total assets) does not have any impact on the debt maturity decision. Our results do not conform to the under-investment hypothesis of Myers (1977) that growing firms will shorten the maturity of debt so as to avoid an under-investment problem. Our finding is also in contrast to the finding of Barclay and Smith (1995); Varouj, *et al.* (2005) Majority of the previous research studies on debt maturity structure have used market-to-book value of equity as a proxy for growth; however, we use the proxy of annual percentage increase in total assets. One may suspect that our proxy for Growth does not effectively represent growth opportunities; be that as it may, a similar insignificant relationship is reported by Stohs and Mauer (1996), though they use the proxy of market-to-book ratio (MV/BV) for growth.

Though the Growth variable does not support the prediction of agency cost hypothesis, our Size variable does support the agency cost hypothesis, given by Barnea, *et al.* (1980), that small firms have more agency problems and will use more short-term debt to lower the costs of these problems. The Size variable is positively related to maturity structure and is significant in all models except in AH 2SLS and difference GMM. The level of significance is 1 percent in OLS and Within Group regressions and 5 percent in system GMM. The coefficient value of 0.0304 suggests that Size is the most significant determinant of debt maturity structure in Pakistan. As the size of a firm increases, the percentage of long-term debt to total debt also increases. Besides the agency cost hypothesis, our results confirm to the argument by Pettit and Singer (1985) that information asymmetry problem is severe with small firms as they find it costly to produce and distribute information about themselves. Information asymmetry makes their access to capital market difficult for long-term debt. The large fixed flotation cost of long-term securities is another impediment that stops small firms approaching capital market.

The variable Assmat has the predicted sign and is significant in all models at 1 percent level with the exception of difference GMM where it is significant at 5 percent level. In term of importance, Assmat has the second largest coefficient of 0.006 after the Size variable. On other hand, the other proxy for maturity matching (Opcycle) has also the expected negative sign and is significant at 5 percent level in system GMM and at 1 percent level in OLS and WG regressions. Both of the proxies for maturity matching show that the maturity of debt varies with the maturity of firms' assets. A firm uses more short-term debt when sales and production activities pace up. However, the proportion of long-term debt increases when the percentage of assets with longer lives increases. The significance of Assmat and Opcycle lend unambiguous support to maturity matching hypothesis.

The Quality variable as measured by the proxy of abnormal profit has neither the expected sign nor statistically significant coefficient in any model. This finding is strictly in contrast to signalling hypothesis presented by Flannery (1986) that short-term debt serves as a signalling device when information asymmetry between firm's managers and investors with respect to quality of the firm is higher.

Finally, Consistent with the tax-based hypothesis, the coefficient estimate on the variable Tax is negative and significant in all models except in Within Group. The level of significance is 1 percent in all models. This shows that corporate tax rate does have an influence the maturity structure of debt.

### Robustness of the Results

In order to test the robustness of the results, we estimate the relationship between the dependent variable DEMA and the six explanatory variables with static panel data models. Specifically, we apply pooled regression model, fixed-effects model and cross-sectional model. Table 5 summarises the regressions' output for these models. The first two columns show the names of variables and their hypothesised signs respectively. The last three columns report the results for pooled, fixed-effects and cross-sectional regressions respectively. Standard errors are reported in the parentheses below the coefficient values. The alternative estimations under static panel data models substantiate the main findings of our prior estimations under dynamic panel data models. The Growth variable is still statistically insignificant in all of the three models whereas the Quality variable has the expected negative sign but is insignificant in the first two models. Assmat, Size and Opcycle are highly significant and have the expected signs in all of the three models. The Tax variable shows inconsistency in the static models. Though it has the expected sign, it is insignificant in the fixed-effects model and cross-sectional model. Overall, the static models are in agreement with the results of our prior estimations under dynamic panel data models.

Table 5

#### *Regression Output of Pooled, Fixed-Effect and Cross Sectional Models*

| Variables | Predicted Sign | Pooled             |         | Fixed-effects      |         | Cross Section      |         |
|-----------|----------------|--------------------|---------|--------------------|---------|--------------------|---------|
|           |                | Coeff.             | p-value | Coeff.             | p-value | Coeff.             | p-value |
| Growth    | -              | 0.0014<br>(.0203)  | 0.945   | 0.0005<br>(.0174)  | 0.974   | 0.0175<br>(.0539)  | 0.746   |
| Assmat    | +              | 0.0074<br>(.0008)  | 0.000   | 0.0039<br>(.0009)  | 0.000   | 0.0065<br>(.0016)  | 0.000   |
| Size      | +              | 0.0222<br>(.0034)  | 0.000   | 0.0953<br>(.0194)  | 0.000   | 0.0150<br>(.0087)  | 0.084   |
| Quality   | -              | -0.0019<br>(.0015) | 0.225   | -0.0013<br>(.0011) | 0.244   | -0.0059<br>(.0029) | 0.039   |
| Opcycle   | -              | -0.0135<br>(.0009) | 0.000   | -0.0063<br>(.002)  | 0.002   | -0.0182<br>(.0029) | 0.000   |
| Tax       | -              | -0.0078<br>(.0038) | 0.044   | -0.0006<br>(.0029) | 0.818   | -0.0109<br>(.0094) | 0.248   |

## 6. CONCLUSION

In this study we examine the empirical determinants of debt maturity structure for a sample of 266 firms in non-financial sector over the period 2000 to 2004 by using

several variants of dynamic panel data models. Our study on debt maturity structure is a first one in Pakistan and hence contributes to literature by providing evidence from a developing country. To examine the dynamic nature of debt maturity structure, we start our analysis with a partial adjustment model using OLS estimation ignoring the individual effects. Going a step forward with the model, individual effects are purged out with Within Group (WG) estimation. To account for the endogeneity problem, GMM estimation is used next and precision in the estimates is obtained with the proper set of instruments.

To test the relevant theories of debt maturity structure suggested in the literature, we examine the effect of six explanatory variables on long-term debt ratio which is calculated as a ratio of debt maturing in more than year divided by total debt. These theories include agency cost theory, signalling and liquidity risk theory, the maturity matching hypothesis, information asymmetry hypothesis, and tax hypothesis. We find mixed support for the agency cost hypothesis. Our results show that smaller firms use more short-term debt; however, there is no evidence that growing firms use more of short-term debt as predicted by Myers (1977) that debt maturity is inversely related to proxies for growth options in firms' investment opportunity sets. The significance of Size variable also substantiates the information asymmetry hypothesis that information asymmetry is greater with small firms and hence they find it costly to approach capital market for long-term debt. We find unambiguous support for maturity matching hypothesis. Our results show that the long-lived assets are positively correlated with debt maturity structure. On the other hand, the yearly ups and downs in operating activities cause the short term financing to rise and fall accordingly. The signalling hypothesis suggested by Flannery (1986) is not supported by our results. Flannery (1986) had argued that good quality firms will use more short-term debt in order to generate positive signals to the outside world. Our proxy for firm quality is insignificant in any model. Finally we find support for the tax-based hypothesis. The coefficient of the Tax variable is negative and significant in almost all models.

## REFERENCES

- Anderson, T. W. and C. Hsiao (1982) Formulation and Estimation of Dynamic Models Using Panel Data. *Journal of Econometrics* 18, 47–82.
- Antoniou, A., Y. Guney and K. Paudyal (2006) The Determinants of Debt Maturity Structure: Evidence from France, Germany and the UK. *European Financial Management* 12: 2,161–194.
- Arrelano, M. and S. Bond (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and An Application to Employment Equations. *The Review of Economics Studies* 58, 277–297.
- Arslan, O. and M. B. Karan (2006) Ownership and Control Structure as Determinants of Corporate Debt Maturity: A Panel Study of an Emerging Market. *Corporate Governance* 14:4, 312–324.
- Barclay, M. J., L. M. Marx, and Jr. C. W. Smith (2003) The Joint Determinant of Leverage and Debt Maturity. *Journal of Corporate Finance* 9, 149–167.
- Barclay, M. J. and C. W. Smith Jr. (1995) The Maturity Structure of Corporate Debt. *The Journal of Finance* 50:2, 609–631.

- Barnea, A., R. A. Haugen and L. W. Senbet (1980) A Rationale for Debt Maturity Structure and Call Provisions in the Agency Theoretic Framework. *The Journal of Finance* 35:5, 1223–1234.
- Bond, S. (2002) Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice. (Cemmap Working Paper, UCL CWP09/02).
- Booth, L., V. Aivazian and A. Demirguc-Kunt (2001) Capital Structure in Developing Countries. *Journal of Finance* 56, 87–130.
- Brick, I. and S. A. Ravid (1985) On the Relevance of Debt Maturity Structure. *Journal of Finance* 40, 1423–1437.
- Datta, S., M. Iskandar-Datta and K. Raman (2005) Managerial Stock Ownership and the Maturity Structure of Corporate Debt. *The Journal of Finance* 60: 5, 2333–2350.
- Demirguc-Kunt, A. and V. Maksimovic (1999) Institutions, Financial Markets, and Firm Debt Maturity. *Journal of Financial Economics* 54:3, 295–336.
- Demirguc-Kunt, A. and V. Maksimovic (1999) Institutions, Financial Markets, and Firm Debt Maturity. *Journal of Financial Economics* 54:3, 295–295.
- Easterwood, J. C. and P. R. Kadapakkam (1994) Agency Conflicts, Issue Costs, and Debt Maturity. *Quarterly Journal of Business and Economics* 33:3, 69–80.
- Flannery, M. J. (1986) Asymmetric Information and Risky Debt Maturity Choice. *Journal of Finance* 41:1, 19–37.
- Gay, B. Hatfield, T. Louis, W. Cheng, and Wallace N. Davidson (1994) The Determination of Optimal Capital Structure: The Effect of Firm and Industry Debt Ratios on Market Value. *Journal of Financial and Strategic Decisions* 7:3, 1–14.
- Goswami, G., T. H. Noe, and M. Rebellio (1995) Debt Financing under Asymmetric Information. *Journal of Finance* 50:2, 633–659.
- Guedes, J. and T. Opler (1996) The Determinants of the Maturity of Corporate Debt Issues. *The Journal of Finance* 51:5, 1809–1833.
- Hayakawa, K. (2005) Small Sample Bias Properties of the System GMM Estimator in Dynamic Panel Data Models. Institute of Economic Research, Hitotsubashi University. (Hi-Stat Discussion Paper Series d05-82).
- Jun, S. G. and F. C. Jen (2003) Trade-off Model of Debt Maturity Structure. *Review of Quantitative Finance and Accounting* 20, 5–34.
- Kane, A., A. J. Marcus, and R. L. McDonald (1985) Debt Policy and the Rate of Return Premium to Leverage. *Journal of Finance and Quantitative Analysis* 20, 479–499.
- Leland, H. E. and K. B. Toft (1996) Optimal Capital Structure, Endogenous Bankruptcy, and the Term Structure of Credit Spreads. *The Journal of Finance* 51:3, 987–1019.
- Lewis, C. (1990) A Multi-Period Theory of Corporate Financial Policy under Taxation. *Journal of Finance and Quantitative Analysis* 25, 25–43.
- Lewis, T. R. and D. E. M. Sappington (1995) Optimal Capital Structure in Agency Relationships. *The Rand Journal of Economics* 26: 3, 343–361
- Maria-Teresa, M. (2005) Debt Maturity and the Characteristics of Ownership Structure: An Empirical Investigation of UK Firms. Department of Economics, University of York. (Discussion Papers 05/29).
- Miao, J. (2005) Optimal Capital Structure and Industry Dynamics. *The Journal of Finance* 60: 6, 2621–2659.

- Milton Haris, A. R. (1991) The Theory of Capital Structure. *Journal of Finance* 40:1, 297–355.
- Mitchell, K. (1991) The Call, Sinking Fund and Term to Maturity Features of Corporate Bonds: An Empirical Investigation. *Journal of Financial and Quantitative Analysis* 26, 201–221.
- Myers, S. C. (1977) Determinants of Corporate Borrowings. *Journal of Financial Economics* 17, 147–176.
- Ozkan, A. (2000) An Empirical Analysis of Corporate Debt Maturity Structure. *European Financial Management* 6:2, 197–212
- Pettit, R. R. and R. F. Singer (1985) Small Business Finance: A Research Agenda. *Financial Management* 14, 47–60.
- Roodman, D. (2006) How to Do Xtabond2: An Introduction to “Difference” and “System” GMM in Stata. Centre for Global Development. (Working Paper).
- Shah, A. and T. Hijazi (2004) The Determinants of Capital Structure of Stock Exchange-Listed Non-Financial Firms in Pakistan. *The Pakistan Development Review* 43:4, 605–618.
- Smith, C. W. J. and J. B. Warner (1979) On Financial Contracting: An Analysis of Bond Covenants. *Journal of Financial Economics* 7, 117–161.
- Stohs, M. H. and D. C. Mauer (1996) The Determinants of Corporate Debt Maturity Structure. *The Journal of Business* 20:3, 279–312.
- Titman, S. and R. Wessels (1988) The Determinants of Capital Structure Choice. *Journal of Finance* 43, 1–19.
- Varouj, A. A., G. Ying, and Q. Jiaping (2005) Debt Maturity Structure and Firm Investment. *Financial Management* 34:4.
- Yi, J. (2005) A Study on Debt Maturity Structure. *The Journal of American Academy of Business, Cambridge* 7: 2, 277–285.

## **Pakistan’s Higher Education System— What Went Wrong and How to Fix It**

PERVEZ HOODBHOY

None of Pakistan’s 50+ public universities comes even close to being a university in the real sense of the word. Compared to universities in India and Iran, the quality of both teaching and research is far poorer. Most university “teaching” amounts to a mere dictation of notes which the teacher had copied down when he was a student in the same department, examinations are tests of memory, student indiscipline is rampant, and a large number of teachers commit academic fraud without ever getting punished. In some universities the actual number of teaching days in a year adds up to less than half the officially required number. Some campuses are run by gangs of hoodlums and harbour known criminals, while others have had Rangers with machine guns on continuous patrol for years on end.

Common wisdom has always been that increased funding can solve all, or at least most, of the systemic problems that bedevil higher education in Pakistan. But Pakistan offers an instructive counterexample: a many-fold increase in university funding from 2002-2008 resulted in, at best, only marginal improvements in a few parts of the higher education sector. This violation of “commonsense” points to the need for some fresh thinking.

The analysis of Pakistan’s higher education system divides naturally into three parts: consideration of the necessary background; understanding the meaning of university quality in the Pakistani context; and exploring the space of solutions.

### **I. HIGHER EDUCATION ENROLLMENT AND GROWTH**

In the early 20th century, Muslims of the Indian subcontinent were, in general, poorly educated relative to Hindus. This was both because of British prejudice against Muslims, as well as resistance by orthodox Muslims to modern scientific ideas and to the English language. Poor education made it difficult for Muslims to get high-level government jobs. This was historically one of the most important reasons that led to the demand for Pakistan.

Compared with much of India, the areas that currently constitute Pakistan were educationally backward. In 1947, Pakistan had only one teaching university, Punjab University in Lahore, with a student enrolment of 644. It lost its best faculty members, who were mostly Hindus, to the migration following the Partition. Although the

Pervez Hoodbhoy <hoodbhoy@mit.edu> is Chairman, Department of Physics, Quaid-i-Azam University, Islamabad.

University of Sindh also formally existed at this time, it was only an examining body and began its role as a teaching university after relocating from Karachi to Hyderabad in 1951. Karachi University was established in 1950. University level education in Pakistan clearly had a very modest beginning.

Expansion followed in subsequent years. Table 1 shows the growth in the number of universities, as well as other degree awarding institutions (DAI's), over a period of about 60 years.<sup>1</sup> The first major increase in the number of public universities was initiated by Zulfikar Ali Bhutto, whose populist regime (1971-1977) promised to spread higher education widely. This was subsequently eclipsed by a much faster expansion in the public sector.

Table 1

| Year | <i>Universities and Degree Awarding Institutions (DAIs)</i> |         |        |         |
|------|---|---------|--------|---------|
|      | Universities  |         | DAI's  |         |
|      | Public  | Private | Public | Private |
| 1947 | 1   | 0       | 0      | 0       |
| 1960 | 5   | 0       | 1      | 0       |
| 1970 | 8   | 0       | 2      | 0       |
| 1980 | 19  | 0       | 2      | 0       |
| 1990 | 20  | 2       | 3      | 0       |
| 2000 | 32  | 14      | 5      | 8       |
| 2007 | 50  | 37      | 9      | 18      |

The first private Pakistani universities were the élite Lahore University of Management Sciences in 1984, followed by the Aga Khan University Hospital in 1985. The tally in early 2007 was as follows:

- 50 public universities (several upgraded from college status).
- 9 public Degree Awarding Institutes (DAIs).
- 37 private HEC recognised universities.
- 18 private Degree Awarding Institutes.

This makes a grand total of 114 universities and DAI's, an apparently impressive achievement given the low starting point. Student enrolment increased correspondingly.<sup>2</sup> According to the Higher Education Commission the year-wise enrolment in 101 universities/DAIs (including distance-learning institutions) was 276,274 in 2001-2002, 331,745 in 2002-2003, and 423,236 in 2003-2004. Of the total enrolment in 2003-2004, 48 percent was in public sector universities and DAI's, 38 percent in distance learning, and 14 percent in private sector institutions. The latest<sup>3</sup> presently available enrolment statistics are for 2004-2005. They amount to 534,000 or 2.5 percent of the eligible age group. If affiliated colleges are included, the number of students the higher education sectors increases to 807,000 which is about 3.8 percent of the eligible age group. A regional distribution is shown in Table 2.

<sup>1</sup>Higher Education Commission, <http://www.hec.gov.pk/new/QualityAssurance/Statistics.htm>

<sup>2</sup>*Ibid.*

<sup>3</sup>World Bank Report No. 37247, *Higher Education Policy Note. Pakistan: An Assessment of the Medium-term Development Framework*. June 28, 2006. Human Development Sector, South Asia Region, The World Bank.

Table 2

*Enrolment at Universities/DAI + Constituent Colleges during 2003-04*

| Sector  | Distance Learning | Federal | AJK  | Balochistan | Khyber<br>Pakhtunkhwa | Punjab | Sindh |
|---------|-------------------|---------|------|-------------|-----------------------|--------|-------|
| Public  | 159257            | 31843   | 2005 | 5217        | 30815                 | 86032  | 46959 |
| Private | –                 | 4720    | 379  | 564         | 5865                  | 16749  | 32831 |
| Total   | 159257            | 36563   | 2384 | 5781        | 36680                 | 102781 | 79790 |

Let us briefly reflect upon the province-wise enrolment. The populations in Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan are roughly 55 percent, 23 percent, 16 percent and 5 percent of the total population respectively. *If Balochistan had the same population as Punjab the enrolment there would be only 63,591 instead of Punjab's 102,781, showing that this province has much lower access.* Sindh appears to have far greater access – it would have 190,802 for equal population with Punjab. But this is deceptive because Karachi, with a population of nearly 16 million, has the overwhelming number of higher education institutions in Sindh.

To put these figures in context: the university enrolments of Khyber Pakhtunkhwa and Balochistan put together is less than the enrolment at a single large US university. The University of Maryland, for example, has over 50,000 students. Pakistan does not compare favourably even in comparison with its neighbours—Iran and India. Iran with a population of about 65 million in 2004 had over 2.2 million students in its universities.<sup>4</sup> India has approximately twice as much of its eligible population enrolled in comparison to Pakistan. Such comparisons put pressure upon policy makers to show fast results.

Constraints upon increasing enrolment still further come principally from the following:

- (a) Availability of formally qualified faculty.
- (b) Availability of formally qualified students.
- (c) Funding.

We shall consider each in turn.

(a) **Faculty:** Table 3, show the number of full-time faculty members, classified by their last degrees. A large number of Pakistani university teachers hold only bachelor's degrees but teach at least at the BA/BSc level. The average number of PhD teachers per university works out to roughly 30. Assuming 10 departments per university, this is only 3 PhDs per department. The "PhD deficit" has frequently been emphasised, and plans to increase the number of PhD holders several fold were announced but with little consideration for suitability.<sup>5</sup> Clearly, even without insisting upon any quality standards of teachers with PhDs (i.e., a person with a PhD is to be considered a "real PhD" for counting purposes), a simple consideration of the numbers available in Pakistan puts a definite limit to expansion of the university system.

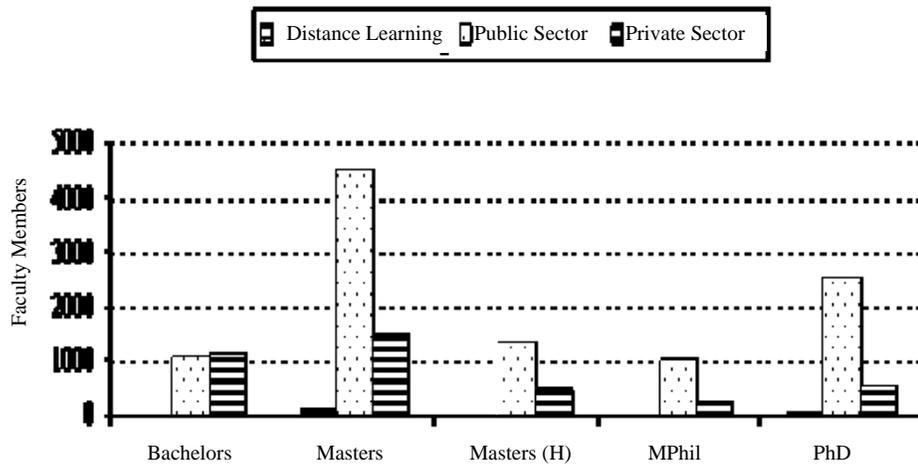
<sup>4</sup> Ministry of Knowledge, Research, and Education, Government of Iran, <http://www.irphe.ir/fa/statistics/Statistics%20Forms/w-br.bruoshoor83-84.pdf>

<sup>5</sup> Aim to have 1,500 PhDs every year: Atta-ur-Rahman. Dawn, 20 June 2004.

Table 3

*Full Time Faculty Members Classified by Their Highest Qualification, 2003-04.*

| Sector            | Bachelors | Masters | Master (H) | MPhil | PhD  | Total |
|-------------------|-----------|---------|------------|-------|------|-------|
| Distance Learning | 9         | 110     | 0          | 22    | 41   | 182   |
| Public            | 1059      | 4525    | 1319       | 1019  | 2549 | 10471 |
| Private           | 1151      | 1480    | 508        | 284   | 540  | 3963  |
| Overall           | 2219      | 6115    | 1827       | 1325  | 3130 | 14616 |



(b) **Students:** Those who complete their Higher Secondary Certificate (FA/FSc) have gone through 12 years of schooling. Subsequently, they are formally eligible for entering colleges or universities. Currently, only 2 out of 10 students taking the HSC exams pass, and only one makes it to a university.

(c) **Funding:** The total higher spending for higher education increased from Rs 3.9 billion in 2001-2 to Rs 33.7 billion in 2006-7. (Breakup: Rs 15.7 billion for recurring expenses, and Rs 18.00 billion for development.) Per university student, the average expenditure up from around Rs 30,000 in 2001-2 to Rs 135,000 in 2006-7. This is about \$2100 per student which, while small by western standards, is substantially larger than for corresponding levels in India even without the large increases in the last several years.<sup>6</sup>

(d) The above may be summarised as follows: enrolment in higher education has increased many-fold over the last six decades; access is nevertheless limited to only a small fraction of the eligible population; provincial disparities are substantial; the number of formally qualified teachers is low; and funding for universities has increased enormously since 2002. But the real problem—higher education quality—has so far not entered the discussion. It will be taken up next.

<sup>6</sup>*Indian Higher Education Reform: From Half-Baked Socialism to Half-Baked Capitalism.* Devesh Kapur and Pratap Bhanu Mehta. CID Working Paper No. 108, Harvard University, September 2004.

## II. MEASURING UNIVERSITY QUALITY

Every country wants universities, and the more the better. There is a clear utilitarian goal behind this: universities have become the engines of progress for knowledge-driven economies in the age of rapid globalisation. They are the fountainheads of modern science, and of technologies that have changed the world more in the past fifty years than the previous ten thousand years.

But higher education requires much more than just building structures and calling them universities or colleges. There is little to be gained from a department of English where the department's head cannot speak or write a grammatically correct non-trivial sentence of English; a physics department where the head is confused about the operation of an incandescent light bulb; a mathematics department where graduate students have problems with elementary surds and roots; or a biology department where evolution is thought to be new-fangled and quite unnecessary to teach as part of modern biology. Nor does putting a big signboard advertising a "centre of excellence" make it one.

There are countless places in Pakistan where the above is not far from the truth. On the other hand, there are also some examples of high quality such as a world-class medical university and business school, some good quality engineering and fine-arts colleges.

Ultimately, one must ask: what does "quality" of higher education mean? Equivalently, how may one differentiate between HE institutions on the basis of quality? This then translates into measuring "real access" to higher education and separating it from mere enrolment. Of course, judging quality is always controversial. Comparing universities across countries, or even within a country, is fraught with difficulties. No international agency has yet done a proper global comparison of universities. There have been a few attempts by newspapers and journals but with only some success. Many find their results unconvincing, and different surveys differ sharply in their assessments. This applies even to the widely quoted results of the Times Higher Education Supplement, as well as those of Shanghai Jiao Tong University, both of which are widely quoted in the literature. Their criteria for assessment and weighting factors, breadth of surveys, techniques of analysis etc. are quite different. This leads to a wide spread of results. The problem is the lack of a sound theoretical basis for doing comparisons.

As a tool that could help us frame the issues better and guide us towards a reasonable answer to the questions posed above, let us create for ourselves a hypothetical *ideal university*. Freed from practical constraints, this artifact allows us to imagine all that a university should be<sup>7</sup> and provides a datum against which actual universities can be assessed.

First, the ideal university should be a bastion of critical inquiry covering every conceivable field of human endeavour. It has first-rate faculty that does first-rate research on super-massive black holes and discovers new extra-solar planets, figures out quantum computation and the folding of proteins, documents the mating habits of macaws and tarantulas, and deciphers the extinct languages of Sumeria and Mesopotamia. The professors are widely cited and known for important discoveries. Their fame attracts talented researchers and students from across the world.

<sup>7</sup>World-class universities: a new holy grail, Pervez Hoodbhoy, 6 June 2007, SciDev.Net, <http://www.scidev.net/opinions/index.cfm?fuseaction=printarticle&itemid=617&language=1>

Our university also spawns high-tech companies that create more powerful computers and data compression techniques. It generates products and ideas upon which civilisations' progress and survival depend, such as new crop varieties and renewable energy sources. It also does a splendid job at training engineers, doctors, economists, business managers, and other professionals.

Most importantly—this ideal university creates a modern citizenry capable of responsible and reasoned decision making. Its graduates can think independently and scientifically, have an understanding of history and culture, can create discourses on social and political issues, and are capable of coherent expression in speech and writing. They are in demand everywhere—both in academia and industry—nationally and internationally. A tall order indeed! Harvard, MIT, Cambridge, Oxford, Sorbonne are considered among the world's best universities. But even these are poor approximations to an impossibly high ideal.

Coming down to earth: one would like to know what constitutes a reasonable expectation from a public university in Pakistan. If, for example, Khairpur University, deep in the backwaters of Sindh, or Quaid-i-Azam University, in the heart of Pakistan's capital, are to be called real universities then by what criteria should they be evaluated?

A perfectly objective assessment is simply impossible. Value judgments are inevitably involved. Even more fundamentally, ideology and purpose play a crucial role. For example, Soviet and Chinese universities concentrated largely on utilitarian goals whereas western universities—or at least the better ones among them—seek a balance between scholarship and utilitarian needs. Nonetheless, the need to judge and assess is one that cannot be avoided.

Why does quality have to be reflected in numbers? The fact is that resources and finances are always finite. The world we live in demands that hard choices be made. If you are a planner in a high position, finances have to be allocated in a manner according to some rational policy. This means one simply must have numbers. The thoughtful educational planner is inevitably presented with a dilemma: hard numbers reflecting a sufficient measure of truth are essential for decision-making. But at the same time, he or she is aware that behind these numbers can be hidden subjective judgments.

What I have proposed in detail elsewhere<sup>8</sup> is a research strategy that would yield some quantitative measurements of university quality. The proposed measure, called "Institutional Teaching Quality Factor", purports to be a measure of the teaching performance of a given university or college and can be used to define genuine access as follows:

$$\text{Genuine Access} = \text{Institutional Teaching Quality Factor} \times \text{Enrollment}$$

The Institutional Teaching Quality Factor (ITQF) must take the following factors into consideration:

- (a) Quality of teaching and teachers.
- (b) Quality of student body.
- (c) Adequacy of basics.

<sup>8</sup> "Towards Measuring University Quality", by Pervez Hoodbhoy, SAPANA report 2010, edited by Abbas Rashid and Muzzafar Iqbal.

- (d) Governance and ethics.
- (e) General ambience.

A numerical calculation of ITQF should be based upon a formula that gives an agreed upon importance to each of the above:

$$\begin{aligned}
 (\text{ITQF})_{\text{total}} = & W_{\text{teachers}} \times (\text{QF})_{\text{teachers}} \\
 & + W_{\text{students}} \times (\text{QF})_{\text{students}} \\
 & + W_{\text{basics}} \times (\text{QF})_{\text{basics}} \\
 & + W_{\text{governance}} \times (\text{QF})_{\text{governance}} \\
 & + W_{\text{ambience}} \times (\text{QF})_{\text{ambience}}
 \end{aligned}$$

The weight  $W$  of each Quality Factor (QF) component is a number between zero and one.  $W$  is a measure of the importance that one chooses to assign to each determining factor. The sum of all weights is, of course, one. An ITQF of one means that all enrolled students in that institution have real access to higher education. Conversely a non-functional university would have an ITQF equal to zero—enrolling any number of students does not amount to any real access at all.

The  $W$ 's cannot be mechanically generated by a computer—they reflect the individual judgment of those who have been tasked with planning. How much importance should one give to having good teachers as compared to, for example, good administrators? There can never be an answer that is fully satisfactory and one might end up by saying they should given equal importance, or perhaps that teaching is twice as important as administration, etc. Then, one could make a strong argument that, specifically for Pakistan's case, teaching needs to be taken much more seriously than what goes as research.

Since individual opinions and judgments are inevitably involved, is it worth the effort to compute numbers requiring so much detailed knowledge? The answer is yes. The very fact that one must work through details makes individual whim less important. And what about research? Should it not be part of the figure-of-merit of a teaching institution? If so, why has it been excluded from the above formula? We shall return to this important matter later.

## II.a. Quality of Teachers and Their Teaching

The ignorant must not teach the ignorant. This cardinal principle is beyond dispute. It is not our intent here to discuss philosophical questions of what constitutes ignorance or wisdom. Instead, one wishes to address a practical question: how can one decide whether an individual is adequately knowledgeable, or perhaps unacceptably ignorant, to function as a university or college teacher?

Requiring formal qualifications is the first step. It is a sensible first-order approximation to assume that an individual with a higher university degree possesses a higher degree of knowledge, and is hence relatively more suitable as a teacher in a higher education institution. In much of the world this works. But the premise is valid only when an educational system has sufficient integrity; after it is corrupted beyond a certain point the correlation between university degrees and the quantum of subject knowledge becomes uncertain. There are a large number of examples to be found in Pakistani universities and colleges, some of which were quoted earlier, where there is only a weak

correlation between formal qualifications and subject competence. Nothing can be done about a 50-year old English professor who speaks or writes ungrammatical English, or a physics professor unable to solve a simple quadratic equation. But does such basic incompetence exist at the 20, 50, or 70 percent-level? Higher? Lower?

Such a question is unanswerable unless one creates yardsticks, and then proceeds to use them for performing measurements.

At least in the sciences, criteria are possible to devise. As one possibility: a college or university teacher should know adequately the material in a reasonably good quality international textbook, in the subject that he or she is currently teaching or has taught in the past. A sufficient measure of the teacher's adequacy would be if he or she can solve at least a certain percentage of the problems and exercises at the end of the book chapters. Textbook writers and experts strongly recommend, and even require, problem solving. This encourages analytical thinking and requires the student to acquire a certain minimum understanding. One can imagine more stringent tests, but at even this basic level one expects that a majority of Pakistani college and university teachers would simply not make it in the natural sciences. This calls for appropriate corrective action that shall be discussed later.

A second possibility for assessing the competence of a college or university science teacher is to use some standardised subject test. Such tests are frequently used for entrance into US universities. The Graduate Record Examination (GRE), administered by the Educational Testing Service in Princeton, is the most commonly used one. Subject areas include a number of scientific disciplines: biology, biochemistry, cell and molecular biology, chemistry, physics, mathematics, and computer science. In 2006, the GRE subject test was officially declared mandatory for obtaining admission into a PhD programme in Pakistani universities. However, much confusion surrounds this condition, no pass criterion has been set, and there appears to be no example as of 2008 where this condition has been rigorously imposed.

A locally devised so-called GRE substitute also exists. In Pakistan, a private company, the National Testing Service, offers specialised subject testing in 10 areas: agriculture sciences, computer engineering, economics, electronics, electrical engineering, education, geography, Islamic studies, management sciences, and veterinary/animal sciences.<sup>9</sup> Unfortunately, although NTS claims to provide "efficient and credible evaluation", a large number of spelling and grammatical mistakes on its website, as well as poorly constructed sample questions, puts this claim in some doubt. One hopes that professional management of the company, and oversight by suitably capable academics, will eventually change the situation.

In the humanities and social sciences, assessment of a university teacher's adequacy or otherwise is harder and more controversial. One must resort to such criteria as whether the teacher is capable of holding an intelligent discussion in the subject he or she is teaching; has adequate verbal and quantitative skills; is reasonably fluent in oral and written expression; and has adequate capacity to think analytically and abstractly. In principle, one would like such abilities of a general academic nature, which are independent of specialisation, to be measured by some kind of standardised test. The general part of the GRE is one such test that is widely used.

<sup>9</sup> National Testing Service website, <http://www.nts.org.pk/>

## II.b. Quality of Student Body

Student admission into higher education institutions determines the quality of the student body. Countries with a properly functioning higher education system take this very seriously. US universities admit students on the basis of their grades, recommendations, and SAT/GRE scores; British universities place heavy emphasis on O-A level scores; the well-known Indian Institutes of Technology have fiercely contested national competitive examinations; Iranian universities require a centralised nationwide university entrance examination and select roughly 150,000 out of 1.4 million high school graduates who take a tough 4.5 hours multiple-choice exam.

Student quality is fundamental to the success of a university. But how is this to be defined? Traditional societies educated their young to be replicators and reproducers of existing wisdom. This was as true for traditional Islamic societies as for classical education of Victorian times in England. But creating a modern citizenry capable of responsible and reasoned decision making imposes very different demands.

Critical inquiry is fundamental. This attitudinal trait is essential for generating new knowledge of the physical world, as well as of human societies. The traditional concept of knowledge will simply not do. Knowledge is not something to be acquired because of a divine command nor can it be acquired once and for all; rather it is the result of an incremental process and the outcome of exercising critical intelligence.

From this standpoint, there has probably been significant deterioration in the student quality of Pakistani public higher education institutions, and perhaps in private ones as well. But there is no “smoking gun” proof of this, just partial indicators.

One hint comes from the number of Pakistani students studying in the US. Generally, only students with sufficient academic background succeed in getting admission to a US university because, in contrast to some European universities, many require credible proof of academic achievement. The situation is complicated by the fact that visas for studying in the US are relatively hard to get, and expenses are greater as well. Nevertheless, it is interesting to look at some current trends.

From the International Institute for Education, which publishes a year-wise report for every country,<sup>10</sup> one learns that in academic year 2008-09, 5,298 students from Pakistan were studying in the United States (down 0.9 percent from the previous year). The majority of Pakistani students study at the undergraduate level. In 2008/09, their breakdown was as follows:

|       |                                   |
|-------|-----------------------------------|
| 48.5% | undergraduate                     |
| 41.8% | graduate students                 |
| 1.7%  | other                             |
| 8.0%  | OPT (Optional Practical Training) |

According to the IIE, following a period of decline in the 1990s, Pakistan experienced significant growth in the first two years of the 2000s. Since 2001-02, the number of Pakistani students in the US has dropped significantly, pushing Pakistan out of the top 20 sending places of origin in 2006-07. The number of students from Pakistan continued to decline, by 1 percent in 2007-08 and again by 0.9 percent in 2008-09.

<sup>10</sup> <http://opendoors.iienetwork.org/>

Most students in the US from Pakistan study at the undergraduate level, which indicates that they mostly come from elite Pakistani private high-schools and not public higher education institutions, where the student body is manifestly of poorer academic quality. Countries with stronger universities have a greater fraction of students in US graduate programmes: compare India (73.7 percent) and Turkey (59 percent) with Pakistan (37.1 percent).

Let us now return to the question: how should one seek to determine student quality at a particular institution? A combination of four determinants with appropriately chosen weights could provide an adequate gauge. These are: The quality of the standardised test that checks reading, writing, and math skills for selecting incoming students; the quality of the student selection mechanism used in a particular institution; employer satisfaction with graduates; and student intellectual activities outside the classroom.

### **II.c. Adequacy of Physical and Governance Structures**

Every college or university has certain basic infrastructural and operational requirements. An assessment should involve the following key factors: land and buildings; the period of actual university operation; size and adequacy of library facilities; adequacy of science teaching laboratories; and internet access and the average number of computers per students.

Institutional governance and ethics are critical. Universities are microcosms of the society in which they exist. As such they necessarily reflect values and practices in the rest of society. The successful functioning of a higher education institution depends critically upon adherence to basic norms of academic values and behaviour. Conversely, any institution that violates its own rules is unlikely to have collective self-respect.

### **II.d. Campus Ambience**

Campus ambience is important. The learning environment in any educational institution really matters. The “feel” of a campus is necessarily subjective—different individuals will assess the ambience differently, and different kinds of institutions create different environments. The atmospherics of a well performing technical training school are unlikely to be suitable for a liberal arts college, etc. Hence, weights for the criteria below must be adjusted appropriately.

Well-functioning universities are the products of a complex organic and evolutionary process that is internal to a society. Facilities matter, but it is much more important for a university to have a forward looking world-view, an open environment, high ethical standards, a sense of collegiality and shared sense of purpose, and good governance practices.

### **II.e. Should University Research be Counted?**

Finally, let us ask: should university research be counted in assessing university quality? In principle, the answer is: yes. There are excellent reasons for this. A university should be the place where new knowledge grows, new questions are asked, and curiosity is encouraged as a matter of principle. The best teachers are often those who have created new concepts and worked at the cutting edge of their field. They can create a genuine sense of excitement in their students.

But within Pakistani public universities—at least in their present condition—a culture of corruption has made the value of research uncertain at best. Research is a seriously misunderstood concept in much of Pakistan's academia, and the criteria for assessing its worth are often wrong.

Research in any professional field—mathematics or physics, molecular biology or engineering, economics or archaeology—defies a unique, precise definition. An exploratory definition might be that research is the discovery of new and interesting phenomena, creation of concepts that have explanatory or predictive power, making of new and useful inventions and processes, etc. The researcher must certainly do something original, not merely repeat what is already known. But merely doing something for the first time is not good enough to qualify as research. So, for example, one does not do meaningful research by gathering all kinds of butterflies and listing the number caught of each kind in a particular place at a particular time, etc. Nor is it “research” if one finds the spectrum of one kind of atom after another, or merely categorises the compounds found in certain plants, or note wind speeds at different geographical locations. Unless there is a valid and interesting reason for doing so, to gather data is essentially valueless. It is not research—even if it is published in some journal, whether international or national.

The success of research is judged by its importance. For research of an applied nature, the impact can be measured by its effect upon industrial or academic production, jobs created, rise in company stock, etc. The number and type of patents that follow from the research give an important indication of success.

For academic research, only the specialist in that exact field can be entrusted with the evaluation. Of all imperfect measures, the least imperfect one is to count the number of citations in refereed journals. However, this ignores the contribution of university faculty to specific national needs, as judged by importance given by decision makers in government or industry. Clearly, judging research quality involves many different criteria.

Nonetheless, one cannot abandon the task of judging research quality, importance, and impact. Else, every kind of nonsense with pretensions to research would proliferate, and demand reward in some shape or form. Pakistan provides an example. Here, counting journal publications, and rewarding individuals proportionately, has worsened the state of corruption. An environment, where unethical behaviour was regrettably common to begin with, has been made yet unhealthier.

To summarise: a methodology for evaluating university quality has been presented here. The primacy of faculty and student quality has been stressed. As yet there is no data, only the framework could be discussed. Although it calls for considerable effort, an attempt at measurement would, at the very least, focus on the key elements needed for creating universities that actually work. Else one will continue to shoot in the dark.

### **III. THE PATH AHEAD**

Six decades of consistent failure in creating a viable higher education system forces us to search for reasons that go beyond fiscal and administrative issues. A key challenge for every government in Pakistan will be to sort out, in all the areas of public policy, the facts on the ground from the intricate fictions offered over the eight years of General Pervez Musharraf's regime that paraded for success.

This means going beyond the standard blame game. Governments have come and gone without setting Pakistan on a clear way forward. So what sets it apart from the developed world, or even India? At the deepest level, it is the value system that shapes modern education and a modern mindset built upon critical thinking. Pakistan's educational system, shaped by deeply conservative social and cultural values, discourages questioning and stresses obedience. Progress demands that ultimately the dead hand of tradition be cast aside.

More specifically, in seeking change of values, it will be important to break the absolute tyranny of the teacher, a relic of pre-modern social values. Closed minds cannot innovate, create art and literature, or do science. Modern education is all about individual liberty, willingness to accept change, intellectual honesty, and constructive rebellion. Critical thought allows individuals to make a revolutionary difference and to invent the future. Else they will merely repeat the dysfunction of the past. But Pakistani students memorise an arbitrary set of rules and an endless number of facts and say that X is true and Y is false because that's what the textbook says. (I grind my teeth whenever a master's or PhD student in my university class gives me this argument!) Minds must be opened.

To develop thinking minds, change must begin at the school level. Good pedagogy requires encouraging the spirit of healthy questioning in the classroom. It should therefore be normal practice for teachers to raise such questions as: How do we know? What is important to measure? How to check the correctness of measurements? What is the evidence? How to make sense out of your results? Is there a counter explanation, or perhaps a simpler one? The aim should be to get students into the habit of posing such critical questions and framing reasoned answers.

On a more practical level, there is urgent need for better academic planning and management at the national level. This will be amplified upon below.

*Revise Spending Priorities:* Currently these are the haphazard expression of individual whims, not actual needs. For example, most Pakistani students in higher education (about 0.8 million) study in about 800 colleges. These colleges receive pitifully small funding compared to universities. During 2001-2004, the funds annually allocated to colleges averaged a miserable sum of Rs 0.48 billion and the spending per college student was only one sixth that for a university student. Subsequently this has become worse. It is no surprise then that public colleges are in desperate shape with dilapidated buildings, broken furniture, and laboratory and library facilities that exist only in name.

The beggarly treatment of colleges compared to universities is often justified on grounds that universities perform research while colleges do not. But, notwithstanding a few honourable exceptions, this "research" has added little to the stock of existing knowledge as judged by the international community of scholars. Nevertheless, in 2005-2006 university research funding totalled a whopping Rs 0.342 billion. Past experience shows that much of the money will be used to buy expensive research equipment that will find little if any real use.

Meanwhile, many public universities are awash in funds. They have gone on a shopping binge for all kinds of gadgetry—fax machines, fancy multimedia projectors, and electricity-guzzling air conditioners. But it would be hard to argue that any of this has served to improve teaching quality even marginally. Worse, the availability of "free

money” has led to the pursuit of expensive but unworkable projects such as the attempt to bring in hundreds of fearful European university professors to teach in a country where suicide bombers kill at will.

*Concentrate Upon Faculty Development:* Because bad teaching quality largely comes from having teachers with insufficient knowledge of their subject, it is important both to have better teacher selection mechanisms and to create large-scale teacher-training academies in every province. Established with international help, these academies should bring in the best teachers as trainers from across the country and from our neighbours. It is hard to see any trainers coming from western countries, although one should try to get them. This effort will cost money and take time—perhaps on the order of a billion dollars over 5 years. These high-quality institutions should have a clear philosophy aimed at equipping teachers to teach through concepts rather than rote learning, use modern textbooks, use distance-learning materials effectively, and emphasise basic principles of pedagogy, grading, and fairness. They should award degrees to create an incentive for teachers to enrol and to do well. Until a sufficiently large number of adequate university teachers can be generated by the above (and various other) means, the practice of making new universities must be discontinued.

*Institute National Level University Entrance Examinations:* These would separate students who can benefit from higher education from those who cannot.

*Qualifying Tests for University Faculty must be Made Mandatory:* The system has remained broken for so long that written entrance tests for junior faculty, standardised at a central facility, are essential.<sup>11</sup> Teachers will surely resist this but without such tests, universities will continue to hire teachers who freely convey their confusion and ignorance to students. No teacher has ever been fired for demonstrating incompetence.

*Be Harsh and Uncompromising in Matters of Academic Fraud and Corruption:* Academic crime flourishes in Pakistan's universities because it is almost never punished. Even when media publicity makes action unavoidable, the punishment amounts to little more than a slap on the wrist.

*Implement Better, More Transparent, and Accountable Ways to Recruit Vice-Chancellors and Senior Administrators:* Pakistan has a patronage system that appoints unqualified and unsuitable bureaucrats or military men as vice-chancellors, and that staffs universities with corrupt and incompetent administrators. Fortunately, there seems to be some indications of positive change and, at least for the appointment of a number of vice-chancellors, search committees were set up.

*Permit Students to Self-organise:* It is crucial to bring back on to the campuses meaningful discussions on social, cultural and political issues. To create the culture of civilised debate, student unions must be restored, with elections for student representatives. They will be the next generation of political leaders. Such a step will not be free from problems—religious extremists rule many Pakistani campuses although all unions are banned. They would surely try to take advantage of the new opportunities offered once the ban is lifted. Political parties have also been less than responsible. But the reinstatement of unions—subject to their elected leaders making a pledge to abjure violence and the disruption of academic activity—is the only way forward towards

<sup>11</sup> In Italy, passing the centrally administered “concorso” examinations is necessary for the appointment of junior faculty. A sample lecture must also be delivered on a topic given to the candidate a day earlier.

creating a university culture on campus. Ultimately, reasonable voices, too, will become heard. As an interim step, the government should allow and encourage limited activities such as community work, science popularisation by students, etc. To condemn Pakistani students as fundamentally incapable of responsible behaviour amounts to a condemnation of the Pakistani nation itself. If students in neighbouring countries can successfully study, as well as unionise and engage in larger issues, then surely Pakistan's can do so as well.

*Remove Nationality Restrictions on Foreign Faculty Hiring:* It is a good thing that the Higher Education Commission has initiated a programme for hiring foreign faculty with attractive salaries. There are simply not enough qualified persons within the country to adequately staff the departments. But the success of this programme is uncertain, and programme management is poor. Jealousy at salary differentials, and a fear that local incompetence will be exposed, has led local teachers and university administrations to block the hiring of faculty from abroad.

Pakistan's image as a violent country deters most foreigners from wanting to come and live in Pakistan for any considerable period of time. Therefore, westerners are almost totally absent from the list of those who have applied under the foreign faculty hiring programme. Apart from Pakistani expatriates in the Middle East, the bulk of applicants are Russian speakers from the former Soviet Union countries. One wishes it could be otherwise. It would be a major breakthrough if Indian and Iranian teachers could be brought to Pakistan. Indians, in particular, would find it much easier to adapt to local ways and customs than others and also have smaller salary expectations. The huge pool of strong Indian candidates could be used to Pakistan's advantage—it could pick the best teachers and researchers, and those most likely to make a positive impact on the system. In the present mood of rapprochement, it is hard to think of a more meaningful confidence building measure.

Pakistani higher education will turn around only if Pakistan can be turned around. This cannot happen while our cities, towns, army, and police are attacked by maniacal terrorists day after day. Expatriate Pakistanis, as well as others of high academic accomplishment, are vital to the uplift of our universities and colleges. In these circumstances they do not feel safe enough to work in Pakistan. Without winning peace, the country will just keep staggering along.

## **Education: The Need for Consolidation**

PERVEZ TAHIR and NADIA SALEEM

### **INTRODUCTION**

After six decades of its existence, Pakistan finds itself in an educational quagmire. There is not much to show in terms of national, provincial and local indicators of a standard variety. At the international level, the country has earned the notoriety of being regularly lower down on all known indices and league tables on human development, competitiveness and governance. Neglect of education lies at the heart of the problem. This is surprising because the thinking on the nature of the educational system required for the newly emerging country had started quite early. An All Pakistan Educational Conference was held on November 27, 1947 in Karachi. Education thus was the subject of the very first professional conference held in the country, bringing together all the stakeholders.

The Father of the Nation set the guidelines in his detailed message: “Under foreign rule for over a century, in the very nature of things, I regret, sufficient attention has not been paid to the education of our people, and if we are to make any real, speedy and substantial progress, we must earnestly tackle this question and bring our educational policy and programme on the lines suited to the genius of our people, consonant with our history and culture and having regard to the modern conditions and vast developments that have taken place all over the world” [Tahir (1980), p.39]. Throughout his political career, Jinnah championed the cause of education. A number of critical issues which continue to bedevil the educational planners of Pakistan to this day, were identified by him long before the freedom struggle for Pakistan came to fruition. These include compulsory elementary education, non-elitist education, technical and vocational education for school leavers, merit-based higher education, equal opportunities for women, and adequate resourcing [Tahir (2002)]. The order of national priorities for him was education, economic development and then defence. The record of performance since independence shows a reversal of these priorities [Tahir (2008)]. Far from the welfare state envisaged by him, Pakistan has become an incorrigible security state. There are thus many lessons that have not been learned. This paper has space to focus only a few.

### **EXPENDITURE: THE LESSON NOT LEARNED**

The first, and the most important, lesson not learned relates to expenditure on education. Education in Pakistan lacks money and will continue to lack money, and yet plans after plans and policies after policies continue to announce magic ratios with

Pervez Tahir <perveztahir@yahoo.com> and Nadia Saleem, respectively, are Professor and Associate Professor at the Department of Economics, FCC University, Lahore.

respect to GDP for educational spending. The draft education policy wants it jump to 7 percent of GDP by 2015, completely forgetting that the Medium Term Development Framework 2005-10 (MTDF) had envisaged an expenditure of 5 percent of GDP by 2009-10, but is likely to end up well below 2 percent. Interestingly, the ratio of 7 percent was mentioned in the Vision 2030 document as an indicative target for 2015 on the assumption that the MTDF target of 5 percent would be achieved. Formulated in the background of a relatively favourable economic climate, Fiscal Responsibility and Debt Limitation Act 2005, which aimed to reduce debt without adversely affecting social sector spending, fixed the goalpost of 3.72 percent of GDP by 2013. Under any realistic macroeconomic framework, even this looks like an unrealisable dream.

The fact of the matter is that Pakistan has never spent more than 2.5 percent of GDP on education in a single year and 2.3 percent as annual average over a decade. Table 1 shows peak years for the decades of the 1980s, 1990s and 2000s. It also gives the average for these decades, which are in the lows of 0.8 percent, 2.3 percent and 1.7 percent.

Table 1

*Past Trends in Spending*

| Period | Percentage of GDP per Annum | Peak Years            |
|--------|-----------------------------|-----------------------|
| 1980s  | 0.8                         | 1986-87: 2.4 % of GDP |
| 1990s  | 2.3                         | 1996-97: 2.5% of GDP  |
| 2000s  | 1.7                         | 2006-07: 2.4% of GDP  |

Source: Pakistan Economic Survey.

In the absence of any evidence of the economy having witnessed sustained increase in the expenditure/GDP ratio, why do the policies and plans persist in the error of elusive targets? Sadly, policy making in Pakistan is not about effecting change and seeking outcomes. It is about target setting and incremental spending on inputs. Targets are influenced by the norms set by international organisations, in this case minimum spending prescribed by UNESCO. As league tables of expenditure/GDP ratios published annually by the international institutions continue to show the country as a laggard, the temptation is to plan big, without much thought. The list of countries in Table 2 does not include any developed economy. It consists of high spenders in the developing world. The range is 1.9-9.1 percent of GDP, with the lower limit provided by Pakistan.

Table 2

*International Comparisons of Educational Spending, 2006*

| Countries  | Percentage of Budget | Percentage of GDP |
|------------|----------------------|-------------------|
| Cuba       | 14.2                 | 9.1               |
| Djibouti   | 22.4                 | 8.4               |
| Maldova    | 20.2                 | 7.6               |
| Seychelles | 12.6                 | 6.5               |
| Iran       | 18.6                 | 5.2               |
| Egypt      | 12.5                 | 4.2               |
| Indonesia  | 17.2                 | 3.6               |
| Mauritania | 10.1                 | 2.7               |
| Pakistan   | 10.1                 | 1.9               |

Source: UNESCO.

Curiously, expenditure on education does not necessarily rise with the growth in GDP. The year of the highest recorded growth of 9 percent, 2004-05, posted the lowest expenditure/GDP ratio. Table 3 suggests that the correlation in general is quite weak.

Table 3

*Expenditure and Growth*

|         | Expenditure on Education as<br>Percentage of GDP | GDP Growth<br>(Percentage per Annum) |
|---------|--|--------------------------------------|
| 2000-01 | 1.6  | 2.0                                  |
| 2001-02 | 1.9  | 3.1                                  |
| 2002-03 | 1.7  | 4.7                                  |
| 2003-04 | 2.1  | 7.5                                  |
| 2004-05 | 1.0  | 9.0                                  |
| 2005-06 | 1.9  | 5.8                                  |
| 2006-07 | 2.4  | 6.8                                  |
| 2007-08 | 1.7  | 4.1                                  |
| 2008-09 | 1.5  | 2.0                                  |

Source: Pakistan Economic Survey 2008-09.

**WHOSE RESPONSIBILITY IS IT ANYWAY?**

Education in Pakistan lacks order, direction and focus. Chaos rather than order results from confusion about federal, provincial and local responsibility. Before the Eighteenth Amendment to the Constitution is fully operationalised, Federal Government has exclusive jurisdiction under Federal Legislative List Part I on issues related to Pakistani students abroad and foreign students in Pakistan. It could also set up institutes for research, professional or technical training, and for the promotion of special studies.

Under the Concurrent List, Federal and Provincial Governments have joint responsibility for curriculum, syllabus, planning, policy, centres of excellence and standards of education. However, Federal legislation has precedence over Provincial legislation under the Concurrent List. Universities, colleges and schools fall in the Provincial jurisdiction. Poor funding by the Provinces led the Federal Government to set up a University Grants Commission, which in 2002 was upgraded to the present high-profile Higher Education Commission under a new ordinance. Devolution Ordinance 2001 placed elementary and college education under the district governments. Colleges, which already received less funding per capita compared to elementary and university education, faced serious neglect under the devolved system due mainly to capacity constraints. They had to be reverted subsequently to the provincial domain.

**DIRECTIONLESSNESS**

Directionlessness of education is reflected in the pendulum swinging from one level or type of education to another and back in fairly short periods of time. Medium of instruction and the role of English continue to be an unsettled debate. The Dakar enthusiasts of the Universal Primary Education (UPE) by 2010 and Education For All (EFA) by 2015 pressed into service Social Action Programme in the nineties, which

turned out to be a disaster in its second phase. Lack of provincial ownership, donors essentially taking over to resolve an intractable coordination puzzle and corruption led to its premature termination. Primary education was again the focus in the Millennium Development Goals agreed in 2000. In the following decade, however, the Federal Ministry of Education lost out to an autonomous Higher Education Commission (HEC) its control of resources and the subject of higher education. Its role was confined to push an Education Sector Reform Programme of no consequence.

It is obvious from Table 4 that the pendulum swung towards higher education in the 2000s. Primary and secondary education continue to claim the largest share of the total expenditure on education sector, but their shares have declined. As the overall resource envelop remained more or less the same, higher education gained at the expense of elementary education. Primary education has been the worst sufferer. Its share plummeted from 42.4 percent in 2002-03 to 32.4 percent in 2008-09, i.e. 10 percentage points in a matter of 6 years. The slight recovery in 2009-10 is based on half-yearly returns and any firm conclusion will have to await the availability of information for the full fiscal year. Secondary education has also suffered but not as much as the primary education. Its share declined from 25.8 percent in 2002-03 to 21.23 percent in 2006-07, but has been recovering since. General universities and colleges are clubbed together but the gains in this category are all due to the universities. Separate data is not available but the short-funding of the colleges is well-known. The sizeable gains of this category can be judged by the fact that its share in 2002-03 was half of the share of secondary education. By 2006-07, it had overtaken the secondary education. The gains of professional and technical universities are in addition. Teacher/vocational training gets the least attention.

Table 4

*Education: Intrasectoral Spending (% Distribution)*

| Year             | Primary | Secondary | General Universities/<br>Colleges,<br>Institutes | Professional/<br>Technical Universities/<br>Institutes | Teacher/<br>Vocational<br>Training | Other |
|------------------|---------|-----------|--|--|------------------------------------|-------|
| 2002-03          | 42.4    | 25.8      | 12.70  | 3.98   | 1.71                               | 13.41 |
| 2003-04          | 44.3    | 24.0      | 14.92  | 4.75   | 1.84                               | 10.19 |
| 2004-05          | 42.2    | 23.9      | 14.39  | 12.86  | 2.30                               | 4.35  |
| 2005-06          | 37.96   | 23.89     | 20.62  | 5.84   | 1.62                               | 10.03 |
| 2006-07          | 32.53   | 21.23     | 22.32  | 4.54   | 1.97                               | 17.41 |
| 2007-08          | 33.79   | 22.97     | 19.55  | 5.76   | 1.54                               | 13.29 |
| 2008-09          | 32.40   | 24.68     | 19.30  | 5.13   | 1.53                               | 16.96 |
| 2009-10 July-Dec | 35.62   | 26.39     | 17.29  | 5.02   | 2.96                               | 12.72 |

The higher allocation of resources to higher education has led to the highest growth per annum in the number, enrollment and teachers of the universities—all in the double-digit. In sharp contrast is the primary education, which registered less than one percent annual growth in the number of schools, 3.2 percent in enrolment and 1.6 percent in the availability of teachers. While the enrolment and teachers growth in the case of universities is in line, the growth of primary teachers is far behind the growth of enrollment. As the data in Table 5 includes private sector as well, the implication is that private sector also has a preference for higher education.

Table 5  
*Growth of Educational Institutions, Enrolment and Teachers, 1992–2009*

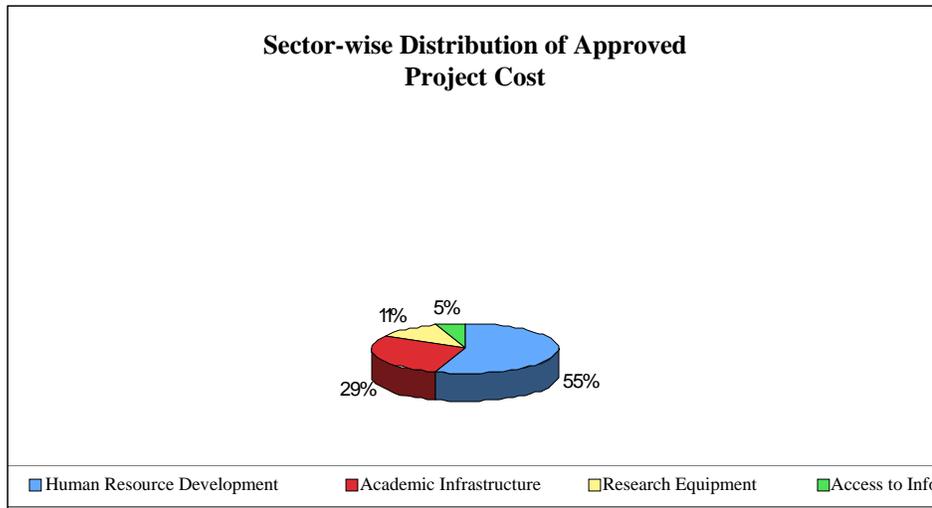
|                              | Institutions | Enrolment | Teachers |
|------------------------------|--------------|-----------|----------|
| Primary                      | 0.96         | 3.2       | 1.6      |
| Middle                       | 9.39         | 3.2       | 6.5      |
| High                         | 7.26         | 3.9       | 4.4      |
| Secondary / Vocational Inst. | 10.15        | 6.8       | 4.2      |
| Arts/Sc. Colleges            | 10.05        | 6.0       | 7.4      |
| Professional Coll.           | 11.18        | 1.2       | 5.8      |
| Universities                 | 11.29        | 19        | 18       |

### PRIORITIES

The obsession with expenditure/GDP ratios pushes in background the issues of quality, equity and efficiency. The current or non-development budgets are consumed almost entirely by salaries. In education sector, paying teachers well is the most desirable expenditure and describing it as non-development expenditure hides the fact that it is investment in human capital. However, current budgets are also recurrent budgets and include expenditure on education materials, repair and maintenance of equipment and buildings. One objective of the Social Action Programme in the nineties was to increase the non-salary component of the current budgets. The objective could not be achieved because the budget makers are oriented towards protecting salaries of the regular employees. By default, all else shows up in the development budget. Quality, equity and efficiency thus become goals to be achieved in the projects and programmes of the development budget. It is, therefore, from the development budget that one can get a sense of priorities.

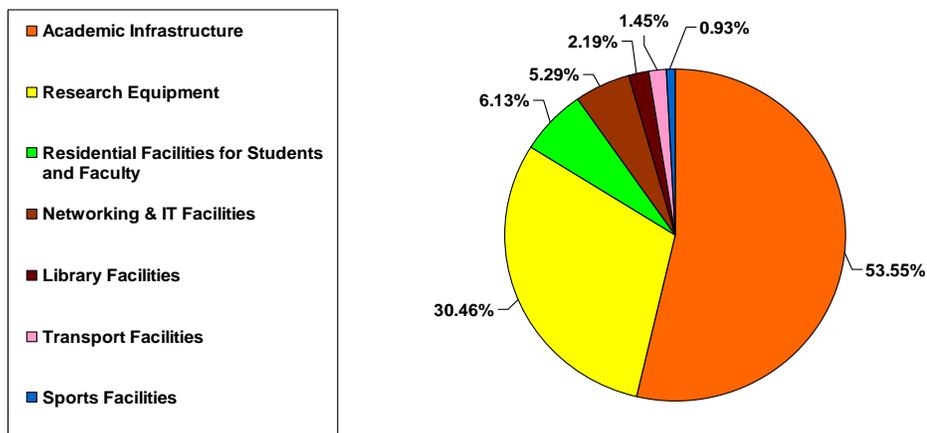
The HEC is the only body in the education sector which regularly places its budgetary information in the public domain. This is mainly why the following analysis is confined to the HEC alone. But it gives a fairly good idea of how planning and budgeting is done in the education sector as a whole.

By 2007-08, the HEC had piled up an approved portfolio of 742 projects with a total cost of Rs 337.6 billion. This is an enormous sum of money and the number of projects is the largest in the entire Public Sector Development Programme. Fig.1 shows the distribution of the money planned to be spent on various heads. It indicates the set of priorities that HEC kept in view while formulating these projects. Broadly, the distribution of the total project cost indicates a right set of priorities. Top priority is accorded to human resource development (55 percent), followed by academic infrastructure (29 percent), research equipment (11 percent) and access to information (5 percent).



This right set of priorities, however, begins to be distorted in the expenditure actually made against various projects. Figure 2 gives the distribution of the HEC's actual development expenditure upto 2007-08, which reveals a different story. The major chunk of expenditure was on academic infrastructure (53.55 percent), followed by research equipment (30.46 percent), residential facilities for students and faculty (6.13 percent), networking and IT facilities (5.29 percent), library facilities (2.19 percent), transport facilities (1.45 percent) and sports (0.93 percent). In actual practice, top priority thus shifts from human resource development to academic infrastructure. Next comes equipment of various kinds—research, IT and transport—consuming 37.2 percent. Together, infrastructure and equipment claimed 90.75 percent of the total expenditure. If we add the 6.13 percent of expenditure made on residential facilities for students and faculty, 96.88 percent of the total expenditure was on construction and equipment.

#### HEC Development Expenditures 2002-08 by Category of Expenditure



The categorisation of expenditure does not include human resource development, the top priority in planning and project formulation. What happened to the projects related to this category? After all, one does hear about the programmes related to faculty development, overseas and indigenous scholarships, and fellowships. It might seem that the category of academic infrastructure has been ill-defined. However, the definition of academic infrastructure given adopted by the HEC leaves no doubt that the reference here is to brick and mortar. It states: "In pursuit of institutional excellence in teaching and research, HEC has made massive investments to upgrade the physical infrastructure of universities, particularly to cater for the requirements of increased enrolment in higher education and to accommodate the students admitted through various human resource development programs....Decades of under-investment in the Higher Education system have led to under-development of physical infrastructure of universities. Strategies for increasing enrolment in higher education, improving research capacity and improving quality of education programs succeed only when the necessary infrastructure for these intervention strategies is in place. In this regard, HEC is complementing these activities through a host of physical and technological infrastructure programs to provide high-quality education services to the sector.... Examples of the types of projects funded in this manner are as follows:

- Development of new universities and degree awarding institutions.
- Introduction of new disciplines and cutting edge technologies.
- Improvement of existing infrastructure.
- Upgrading/ strengthening/ establishing of Laboratories.

Universities have now been encouraged to submit 'University Mega-Projects', which contain all of the development activities" (HEC).

The largest proportion of spending is on brick and mortar and most of the mega projects have doubtful financial sustainability. A huge throwforward has been piled. As the vested interests in construction and supply projects are stronger than the projects related to improving the quality of human resource and its development, the latter are likely to be marginalised in the struggle for resources.

### **THE WAY FORWARD**

In view of the foregoing discussion, the way forward is rather obvious. We must say goodbye to elusive expenditure/GDP ratios. It must be understood that more than 2 percent is unlikely for the next five years. A macroeconomic framework envisaging the tax/GDP ratio going up to 15 percent and a perceptible reduction of military and internal security expenditure will be anything but reasonable. What is required is an educational consolidation plan, with a key focus on quality within realistic financial parameters.

The consolidation plan should mark a shift from design quality to implementation quality (IQ). The pillars on which the IQ rests include students, teaching, teacher training and faculty research capability. The enrolment rate should increase, but equally important are the survival rate and the percentage of students achieving mastery.

In the case of elementary education, learning outcomes, reduction in drop out rates, better pupil teacher ratios, improved quality of teacher training and better textbooks are the issues to be addressed. Relevant curriculum, instructional time and learning

materials present another set of issues to be tackled. The school environment in public sector has deteriorated. Attention must focus on safety, health and sanitation, access for disabled. Language of instruction continues to be a matter of contention. Research, however, shows that the mother tongue is the most effective means of instruction at the elementary level.

In sum, measuring quantity and chasing expenditure/GDP ratios has done more harm than good. Implementation quality is the name of the game. Higher education should be selective and merit-based. Priority should be given to basic and skills education to maximise social and economic returns. This is also necessary to produce citizens aware not only of their rights, but also duties. Openness, transparency, accountability and other elements of good governance are instituted best in a literate society.

### REFERENCES

- HEC. <http://www.hec.gov.pk/InsideHEC/Divisions/FPD/DevelopmentProjects/Pages/>
- Pakistan, Government of (2005) *Medium Term Development Framework 2005-10*. Islamabad: Planning Commission
- Pakistan, Government of (2005) *Fiscal Responsibility and Debt Limitation Act 2005*. Islamabad: Finance Division.
- Pakistan, Government of (2007) *Vision 2030*. Islamabad: Planning Commission.
- Pakistan, Government of (2009) *Pakistan Economic Survey 2008-09*. Islamabad: Finance Division.
- Tahir, Pervez (1980) *Economic and Social Thinking of the Quaid-i-Azam*. Lahore: Research Society of Pakistan, University of the Punjab. (Reprinted 1991).
- Tahir, Pervez (2002) Development Priorities of the Founding Father of Pakistan. *The Pakistan Development Review* 41: 4 (Part II), 991–1010.
- Tahir, Pervez (2008) Reversing Jinnah's Development Priorities. (Paper)
- Tahir, Pervez and Nadia Saleem (2008) Financing Higher Education in Pakistan: Issues of Fiscal Sustainability. In Pervez Tahir, *et al. Financing Higher Education in Pakistan*. Lahore: GC University.

## **Making People Employable: Reforming Secondary Education in Pakistan**

SHAUKAT HAMEED KHAN

### **1. INTRODUCTION**

It is imperative for Pakistan to quickly put in place the building blocks of a knowledge economy. The first step in this direction requires moving the country out of the “*low skills, low productivity, and low expectations*” trap which permeates many spheres of our national economic activity. To meet this objective even partly, it will be necessary to address the fundamental crisis in education related to access and completion, in numbers and quality, as well as market relevance.

Historically, there have been several major attempts at playing ‘catch up’ during the last 150 years and the dynamics of the process have been studied extensively. These include German attempts to emulate the earlier industrial revolution in England [Gershenkron (1962)] and the forced modernisation of Meiji Japanese society [Morishima (1994)], both of which took place in the 19th century. More recent studies have focussed on the post-war boom in Europe, the sudden rise of NICs in East Asia and of course China. The conditions for latecomers may be different from those who have gone before, but the institutional evolution of domestic knowledge systems and *economic catch-up* depends critically upon *collective competence building as well as* technological congruence and social capability and infrastructure [Abramovitz (1994)].

While economic integration, larger and more homogeneous markets, and large-scale production technologies have driven growth and development, the process of sustained growth experienced by several countries and regions would not have been possible without a general increase in educational levels [Barro and Lee (2004)] and additional resources being allocated to public and private R&D. This facilitated growth of a large stock of human capital, and encouraged innovation in firms [Schumpeter 1912; Harvard (1934)], and explained to a considerable extent Europe’s successful ‘catch-up’ with the USA or the phenomenal rate of growth, first in East and South East Asia and now in China.

This article suggests that even if institutional excellence, governance, and physical and electronic infrastructure can be assured, the major crisis facing the Pakistani economy will remain the absence of employable skills—competence in hard and soft

Shaukat Hameed Khan <shkhan@comsats.net.pk> is currently Executive Director of SOPREST which manages the GIK Institute of Engineering, Sciences, and Technology. He has worked in the Pakistan Atomic Energy Commission and the Planning Commission.

skills—rather than under investment in business and economic activity. This of course reflects into one of the three informational asymmetries suggested by Schumpeterian competition dynamics [Schumpeter (1939–1942)]—technological innovation—and has important implications for Pakistan’s competitiveness in the global economy and its attempts at playing ‘catch-up’.

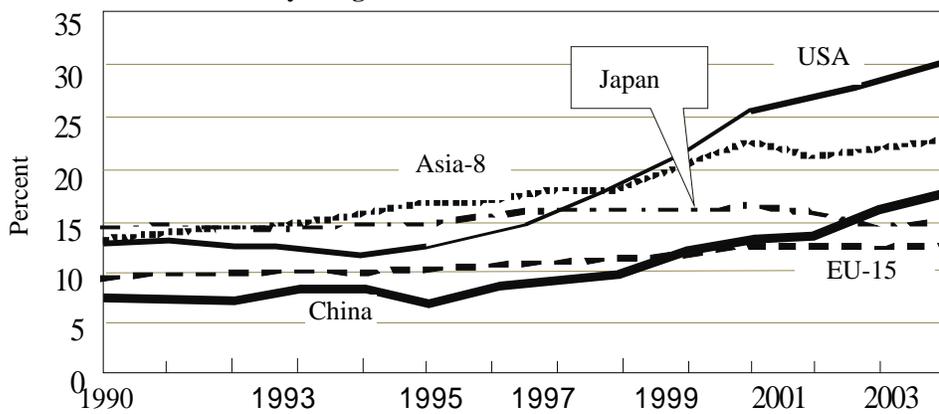
Secondary education needs major reform in order to reduce large dropout ratios which plague Pakistani education. Only a third of Pakistani students enrolled at primary level make it beyond Class V while another two thirds drop out after Class VIII. It is argued that if one or more career based occupational skill programmes are offered at the upper secondary level (Class 8-10) as *supplements* to general education, dropouts can be reduced and productivity increased in the work environment.

## 2. SKILL BIAS IN GROWTH

### 2.1. Global Networks

The presently known industrial economy is being transformed inexorably into yet undefined morphologies on the shoulders of the information and technology revolution. The nature of work and workplace is changing, and national economies are diffusing across national boundaries into truly global networks, whether in industry, services or ownership. *This dispersal of work and strategic linkages across national boundaries, coupled with information integration, and a shift in the technological content (NSF, SEI 2006) of world manufacturing and trade towards high technology (Figure 1), is the most conspicuous feature of the globalised economy of the present and foreseeable future. One manifestation is a major re-location [Lamy (2004)] of manufacturing and even services from the developed to less developed countries, with Asia and perhaps South America emerging as major destinations.*

**Fig. 1. Changing Share of High-technology in Manufacturing by Country / Region: 1990–2003**



Asia – 8 includes S. Korea, India, Malaysia, Indonesia, Philippines, Singapore, Taiwan and Thailand

Source: NSF, USA, SEI (2006).

Almost all developed economies can now be identified as “knowledge economies” to some extent or the other, and they are taking further steps to consolidate this position by becoming even more knowledge intensive and competitive [Romer (2004)]. *Even when their productivity growth has slowed down, the rate of increase in the skill bias in technology has not.* In some newly industrialised Asian countries, such activities have already led to the evolution of small and medium enterprises (SMEs) into major global players and conglomerates. These now offer complete end-to-end services in the supply chain, whether as manufacturers of piece parts and systems, or providers of services, design, and research.

Machin and van Reenen (2007, 1997) regard higher skills as one input factor in the production process, whereby higher educated workers are more able to respond to new technologies such as ICT than less educated workers, and are also able to better react to organisational changes such as decentralisation of decision making and control, collective work, job rotation and skills segregation/homogenisation in modern firms. This non-neutral technological change makes higher educated workers much more attractive for employers and rising worker skills could perhaps create its own demand.

## **2.2. Economic and Social Returns of Secondary Education**

Literature suggests that general education increases wages [Card and DiNardo (2002)]. The impact of a year of schooling on wages is estimated at about 10 percent and the average returns in countries with *low levels of schooling* range from 14 percent in the short run to 23 percent in the long run [Soto (2002)]. The productivity premium at the firm level for a trained worker has also been recently estimated from panel data in the OECD at 23 percent, with the wage premium of training being 12 percent [Konings, *et al.* (2010)].

International data shows that nations with a large proportion of students enrolled in upper-secondary vocational programmes have significantly higher rates of school attendance and completion at the higher upper-secondary [Bishop and Mane (2005)]. It was also observed in the USA that those who devoted about one-sixth of their time in high school to occupation-specific vocational courses earned at least 12 percent extra one year after graduating and about 8 percent extra seven years later. In the USA, 90 percent of students attending a comprehensive high school take at least one occupation specific course, with many taking more than one. This ‘occupational profile’ in US schools has remained stable since the 1980s.

Further, the strong correlation between schooling and growth performance [UNESCO (2002)] in Argentina, Chile, Malaysia and Uruguay suggests that human capital may play a stronger role in the growth process once it reaches a *threshold*, and that high levels of upper secondary and tertiary attainment are important for human capital to translate into steady growth.

## **3. THE CHANGING PAKISTAN ECONOMY**

The Pakistani economy, too, has seen a major structural change during the last three decades with respect to the nature of work and skills, and shifting of employment opportunities across sectors and occupations. The share of agriculture in GDP has halved

since the 1980s to 22 percent, with current share of industry and services estimated at 24 and 54 percent. The corresponding sector share of the work force was 44.6, 19.4, and 36.0 percent respectively in 2009 [*Pakistan Economic Surveys* (2008, 2009, 2010)]. The old ‘cottonomics’ [Rashid (2005)] has shown some diversification away from cotton and its derivatives, with its share of exports falling by 10 percent points in the last 5 years.

The annual Global Competitive Index (2009) looks at a range of “12 pillars” contributing to productivity and competitiveness, *four of the pillars being directly linked to skills*. These are health and primary education, higher education and training, business sophistication, and innovation. Indirect pillars include technological readiness, which measures how a country implements existing technologies to improve productivity, and labour market efficiency.

Pakistan is listed among countries in Stage 1 of economic development (factor driven), and is ranked 101 overall out of 133 countries. In spite of a market size ranking of 30, it is pulled down by deficiency in human capital (health and education, rank 113), labour market efficiency (124), higher education and training (118) and technological readiness (104). There has been some productivity improvement [Kemal, *et al.* (2002); Mahmood and Siddiqui (2000)], but this has more to do with a low starting base.

Considerable demand exists for highly skilled persons for major infrastructure projects such as upgrade of seaports, railways, airports; transnational energy flow, and large dams such as Bhasha-Diamer. The resumption of economic activity in the Gulf Area will be another major spur in the near future, but for different and higher skills.

As much as 45 percent of the civilian employed labour force is illiterate, and 76 percent has *less than 10 years* of education [Labour Force Surveys (2008-09)], while 43 percent of unemployed are illiterate. All these point to a grave deficiency in access to education and skills in the Pakistani school system, and impact heavily on the output and productivity of Pakistani SMEs, which employ nearly 90 percent of the labour force.

Several other factors are important in the context of the changing nature of the Pakistani economy and its workers.

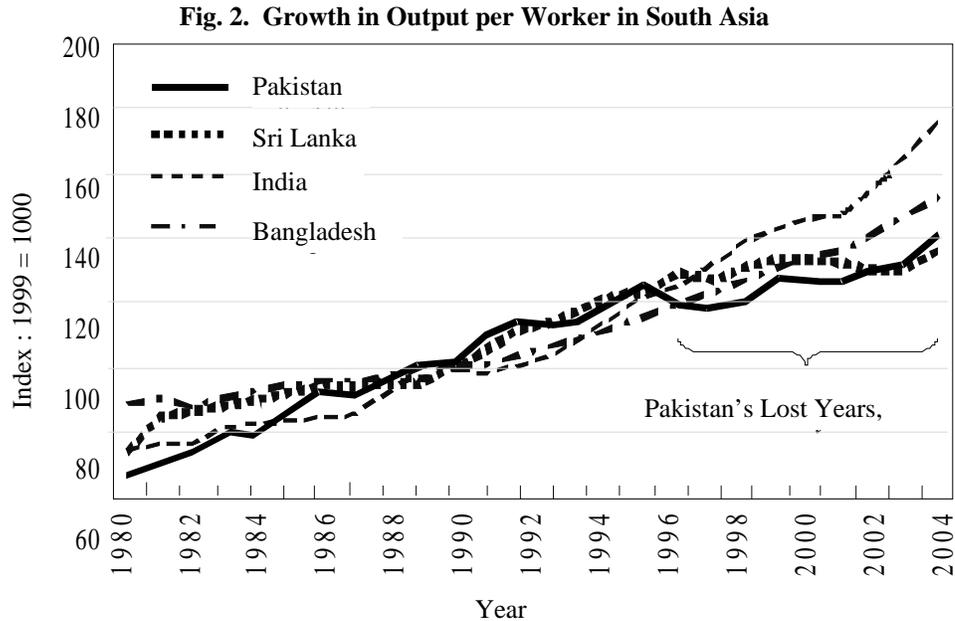
*First*, Pakistan is in the midst of its demographic transition, with some 100 million people under the age of twenty-five [*Pakistan Economic Survey* (2010)]. Without quality education and skills, and employment opportunities, social stability is likely to be negatively impacted.

*Second*, Pakistan is already the most urbanised country in South Asia, with another 80 million people expected to migrate in the next two decades [Vision (2030)], which nearly equals the present population of the whole of Punjab, or Germany. Some 10 million workers have moved away from agriculture into services and industry since 1995 with the service sector absorbing nearly two-thirds. The clustering effect of physical, electronic and human infrastructure makes the city a major centre of growth and power, with a completely different socio-economic profile. We have yet to prepare and capitalise on this opportunity.

Pakistan’s growth accounting (IMF 2005) yields estimates for the share of TFP in growth of GDP at 1.67 during the period 1960–2004, with values of 2.80 (during 1961–70), 2.55 (1980–89) and only 0.14 during 1993–2001. The stalling of agricultural output points to the end of the input-driven ‘green revolution’, which has essentially run its course. It will be difficult to address food security with present labour productivity,

technology, practice and attitude [Misbah (2009), APO Handbook (2010)]. It is worth noting that nearly 70 percent of the rural non-farming workforce is female.

A major reason why Pakistan’s public sector institutions are unable to transfer technology to the SMEs (small and medium enterprises) may lie in the absence of complementary skills in the recipients to absorb and embed new processes and technologies.

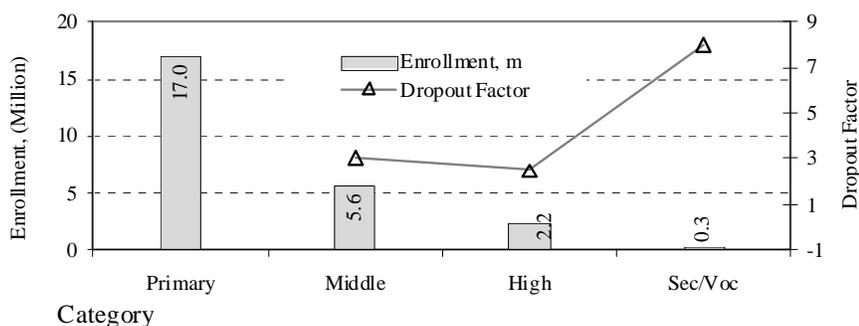
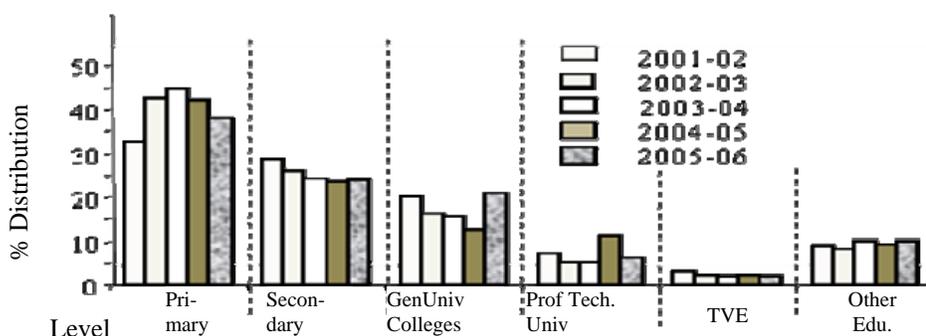


Source: Misbah (2009).

#### 4. EDUCATION AND SKILLS IN PAKISTAN

Pakistan has singularly failed to provide its citizens adequate access and quality of education and training. Low literacy (~54 percent in 2009), high dropout rates, and literacy growth at around 1.5 percent annually [Education Census (2006), and National Education Policy (2009)], highlight the endemic internal and external inefficiencies of the system. The Millennium Development Goal of universal primary education by 2015 will apparently not be met. Pakistan’s planners are still planning for the economy of the past, and change is stifled by poor governance of the E & T (education and training) system, which is non-strategic and fragmented. Practical skills learnt in the formal environment are generally unsupported, and the case of the partly-skilled person training the unskilled through ‘shagirdi’ or informal apprenticeship is common.

Not only is the investment on education and training small (2.4 percent of GDP, 2009) in comparison with other countries of OECD and East Asia [OECD (2009); Khan (2007)], it is also skewed *against* training and skills. (Figure 4).

**Fig. 3. Enrolment and Dropout Statistics (Pak. Edu Stats., 2007)****Fig. 4. Skewed Expenditures on Education in Pakistan**

Source: Khan (2007).

Also, Pakistan cannot spend just Pak Rs 5000 per child *per year* at the primary level (or PPP equivalent US\$ 180) and still expect to become a vibrant knowledge economy.

Table 1

*Comparative Annual Expenditure /Student (PPP Equivalent USD)*

| Country   | Total Spent Prim. To Tertiary Education |           | Pre-Primary USD | Primary USD | Secondary USD | Tertiary (excl. R&D) USD | PCI (2004) USD |
|-----------|---|-----------|-----------------|-------------|---------------|--------------------------|----------------|
|           | USD                                     | % PCI     |                 |             |               |                          |                |
| USA       | 12,092                                  | 32        | 7,896           | 8,805       | 9,938         | 19,842                   | 37,600         |
| Japan     | 8,148                                   | 29        | 3,945           | 6,551       | 7,615         | 12,193                   | 28,000         |
| France    | 7,880                                   | 28        | 4,938           | 5,082       | 8,737         | 7,372                    | 27,800         |
| Germany   | 7,802                                   | 30        | 5,489           | 4,948       | 7,576         | 7,724                    | 26,300         |
| UK        | 7,270                                   | 25        | 7,924           | 5,941       | 7,090         | 8,792                    | 29,000         |
| Ireland   | 6,713                                   | 20        | 4,948           | 5,422       | 7,110         | 7,445                    | 33,200         |
| Korea     | 5,994                                   | 30        | 2,520           | 4,490       | 6,761         | 6,154                    | 20,300         |
| Mexico    | 2,128                                   | 23        | 1,794           | 1,694       | 1,922         | 4,834                    | 9,400          |
| Pakistan* | <b>265</b>                              | <b>10</b> | —               | <b>180</b>  | <b>240</b>    | <b>3900</b>              | <b>2,600</b>   |

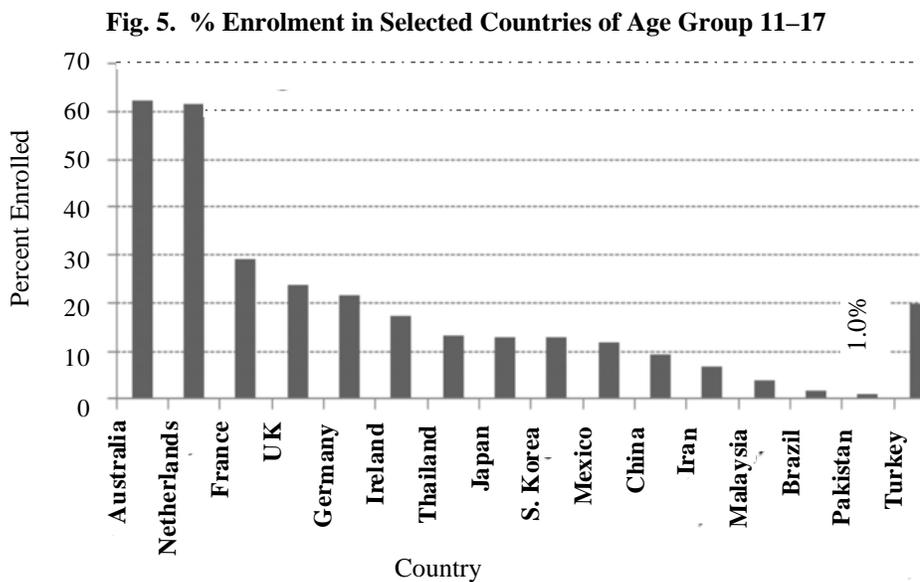
Sources: OECD Education Indicators (2009), numbers for 2004;

\* www.moe.gov.pk (2009).

## 5. TECHNICAL AND VOCATIONAL EDUCATION IN PAKISTAN

### 5.1. The Numbers Game

Pakistan has some 3,125 technical and vocational institutions with a total enrolment of 256,000. The private sector dominates (70 percent of the institutions and 57 percent of enrolment), while 62 percent (or 160,000) of the students and teachers are male. The teacher numbers of 14,914 are equally divided among private and public institutions (Pakistan Education Statistics, 2007-08). However, the number undergoing formal training in Pakistan is very low at about 1.0 percent of the 10-16 age group (11-17 for OECD). This needs to be compared with an average of 25-60 percent for OECD countries [UNESCO (2007)] and 10-20 percent for the fast developing Asia Pacific region ( Fig. 5). This is consistent with time evolution studies of technical vs. general education in 149 countries against their GDP per capita [Bertochhi and Spagat (2002)] for the period 1950-1991.



Source: UNESCO (EFA, 2007).

Even if the Iranian numbers only are taken as benchmark, Pakistan should have an enrolment of 3 million people now instead of 0.26 million. The supply-demand differential will deteriorate further with time as more young people join the ranks of the unskilled and unemployed youth. Low Pakistani enrolments certainly point to a cause of its low productivity—about 7 percent of that in the USA [APO (2009)].

The case of Ireland is quite instructive. It has completely changed the skills composition of its workforce within three generations, from 50 percent of the labour force possessing primary education in 1972, to just 8 percent in 2002. Its economic profile has diversified, and growth trajectory has been re-defined.

Table 2

*Irish Workforce: Changing Educational Attainments*

|              | 1972 | 1982 | 1992 | 2002 |
|--------------|------|------|------|------|
| Primary      | 50   | 36   | 22   | 8    |
| Secondary    | 21   | 24   | 28   | 28   |
| H. Secondary | 20   | 24   | 29   | 28   |
| Tertiary     | 9    | 16   | 21   | 35   |

Source: VTE in Ireland, OECD. [www.oecd.org/document](http://www.oecd.org/document)

## 5.2. Governance and Quality Matters

The training sector is beset with a major crisis of governance. Some are endemic to education in general, others are embedded in the inability to understand that process efficiency and productivity is dependent on worker skill levels, rather than on capital investments alone. The basic problem remains an elitist attitude whereby blue-collar workers are regarded as lesser mortals engaged in 'low' level work.

The Federal Government established NAVTEC (National Vocational and Technical Education Commission) in 2005 to regulate and improve quality and relevance of skills and training programmes. Although placed under the Prime Minister to emphasise its importance, it has not been able to affect the content and course of training programmes in the country. Like its provincial counterparts (TEVTAs), it is run by non-technical persons, whose 'job mobility' militates against delivery of quality training. Some other pertinent issues are:

- (a) The curriculum is not demand driven and is unable to respond to market demands and changing skill needs. This criticism is equally valid for most public and private institutions. Actual hands-on training and contact hours is minimal, because of sub-optimal use of existing curricula or teaching aids.
- (b) Both public and private institutions suffer from non-availability of qualified teachers due to low salaries and inadequate career progression. The largest and oldest polytechnic institute in Pakistan, Government Polytechnic Institute, is situated in SITE, Karachi, which is Pakistan's premier industrial area. It offers training in 17 different trades, but the state of disrepair observed during a visit in mid-2009 or responsiveness to technical enquiries from the faculty is astonishing.

However, there are excellent positive examples also such as the Pakistan Welding Institute run by the Atomic Energy Commission or the Construction Machinery Training Institute run by the Army, both in Islamabad. These are managed by competent, well paid individuals, backed by well organised institutions.

- (a) While Technology Boards exist in every province for conducting examinations, and ensuring quality, yet there is no international accreditation or benchmarking of the skill levels.
- (b) Apprenticeship can be an effective tool if it is combined with formal education. However, the prevalent informal apprenticeship system operating in the informal sector is little more than forced labour, with a typical daily

‘salary’ of fifty to sixty rupees for the first year plus lunch (a quarter of the legislated minimum wage). The apprentices make their own travel arrangements, and there are no health and safety measures in place.

- (c) Furthermore, there is an invisible ‘glass ceiling’ which does not allow improvement in skills and management.
- (d) Previous attempts at placing a public organisation such as PITAC in Lahore also re-bounded because of resistance from existing staff and potential conflict of interest with CEOs drawn from private sector.
- (e) An interesting attempt was made by NAVTEC to incentivise enrolment in existing institutions through stipends of Rs 3,000 per month to young people. The system is reputedly suspected of suffering from misuse.

*And yet they keep coming for training: young men and women in search of employable skills and decent wages!*

## 6. THE WAY FORWARD

### 6.1. Bridging the Public-Private Divide

Recent studies suggest that extreme convictions on both sides of the public-private divide are no longer supported, and an intermediate position is available between pure market forces and rigid state planning. This rare historic opportunity for planning industrial ‘policies’ [Rodrik (2004)] allows the state to be responsible for the provision of basic strategic and coordinating roles in the productive sectors also, irrespective of the intensity of globalisation.

Education and training are ideal instruments for such state intervention. This has happened in every newly industrialised country (NICs) of the last few decades, and is also actively pursued by OECD countries. Education with skills is now viewed as a right for young people and a core responsibility of the state. Extensive interaction with industry and business by the Planning Commission suggests that the private sector in Pakistan is willing and able to participate with the public sector if its stake is duly recognised.

### 6.2. Key Objectives and Features: Vocationalisation of Education

Reforms are imperative in the upper secondary levels (Class VIII-X), if the national objectives to increase access, quality and international benchmarking of skills are to be met.

Assuming that employment and employability needs to become the central theme in economic and social policies, it is clear that *education must be made economically attractive* for the very large segment of population with 5-8 (and even 10) years of schooling who are basically unemployable. This will place the youth at the centre of not just economic development but also in building up social capital and harmony. This also helps the greater goal of building collective competence, and the matching of transnational skills whose absence denies Pakistan the benefits of globalisation.

This is in line with Maclean (2005) who argues that ‘in many countries, secondary education has become the weakest link in the education chain’ and is receiving increasing

attention and policy priority, since it is now regarded not just as a bridge between primary and tertiary education but an active instrument for preparing young people for entry into the workforce of a fast changing global economy.

Current upper-secondary education in Pakistan does not provide students either with skills or preparation for skills and training needed in the marketplace, let alone any incentive to complete 10 years of schooling. Secondary education therefore needs to be reformed so that clear tracks are available to students for technical or business related skills in addition to basic academic programmes at the upper secondary levels. For this it will be necessary to convert our secondary schools (Class VIII–X) into ‘comprehensive’ schools which offer specific labour-market preparation *in at least one programme* area after 8 years of schooling. This is expected to significantly reduce dropout rates, and encourage completion of 10 years of schooling. The major impact will be in non-metropolitan and rural areas.

General education will not be displaced. It will be supplemented to the extent of, say, 15-20 percent with economically relevant courses related to the productive sectors of the economy (services, industry, and agriculture). This needs to be augmented with ‘soft’ skills, such as communications, interpersonal skills, and team based approach. For both streams, teachers will be the long pole which holds up the reformed structure; all programmes must therefore be built around well-trained and well-paid teachers.

At the institutional level, the capacity for data collection and analysis of the labour market needs to be strengthened, while a balance needs to be maintained between institutional autonomy and public accountability of financing instruments and monitoring of outcomes.

### **6.2.1. Chain of Improved Training Centres: “Think National, Act Local”**

The occupational streams in schools will need to be supplemented and linked with formal technical training centres, The Planning Commission (2009) proposed setting up one model centre in each district (130 in all) which will offer certification after further training. Each centre (rebuilt and renovated or built anew if necessary) could offer training initially in a set of 4-6 areas keeping in mind geographical imperatives and national and international benchmarks. Re-joining for improving skill levels will need to be a core principle.

The entire process for increasing high quality skills and productivity in Districts, will place these opportunities close to most people who actually *do* work (farmers, workers on building sites or the office / factory floor, and those who work in trade), and who are hardly educated and may not even be literate. By taking skills training to the school as well as district and tehsil levels, local community strengths and aspirations will be harmonised in the national context.<sup>1</sup>

Examples of matching of location with demand could be the Centre near the Bhasha-Diamer Dam, and the upcoming port of Gwadar. The Bhasha centre could focus on skills needed in the construction and operation of the dam and its auxiliary facilities, with both short-term and long-term benefit and help train people for the series of dams planned to be built in the Northern reaches of the country after Bhasha-Diamer.

<sup>1</sup>The Planning Commission approved the Concept in April 2009, with an allocation of Rs 2.0 billion in the Annual Plan 2009-10. However, no progress is detected.

Similarly Gwadar needs an excellent ‘polytechnic’ to generate the skills needed to build and manage the port, apart from managing its entire supply and hospitality chain. Its socio-economic impact on Balochistan and the country would be considerable, because of its position at the mouth of the Straits of Hormuz, which favours Gwadar evolving into a hub of the North-South Corridor, West of the Indus, as well as opening up Afghanistan and Central Asia.

Managing the various agri-businesses efficiently could be part of the curriculum everywhere. Examples will be processing of spices in Sindh; dates in Turbat and Sindh; fruit processing in all the provinces; and schools of mining in Khyber Pakhtunkhwa, Balochistan, AJK and FANA.

### **6.3. Quality Matters**

Substantial efforts have been expended in recent years to improve governance by integrating the efforts of the several organizations (11 currently) which offer technical skills in the country. Creation of NAVTEC, provincial TEVTAs, and Technical Boards is certainly a step in the right direction, but the national qualifications framework still need major effort in order to integrate both vocational and general qualifications. There is also need to include provisions and commitment for re-training and upward progression in skills.

#### **6.3.1. Mother Institutes and Internal Transfer of Technology**

It is argued that internal technology transfer can and should be facilitated between the best in the country and not-so-good technical institutions. This can take the form of ‘mother institutes’ which help to steer quality matters and benchmarking. Mother institutes could include major institutions and industries in sectors such as power, chemicals and pharmaceuticals, IT, agribusiness, and mining, and relevant departments from academia.<sup>2</sup>

In addition, considerable numbers of highly qualified engineers and technicians from some strategic organisations in Pakistan are becoming available after retirement. Pakistani enterprises will also benefit from an infusion of senior citizens from developed countries<sup>3</sup> (more precious than mere funding aid). Retired Japanese and German experts are already doing this.

### **6.4. Who Pays for Training Programmes**

The cost of such a national competence building programme is estimated at around Rs 48 billion over five years, targeting an additional some 0.25 million persons annually, [Khan (2009)]. Linkages with employers and apprenticeship will be a key instrument for improving training relevance and improving employability. Because of private return to the apprentices, the private sector would be likely to hesitate in bearing the entire cost of apprenticeship.

<sup>2</sup>The Foundry Institute was recently set up by SME Development Authority (SMEDA) in collaboration between an engineering university (UET Lahore).

<sup>3</sup>Pakistan needs to reconsider its immigration policy. Teachers, technologists and managers from other countries need to be actively courted.

Richardson (2005) argues that failure in training markets may result from credit constraints and other capital market imperfections deterring potential trainees, and Government intervention could correct for these. Since social returns are high, a system of co-financing needs to be considered with the state paying for school-based occupational streams and post-school formal training, while the private sector co-finances and contributes towards on-the-job training and apprenticeship.

Billett (1998) has pointed to the dilemma raised by the diverging interests of stakeholders. While the national policy goal might be to increase quality of vocational education and skills programmes, the firm and individual are likely to have different interests, with the former focussing on enterprise relevant training while the latter would prefer to acquire general, transferable skills allowing them to move between occupations. So what is best nationally, building a skilful and adaptable workforce, and what individuals strive for may be different from the narrower interest of enterprises. This issue is quite critical when placement and apprenticeship is involved, and is another reason why the state should consider co-financing apprenticeship in firms.

Another useful instrument to improve skills and productivity might be to introduce sectoral training schemes coupled with a cess (say, 0.5 percent of the annual turnover of a business) for SMEs. This would fund improvement in skill levels or re-training of workers and *employees of that company itself*, which would however be forfeit to the general training kitty for non-compliance.

## 7. CONCLUSION

Employment generation and matching of skill with demand in a changing work place will need to be central to poverty reduction, economic growth and social mobility. The national educational and training system is unfortunately not in synch with these objectives, and is due for a major overhaul.

Low literacy is a natural outcome of the lack of responsiveness of the system to the economic needs of students, and explains to a great extent the high dropout rate after five years of schooling. Labour force educational attainments show that nearly three-quarters possess less than ten years of *education*, while only about one percent of the relevant age group are enrolled in any skills or training programme. This figure compares unfavourably with both developed and developing countries, and impacts productivity.

The severity of the social problem is even more alarming because of the ongoing demographic transition and the implications of a large numbers of young people in economically productive group, who are basically unemployable and at risk of alienation.

The vocationalisation of upper-secondary education is discussed in the background of international studies which have analysed economic and social benefits from large enrolments in skills and training as supplements to general school education. The change in skill bias towards newer and higher (or different) technologies also points to the need for a major re-orientation of the education and training programme. It is believed that internationally benchmarked skills is not just about building the skills needed for the workplace in Pakistan's future economy, it is also about present day marketable and economically relevant education for young people in the economically productive age group.

Majority of the 3,125 technical vocational training institutions in the country are run by the private sector (70 percent of the institutions and 57 percent of enrolment), yet the outcomes are equally poor, and sometimes worse than what the public sector can offer. The matter of training is too important to be left to the private sector alone, which may have met the enrolment demand to some extent but whose quality is uneven unregulated. The institutional structures, interprovincial linkages and autonomy need to be balanced against the requirements of public accountability of funding and outcomes.

The matter of improved governance and quality is essentially one of “*change management*” (training, skill development, and adaptation of technology). It is proposed that an internal technology transfer and networking with ‘mother institutes’ could be a key instrument for the chain of ‘model training centres’ to be set up in the country (reformed, re-built, or completely new ones if necessary) and will be intensified by enhanced networking with industrial clusters and business houses. The cost of such a programme is estimated at around Rs 48 billion.

The issue of linkages with industry and employers is important not only in terms of relevance and quality, but also in terms of financing. Three forms of co-financing are proposed, in which the state can fund the entire programme (‘occupational tracks’ in school for 15-20 percent of studies, and one ‘model’ training institution in each district), or share it with employers and other stakeholders.

Finally Pakistan’s rare inability to consider *importing teachers* is highlighted. It is time for Pakistan to enter the global race for attraction and retention of men and women of talent and skills who are valued and sought after by all nations.

#### REFERENCES

- Abramovitz, M. (1994) The Origins of the Post-War Catch-Up and Convergence Boom. Faberberg, *et al.* (ed). *The Dynamics of Technology, Trade and Growth*.
- Amjad, Rashid (2005) Skills and Competitiveness: Can Pakistan Break Out of the Low-Skills Trap. *The Pakistan Development Review* 44:4.
- Barro, R. J. and J-W. Lee (2010) International Data on Educational Attainment Updates and Implications. (NBER Working Paper 7911).
- Bart van Ark and Robert H. McGuckin (2009) *APO Handbook*. International Comparisons of Labour Productivity and Per Capita Income. *Monthly Labour Review*
- Bertochhi, G. and M. Spagat (2002) *The Evolution of Modern Educational Systems Technical vs. General Education, Distributional Conflict, and Growth*.
- Billett, S. (1998) Enterprises and Vocational Education and Training: Expenditure and Expected Returns. *Journal of Vocational Education and Training* 50:3, 387–402.
- Bishop, J. H. and F Mañe (2005) Economic Returns to Vocational Course in U.S. High Schools; Vocalisation of Secondary Education.
- Card, D. and J. E. Dinardo (2002) Skill Biased Technological Change And Rising Wage Inequality: Some Problems And Puzzles (Working Paper 8769, NBER).
- David Card (1999) The Causal Effect of Education on Earnings. *Handbook of Labour Economics*. Elsevier.
- Gershenkron, A. (1962) *Economic Backwardness in Historical Perspective*. Belknap Press.

- Hoeckel, K. (2008) Costs and Benefits in Vocational Education and Training; OECD, EDU/EDPC/CERI(2008)3.
- IMF (2005) *Pakistan: Selected Issues and Statistics*. (IMF Country Report No 05/408).
- Jonathan, Meer (2007) Evidence on the Returns to Secondary Vocational Education; Science Direct; *Economics of Education Review* 26 559–573.
- Kemal, A. R., Musleh ud Din, and Usman Qadir (2002) Global Research Project. Pakistan Country Report, Islamabad, PIDE.
- Khan, S. H. (2007) Financing Higher Education; A View from The Planning Commission. Conference on Higher Education, GCU, Lahore.
- Khan, S. H. (2009) Making People Employable: Concept Paper for the CDWP. Planning Commission. Government of Pakistan.
- Konings J. and S. Vanormelingen (2010) *The Impact of Training on Productivity and Wages: Firm Level Evidence*. (IZA Discussion Paper No 4731).
- Lamy, Pascal (2004) *The Future of the World Economy; What Place for EU Industries?* Brussels.
- Machin, S. and J. van Reenen (2007) Changes in Wage Inequality. Center for Economic Performance, LSE. (Special Paper No. 18.)
- Machin, Stephen and Alan Manning (1997) Can Supply Create Its Own Demand? Implications for Rising Skill Differentials? *European Economic Review* 41, 507–516.
- MacLean, Rupert (2005) *MacLean An Overview of Secondary Education Reform, with Particular Reference to the Asia Pacific Region*.
- Mahmood, Z. and R. Siddiqui (2000) State of Technology and Productivity in Pakistan's Manufacturing Industries: Some Strategic Directions to Build Technological Competence. *The Pakistan Development Review* 30:1, 1–22.
- Misbah, Tanwir Ch. (2009) *Determinants of Labour Productivity: An Empirical Investigation of Productivity Divergence*. Groningen.
- Morishima, M. (1982) *Why has Japan Succeeded: Western Technology and the Japanese Ethos*. Cambridge/New York: Cambridge University Press.
- National Education Policy (2009) and Pakistan Education Census (2006), Ministry of Education, Islamabad.
- National Science Foundation (2006) *Science and Engineering Index SEI 2006*, USA.
- Pakistan, Government of (2007-09) *Pakistan Economic Surveys*. Islamabad: Finance Division.
- Pakistan, Government of (2008-09) *Labour Force Survey (2008-09)*. Table 9, FBS.
- Pakistan, Government of (2008-09) *Pakistan Economic Survey*. Islamabad: Finance Division.
- Pakistan, Government of (2009-10) *Pakistan Economic Survey*. Islamabad: Finance Division.
- Planning Commission (2007) *Vision 2030: Pakistan in the 21st Century*. Project Director: Shaukat Hameed Khan.
- Richardson, S. (2005) New Estimates of Employers' Contributions to Training. In K. Ball (ed.) *Funding and Financing of Vocational Education and Training*. Research readings, NCVET, Adelaide.
- Rodrik, J. (2004) *Industrial Policy for the Twenty-First Century*. Harvard.
- Schumpeter, J. (1912) *The Theory of Economic Development*. [Harvard, 1934].

- Schumpeter, J. (1939) *Business Cycles*. McGraw-Hill.
- Schumpeter, J. (1942) *Capitalism, Socialism and Democracy*. London: George Allen & Unwin. 1976.
- Schwab, K. (ed.) (2009-2010) *Global Competitive Index*. WEF, Geneva.
- Soto, M. (2002) *Rediscovering Education in Growth Regressions*. (OECD Paper 202).
- UNESCO (2002) *Financing Education, Investment and Returns: Analysis of the World Education Indicators*.
- UNESCO (2007) *EFA Global Monitoring Report*.

## **Regional Health Accounts for Pakistan—Provincial and District Health Expenditures and the Degree of Districts Fiscal Autonomy on Health**

CHRISTIAN LORENZ and MUHAMMAD KHALID

### **1. INTRODUCTION**

The first ever National Health Accounts for Pakistan have been published in May 2009 by FBS in collaboration with GTZ. The activities of NHA were started in January 2008 and it took 17 months to complete the first round, which is a very short period considering the experiences of other countries in the region. NHA estimate health expenditures by four dimensions namely financing sources, financing agents, health care providers and health care functions.

In the first round, two dimensions financing sources and financing agents were covered. Health expenditures by financing source give information on some important policy questions such as who pays, who finances under what scheme that can potentially help in devising financing strategies. Health expenditures by financing agents provide information on policy questions such as what is the overall financing structure, what are the pooling arrangements and what are the payment/purchasing arrangements which can give feedback to health policy decisions related to pooling arrangements and regulation of payers.

NHA also present the regional accounts i.e. the expenditures being allocated to the regions according to the location where the health care is provided. This includes health expenditures by federal government, provincial government, district government, cantonment boards, Employees Social Security Institutions, out-of-pocket expenditures (OOP)<sup>1</sup> and the expenditures by donor organisations. Such regionalisation of expenditures is very important as they are not only potentially helpful at provincial level in taking health related policy decisions but also give a useful information for a national level analysis.

Christian Lorenz <christian.lorenz@gmx.ch> is Economist, Gesellschaft fuer Technische Zusammenarbeit (GTZ), German Technical Cooperation, Islamabad, Pakistan. Muhammad Khalid <dr.khalid@gtz.de> is Public Health Specialist, Gesellschaft fuer Technische Zusammenarbeit (GTZ), German Technical Cooperation, Islamabad, Pakistan.

<sup>1</sup>For details on private out-of-pocket expenditure and their use in NHA see Lorenz (2009).

The scope of this paper is broadly to have analysis of the regional accounts, to have comparison of health expenditure figures of NHA with figures from other sources i.e. comparison of Punjab provincial and district government figures with that of ADB figures and may be to come up with reasons for differences if any. Lastly, the paper does a comparison of district government health expenditures between districts (in each province) and then comparison of provincial and district government health expenditures between provinces. The comparison of provincial and district government expenditures also analyses their share to be used as a proxy to assess the degree of fiscal autonomy of districts in carrying out health related activities.

Our findings can be applied as recommendations for future rounds of NHA in Pakistan regarding formats and necessities of detailed health expenditure data collection to ensure evidence based decision making not only on federal, but also on provincial and district level. Nevertheless, NHA is a pure accounting framework in monetary terms, describing financial flows in health systems comprehensively, but not carrying out productivity analyses or quality assessments of health care.

Regarding data quality it is important to keep in mind when undertaking these analyses that Total Health Expenditures (THE) do include estimations due to a combination of public (PIFRA<sup>2</sup>) and private<sup>3</sup> (household surveys) expenditure data. In contrast to that, the analyses in this article comparing district expenditures do not include estimations, since they are purely based on official PIFRA data, which are taken from AG and AGPR publications.

## **2. PROVINCIAL HEALTH ACCOUNTS**

The NHA 2005-06 report also includes some results of the province wise breakdown of health expenditures. These Provincial Health Accounts are sub-accounts of the NHA and track expenditures on health for a specific regional section of the health system. According to the principle of regionalisation expenditures are allocated to the regions according to the location where the health care has been provided; the residency of the patient is not a criterion.

The following Table 1 shows the relative results of health related expenditures in the regions and gives the percentages of the single Financing Agents for each province. These shares can be compared with the national shares for each Agent. The shares of the Agents on national level include some expenditure which can not be allocated to a single province or are allocated to the Islamabad capital territory. This holds for some federal expenditure as well as for some Zakat and all private insurance expenditures. The basic figures for the calculations shown here are NHA estimations (combination of PIFRA data and published survey results) which became official statistics with their publication by FBS in 2009.

<sup>2</sup>PIFRA is the Project to Improve Financial Reporting and Auditing, which was introduced by the Auditor General of Pakistan in 1994 in order to improve the financial reporting system and to ensure good governance.

<sup>3</sup>For detailed information on different survey results affecting NHA results see Lorenz (forthcoming).

Table 1

*Provincial Expenditures per Financial Agent in %*

| Type of Health Expenditure    | In Percent of Total Expenditures (per Province or Country) |        |                      |         |          |
|-------------------------------|--|--------|----------------------|---------|----------|
|                               | Punjab   | Sindh  | Khyber<br>Paktunkhwa | Baloch. | Pakistan |
| Military Health Expenditure   | 5.8%   | 1.8%   | 2.8%                 | 4.0%    | 4.0%     |
| Provincial/Federal Government | 9.6%   | 16.9%  | 13.9%                | 22.5%   | 20.5%    |
| District Government           | 8.1%   | 13.5%  | 1.1%                 | 18.7%   | 7.6%     |
| Cantt. Boards                 | 0.1%   | 0.1%   | 0.1%                 | 0.1%    | 0.1%     |
| Social Security Institutions  | 1.5%   | 1.4%   | 0.2%                 | 0.4%    | 1.1%     |
| Zakat Health Expenditure      | 0.1%   | 0.1%   | 0.1%                 | 0.1%    | 0.3%     |
| Private Insurance             | —  | —      | —                    | —       | 0.2%     |
| OOP Health Expenditure        | 74.7%  | 66.0%  | 76.5%                | 38.7%   | 64.3%    |
| Donors Organisations          | 0.2%   | 0.1%   | 5.3%                 | 15.5%   | 1.9%     |
| Total                         | 100.0%   | 100.0% | 100.0%               | 100.0%  | 100.0%   |

*Source:* Percentage calculations based on absolute figures per province given in database, Federal Bureau of Statistics, National Health Accounts, 2009, 45.

The shares of military health expenditures are relatively high in Punjab (5.8 percent) and Balochistan (4 percent); in Sindh (1.8 percent) and Khyber Pakhtunkhwa (2.8 percent) they are smaller than at national level (4 percent). The social security expenditures as percent of the THE are very small in Khyber Pakhtunkhwa (0.2 percent) and Balochistan (0.4 percent); in Punjab (1.5 percent) and Sindh (1.4 percent) social security figures are higher than the national level (1.1 percent). The OOP are lowest in Balochistan (only 38.7 percent) compared to the other provinces and the national level; accordingly the provincial/federal (22.5 percent) as well as the district (18.7 percent) expenditures are highest in this province. This situation is similar in Sindh which has second lowest OOP (66 percent) and second highest provincial/federal (16.9 percent) and district (13.5 percent) expenditures. The share of donor expenditures within the province varies from less than 1 percent (0.2 percent Punjab and 0.1 percent Sindh) to 5.3 percent in Khyber Pakhtunkhwa and 15.5 percent in Balochistan.

The total results can also be expressed in USD per capita spent on health by using the total population of each province.

Table 2

*Provincial THE per Capita*

|                   |                             | Punjab        | Sindh       | Khyber<br>Paktunkhwa | Balochistan. | Pakistan      |
|-------------------|-----------------------------|---------------|-------------|----------------------|--------------|---------------|
| THE               | million PKR                 | 95,782        | 34,407      | 28,177               | 7,560        | 185,074       |
| THE               | USD                         | 1,598,231,270 | 574,119,806 | 470,165,193          | 126,147,172  | 3,088,166,194 |
| Population 2005   | estimated                   | 85,650,000    | 35,410,000  | 20,640,000           | 7,630,000    | 153,960,000   |
| Population 2006   | estimated                   | 86,255,000    | 35,864,000  | 21,392,000           | 8,004,000    | 156,770,000   |
| Population 2005-6 | estimated                   | 85,952,500    | 35,637,000  | 21,016,000           | 7,817,000    | 155,365,000   |
| THE per Capita    | at average<br>exchange rate |               |             |                      |              |               |
|                   | USD                         | 18.66         | 16.21       | 22.78                | 16.53        | 20.06         |

*Sources:* THE in PKR: Federal Bureau of Statistics, National Health Accounts, 2009. Exchange rates: The exchange rate for 2005/06 is calculated as mean of the exchange rate 2005 (59.51) and 2006 (60.35). UN, World Statistics Pocketbook, <http://data.un.org/CountryProfile.aspx?crName=Pakistan> and Nationmaster [http://www.nationmaster.com/graph/eco\\_exc\\_rat\\_to\\_usd\\_2006-economy-exchange-rates-usd-2006](http://www.nationmaster.com/graph/eco_exc_rat_to_usd_2006-economy-exchange-rates-usd-2006).

The total population figures for 2005-06 are calculated as mean of the years 2005 and 2006 and are taken from the Economic Survey 2007/08 <http://www.finance.gov.pk/admin/images/survey/chapters/Chapter12%2008-09.pdf> Table 12.7; they differ slightly to the figures given in the Statistical Yearbook, <http://www.statpak.gov.pk/depts/fbs/publications/yearbook2008/Population/16-1.pdf>. A comparison of different official population figures and their impacts on OOP can be found in Lorenz (2009).

The THE per capita are relatively different between the provinces and range from 16 USD in Sindh, 17 USD in Balochistan, 19 USD in Punjab to 23 USD in Khyber Pakhtunkhwa; THE per capita for Pakistan is 20 USD.

To sum up it was found that the relative importance of single agents differs strongly between provinces. Additionally the THE spent in each province reaches from 16 to 23 USD.

### 3. COMPARISON NHA RESULTS WITH ADB FIGURES FOR PUNJAB

ADB has published a study called *Public Expenditure Review—Health Sector in Punjab*. Public sector expenditure on health in Punjab can be divided into two major categories, one is the provincial setup and the other is districts. From here onwards we are just talking about public expenditure by provincial or district governments; total health expenditures including private expenditures are not analysed here. This means the following analyses are based on officially published PIFRA data and do not include expenditure estimations.

#### Provincial Government Expenditure

First the results for the provincial health expenditures are compared and possible reasons for differences in the results will be discussed. The following table shows the results from ADB for the province Punjab for the financial year 2005-06.

The expenditures are divided into current expenditure (expenditures on goods and services, such as salaries, rent, maintenance and interest payments) and development expenditure (also called capital expenditure, which refers to the funds spent for the acquisition of long-term assets) and figures are given for budget (which means they are allocated) and actual expenditure (they are already spent). Relevant for the comparison is the sum of the actual current and development expenditure. This figure has to be compared with the NHA result, which is given in the following Table 3.

Table 3

| <i>Provincial Governmental Health Expenditure Punjab in Million PKR</i> |        |        |                                  |
|---|--------|--------|----------------------------------|
| Expenditure FY 2005-06  | ADB    |        | FBS NHA                          |
|   | Budget | Actual |                                  |
| Current   | 6,027  | 6,012  |                                  |
| Development   | 3,290  | 1,217  |                                  |
| Total   | 9,317  | 7,229  | 7,161                            |
|   |        |        | Department of Health and other   |
|   |        |        | 1,072 Dep. Population Welfare    |
|   |        |        | 172 Health Education             |
|   |        |        | 747 Reimburssem. of med. charges |
|   |        |        | 9,152 Total                      |

*Source:* Figures taken from ADB, authors highlighting of the two compared figures, authors extractions from NHA database, Federal Bureau of Statistics, National Health Accounts, 2009.

From the results of NHA report the expenditure of the provincial department of Health (7,161 million PKR) are relevant, which has to be compared with the ADB figure (7.229 million PKR), which is about 1 percent higher.

### District Governments Expenditure

In the ADB study among others the health expenditures of Punjabi districts are published. FBS NHA section also collected data from districts in Punjab which are published in the NHA report 2005-06. Provincial Accountant General (AG) data do not capture all expenditures, because each district is calculating individual expenditures additionally. These are according to an ordinance passed in 2001, which gave more autonomy to districts and gave more power to them compiling own expenditures. Regarding the availability of data they have to be differentiated between appropriation accounts from AG and civil accounts from World Bank.

From AG Punjab district data in form of appropriation accounts<sup>4</sup> for 19 out of 35 districts were made available in softcopy format. The missing 16 district data were given in hardcopy, which have been entered by NHA section of FBS. For districts not only the total figures of public district expenditures are available, but also additional information on all entities and objects in the district, including health, education and other expenditures for the 19 softcopy districts. For the hardcopy districts only health relevant expenditures are available with FBS. From World Bank district data in civil accounts for Punjab are available, which only show lump sum figures. From ADB the following figures on district health expenditure are given in Table 4.

Table 4

#### *District Governmental Health Expenditure in Million PKR<sup>5</sup>*

| Expenditure FY 2005-06 | ADB    |        | FBS NHA |
|------------------------|--------|--------|---------|
|                        | Budget | Actual | Actual  |
| District               | 7,237  | 6,449  | 7,720   |
| Cantonments Boards     |        |        | 100     |
| Total                  |        |        | 7,820   |

*Source:* ADB, authors highlighting of the two compared figures, authors extraction (district, cantonment and total) from NHA database, Federal Bureau of Statistics, National Health Accounts, 2009.

The district health expenditures are given in actual figures not in budget figures. The actual expenditure is 6,449 million PKR in ADB results compared to 7,720<sup>6</sup> million PKR, which have been calculated in NHA.

The comparison of Punjab health expenditures has shown that there are only slight differences between ADB and FBS results. For provincial expenditure the ADB figure is less than one percent higher than the FBS figure. For district expenditure the FBS figure is about 20 percent higher than the ADB figure maybe due to the inclusion of health

<sup>4</sup>They are very similar to PIFRA, but differ to some extent, because some old classifications are used.

<sup>5</sup>The figures for the districts are only given in current expenditures, for provinces current and development figures are available.

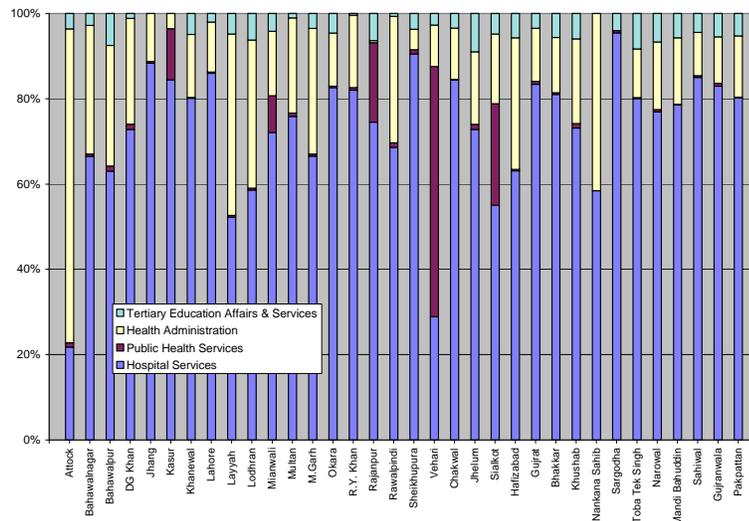
<sup>6</sup>The ADB figure is also without inclusion of cantonments, therefore the figure 7720 has to be used for further analyses.

education as well as some health relevant expenditures from other grants (e.g. hospital construction).

#### 4. DISTRICT GOVERNMENTS HEALTH EXPENDITURE— INTER DISTRICT COMPARISON

This chapter compares the health expenditures between different district governments for each province and for whole Pakistan. Therefore we apply the detailed function classifications of the PIFRA codes which are relevant for health expenditure. These codes are 093-Tertiary Education Affairs and Services,<sup>7</sup> 076-Health Administration, 073-Hospital Services (Nursing and Convalescent home care) and 074-Public Health Services. The first can be further disaggregated into general universities (093101) and professional universities (093102); relevant for health education are the professional universities/institutes under code 093102 as they include medical colleges and nursing schools. Tertiary care is generally defined as specialised consultative care, usually on referral from primary or secondary medical care personnel, by specialists working in a centre that has personnel and facilities for special investigation and treatment. Public Health Services (code 074) include preventive health programmes such as HIV/AIDS control programme, Tuberculosis control programme, maternal and child health programmes. So these are basically the population based programmes primarily aimed at improving and maintaining health of populations as opposed to the curative services which are individual based.

**Fig. 1. Punjab Districts, Public Health Expenditure by  
Function for the Year 2005-06**

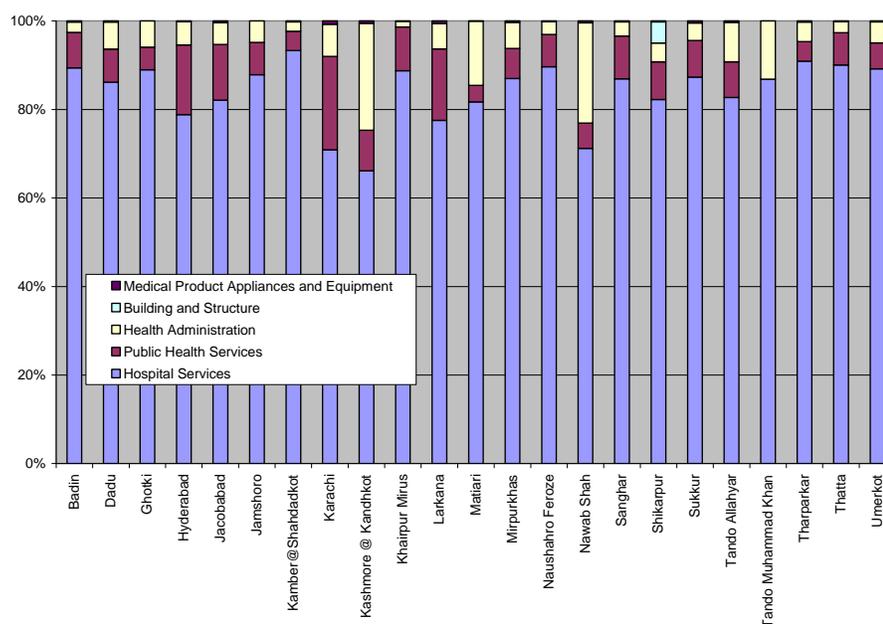


Source: Disaggregated functional expenditures per district taken from database, Federal Bureau of Statistics, National Health Accounts Pakistan 2005-6.

<sup>7</sup>According to SHA manual, medical education and health-related professional training and research is not included in the THE, but WHO gives countries the liberty to include categories which are seen as integral part of the health system [WHO (2003)].

The comparison of the functionally disaggregated expenditure between districts of Punjab shows that in all the districts (except two) the highest expenditure is on hospital services; expenditure on this post are ranging from 22 till 96 percent of the total public health expenditure. This is followed by expenditure on health administration except in district Attock and district Vehari where the highest expenditures are on health administration and public health services respectively. This variation in two districts may be due to differences in understanding of PIFRA classification and data recording by the regional AG and AGPR offices.<sup>8</sup> The expenditures on health administration in all districts are also relatively heterogeneous and range from 0-74 percent. Tertiary care is of lower importance in all districts and ranges from 0-9 percent.

**Fig.2. Sindh Districts, Public Health Expenditure by Function for the Year 2005-06**

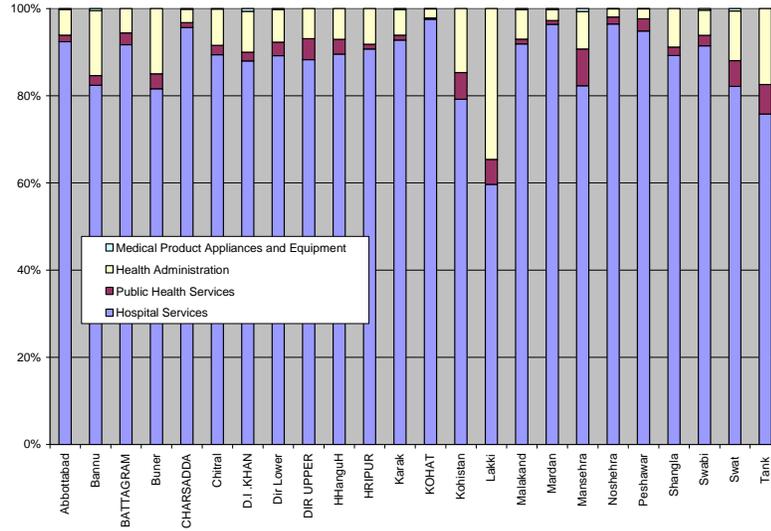


Source: Disaggregated functional expenditures per district taken from database, Federal Bureau of Statistics, National Health Accounts Pakistan 2005-6.

For Sindh the Figure 2 shows that expenditures on hospital services are highest for all districts; they range between 66 and 93 percent with an average of 84.2 percent. Health administration costs are higher in the districts Matiari (14.5 percent), Nawab Shah (22.6 percent) and Kashmore@Kandhkot (24 percent); the average of all Sindh districts is 7 percent only. Public health services are higher in Karachi (21 percent), Larkana (16 percent) and Jacobabad (13 percent); the average is 8.4 percent. Building and structure is only relevant for district Shikarpur with 5 percent. Medical product appliance is less than 1 percent in all districts.

<sup>8</sup>The Auditor General's organisation is the prime institution in the country for ensuring public accountability and fiscal transparency in governmental operations. The Accountant General Pakistan Revenues (AGPR) is responsible for the centralised accounting and reporting of federal transactions.

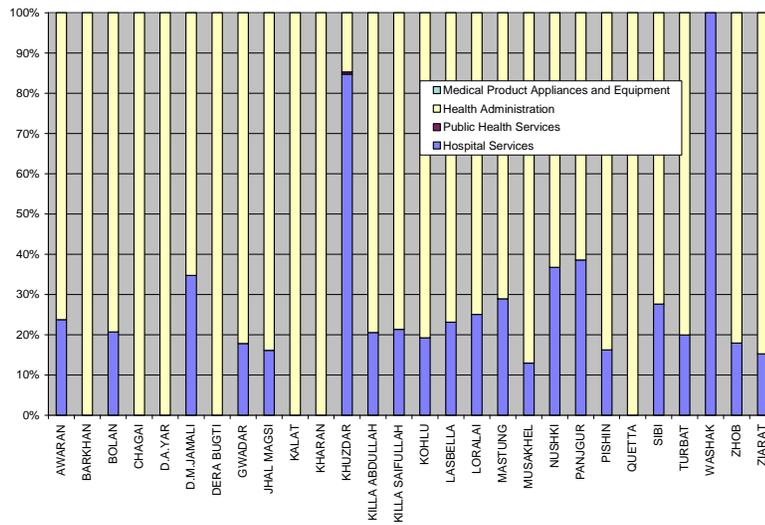
**Fig. 3. Khyber Pakhtunkhwa Districts, Public Health Expenditure by Function for the Year 2005-06**



Source: Disaggregated functional expenditures per district taken from database, Federal Bureau of Statistics, National Health Accounts Pakistan 2005-6.

For Balochistan hospital services as well are highest for all districts with a range between 60 to 98 percent. For health administration expenditure is highest in district Lakki with 35 percent compared to an average of all districts in Balochistan of 9 percent.

**Fig. 4. Balochistan Districts, Public Health Expenditure by Function for the Year 2005-06**



Source: Disaggregated functional expenditures per district taken from database, Federal Bureau of Statistics, National Health Accounts Pakistan 2005-6.

In Balochistan the expenditure structure is different to other provinces, because most districts have given their highest expenditure for health administration (range from 0 to 100 with an average of 78 percent). The second highest expenditure is hospital services, which range from 0 to 100 with an average of 22 percent. Public health services are only given in one district Khuzdar with less than one percent. Expenditures for medical product appliances are zero in all districts of Balochistan.

Within each province most districts—besides a few exemptions—have a similar expenditure structure. For districts in Punjab, Sindh and Khyber Pakhtunkhwa the majority of expenditures are made for hospital services; only most districts in Balochistan report health administration to be their highest expenditure. This difference might occur due to different understanding of the requested disaggregation classifications by the regional AG and AGPR offices.<sup>9</sup>

### **5. PROVINCIAL/DISTRICT GOVERNMENTAL HEALTH EXPENDITURE—INTER PROVINCE COMPARISON AND DEGREE OF FISCAL AUTONOMY**

In this section we describe the legal constitution of districts autonomy from the provinces; in this regard we then analyse the impacts on the distribution of health expenditure between districts and provinces.

The fiscal autonomy of the districts is fixed in the devolution of 2001, which deals with subsidiary and the vertical distribution of responsibilities between different governmental bodies. Decentralisation can broadly be defined as the transfer of authority and power in public planning, management and decision-making from higher to lower levels of government or from national to sub-national levels.<sup>10,11,12</sup> Different processes and models exist within decentralisation such as (1) de-concentration, (2) delegation, and (3) devolution.<sup>13</sup>

- (1) In deconcentration administrative responsibilities are transferred to locally based offices of a national government ministry and the deconcentrated units remain accountable to the central authority for what they use and the outputs produced.
- (2) In delegated forms of decentralisation, management responsibilities are transferred to semi-autonomous entities which are outside the regular bureaucratic structure. The aim is to free national government from day-to-day management functions. Again, the entity remains accountable to national government.
- (3) In a devolved form of decentralisation, political and administrative authority is transferred to an independent local-level statutory agency, for example a municipality or local council. Also, the local level is able to generate revenue due to its statutory status. In this form of decentralisation authority for organising, providing and partly financing services is given to a local

<sup>9</sup>And has to be clarified in the next data requests by the two mentioned institutions.

<sup>10</sup>See Rondinelli (1981), 133ff.

<sup>11</sup>Collins and Green (1994), 58ff.

<sup>12</sup>Mills, *et al.* (1990).

<sup>13</sup>Rondinelli, *et al.* (1983).

government body or similar agency ultimately responsible to the local population. They are rarely completely autonomous, but are bodies largely independent of the national government in their areas of responsibility as opposed to being subordinate units as in the case of de-concentration.

In 2001, Local Government Ordinance 2001 was passed in Pakistan to introduce devolution based on the realisation that devolution would provide a mean for community participation and local self-reliance and will also ensure the accountability of government officials to the population. The devolution of powers in public planning, management and decisions related to finances changed the fiscal structure and the recording of the fiscal data as well. Appropriation Accounts were maintained at the district level for expenditures incurred by districts while provincial Appropriation Accounts only included the expenditures at the provincial level. The process of devolution has to be progressive to shift from one system to another and to ensure the capacity building of the district management teams. For this reason, the four provinces were at different levels of devolution and this can be seen using the health expenditures by provinces and districts as a proxy indicator of level of devolution (see Table 5).

Table 5

*Provincial and District Governmental Health Expenditures 2005-06*

| Provincial/<br>District | In %   |        |                    |             | in Million<br>PKR |
|-------------------------|--------|--------|--------------------|-------------|-------------------|
|                         | Punjab | Sindh  | Khyber Pakhtunkhwa | Balochistan | Total             |
| Provincial              | 52.1%  | 53.5%  | 92.2%              | 52.0%       | 19,007            |
| District                | 47.9%  | 46.5%  | 7.8%               | 48.1%       | 14,081            |
| Total                   | 100.0% | 100.0% | 100.0%             | 100.0%      | 33,088            |

*Source:* Extractions of absolute figures from database, Federal Bureau of Statistics, NHA Pakistan 2005-6.

It is quite obvious from the table that for the three provinces (Punjab, Sindh and Balochistan) the total public health expenditure incurred is about equally shared by provincial and district levels i.e. devolution of fiscal powers in health related activities. Whereas, in the case of Khyber Pakhtunkhwa the provincial government spends 92 percent while districts spend only 8 percent of the total public health expenditures, which might possibly due to limited devolution of fiscal powers.

The following Table 6 shows the percentage to which the expenditure are spend on the functions for major, minor and detailed functions and for all provinces.

Table 6

*Public District Health Expenditures by Functions for Provinces*

| Major Function Code  | Major Function                                    | Sindh                                | Punjab        | Balochistan   | Khyber      | Total          |
|----------------------|---|--------------------------------------|---------------|---------------|-------------|----------------|
|                      |   |                                      |               |               | Pakhtunkhwa |                |
|                      |   | % of Provincial District Grand Total |               |               |             | PKR            |
| 07                   | Health  | 99.8                                 | 96.4          | 100.0         | 100.0       | 13,796,124,389 |
| 04                   | Building and Structure                            | 0.2                                  | 0.0           | 0.0           | 0.0         | 8,844,519      |
| 09                   | Education Affairs and Services                    | 0.0                                  | 3.6           | 0.0           | 0.0         | 275,326,474    |
| Total                |   | 99.8                                 | 96.4          | 100.0         | 100.0       |                |
| Minor Function Code  | Minor Function                                    | % of Provincial District Grand Total |               |               |             | PKR            |
| 045                  | Construction and Transport Total                  | 0.2                                  | 0.0           | 0.0           | 0.2         | 8,844,519      |
| 071                  | Medical Products, Appliances and Equipments       | 0.3                                  | 0.0           | 0.0           | 0.3         | 16,170,571     |
| 073                  | Hospital Services                                 | 82.2                                 | 75.3          | 21.2          | 82.2        | 10,206,086,333 |
| 074                  | Public Health Services                            | 11.5                                 | 3.6           | 0.0           | 11.5        | 815,230,436    |
| 076                  | Health Administration                             | 5.8                                  | 17.5          | 78.7          | 5.8         | 2,758,637,049  |
| 093                  | Tertiary Education Affairs and Services           | 0.0                                  | 3.6           | 0.0           | 0.0         | 275,326,474    |
| Total                |   | 100.0                                | 100.0         | 100.0         | 100.0       |                |
| Detail Function Code | Detailed Function                                 | % of Provincial District Grand Total |               |               |             | PKR            |
| 0457                 | Construction Total                                | 0.2                                  | 0.0           | 0.0           | 0.2         | 8,844,519      |
| 0711                 | Medical Products, Appliances and Equipments Total | 0.3                                  | 0.0           | 0.0           | 0.3         | 16,170,571     |
| 0731                 | General Hospital Services Total                   | 82.2                                 | 74.0          | 21.2          | 82.2        | 10,096,954,214 |
| 0733                 | Medical and Maternity Centre Services             | 0.0                                  | 1.2           | 0.0           | 0.0         | 98,346,958     |
| 0734                 | Nursing and Convalascent Home Services            | 0.0                                  | 0.1           | 0.0           | 0.0         | 10,785,161     |
| 0741                 | Public Health Services                            | 11.5                                 | 3.6           | 0.0           | 11.5        | 807,425,724    |
| 0761                 | Administration                                    | 5.8                                  | 17.5          | 78.7          | 5.8         | 2,744,575,584  |
| 0931                 | Tertiary Education Affairs and Services           | 0.0                                  | 3.6           | 0.0           | 0.0         | 297,192,651    |
| Grand Total in PKR   |   | 4,630,072,134                        | 7,719,837,903 | 1,414,730,850 | 315,654,495 | 14,080,295,382 |

Source: Extractions of absolute figures from database, Federal Bureau of Statistics, NHA Pakistan 2005-6.

Comparing the health expenditures by districts between provinces shows that the highest expenditure is done on hospital services in all provinces except Balochistan where highest expenditure is on health administration. So the overall pattern of health expenditures by districts is comparable in three provinces (Punjab, Khyber Pakhtunkhwa and Sindh). Also the point worth noticing is that expenditures on health education at district level only appear for Punjab, probably because it was only in Punjab that the districts were encouraged to have their own nursing, Lady Health Visitor and Paramedical Training Institutes.

### Per Capita Comparison

The following Table 7 gives an overview on the per capita PKR spend from provincial and district level in all provinces.

Table 7

*Per Capita (PKR) Provincial and District Government Health Expenditures*

| Provincial / District | In Rs Per capita |       |                       |             |
|-----------------------|------------------|-------|-----------------------|-------------|
|                       | Punjab           | Sindh | Khyber<br>Pakhtunkhwa | Balochistan |
| Provincial            | 98               | 150   | 178                   | 196         |
| District              | 90               | 130   | 15                    | 181         |
| District share        | 47.9%            | 46.4% | 7.8%                  | 48.1%       |
| Total                 | 188              | 280   | 193                   | 376         |

Source: Extractions of absolute total figures from database, Federal Bureau of Statistics, NHA Pakistan 2005-6.

Comparing the per capita expenditures by the civilian territorial governments i.e., provincial and district governments, it is highest for Balochistan. *Provincial* Balochistan government spends 196 PKR per capita compared with 98 PKR, 150 PKR and 178 PKR per capita for Punjab, Sindh and Khyber Pakhtunkhwa respectively. *District* Balochistan government spends PKR 181 per capita compared with PKR 90, PKR 130 and PKR 15 per capita for Punjab, Sindh and Khyber Pakhtunkhwa respectively. While the total (provincial and district government) for Balochistan spends 376 PKR per capita as compared to 188 PKR, 280 PKR and 193 PKR per capita for Punjab, Sindh and Khyber Pakhtunkhwa respectively. It is suggested that per capita cost of health services in the provinces should be combined with this expenditure data to have more inferential analysis. This suggestion is based on the rationale that the cost of services if vary between provinces, the expenditure on health to have same set of services would be different and so the financial requirements would also vary between provinces.

## 6. CONCLUSION

For this paper we have carried out four analyses: (1) Provincial Health Accounts for Pakistan, (2) analysis of Punjab provincial and district health expenditures, (3) analysis of district expenditures and comparison within all Pakistani provinces, and (4) analysis of the importance of provincial and district health expenditures in each province as indicator for the degree of fiscal autonomy in health activities within the state.

- (1) To sum up Provincial Health Accounts it was found that the relative importance of single agents differs strongly between provinces; this holds especially for provincial and district government expenditure as for OOP. Furthermore the estimations of THE spent per province range from 16 USD in Sindh to 23 USD in Khyber Pakhtunkhwa.
- (2) The comparison of Punjab health expenditures has shown that there are only slight differences between ADB and FBS results. For provincial expenditure the ADB figure is less than one percent higher than the FBS figure and the district expenditure differ probably due to the inclusion of health education as well as some health relevant expenditures from other grants like hospital construction.

- (3) Within each province most districts—besides a few exemptions— have a similar expenditure structure. For districts in Punjab, Sindh and Khyber Pakhtunkhwa the majority of public expenditures are made for hospital services; only most districts in Balochistan report health administration to be their highest expenditure.
- (4) For the three provinces (Punjab, Sindh and Balochistan) the total public health expenditure are about equally shared by provincial and district levels. In contrast to that in Khyber Pakhtunkhwa the provincial government spends 92 percent while districts spend only 8 percent of the total public health expenditures, which might be possibly due to limited devolution of fiscal powers.

Overall the analysis of RHA has found some immense differences between single districts and even provinces which raise questions and should be analysed in detail in future research on health expenditure in Pakistan. Therefore it is not sufficient to aim at PHA, but also to include district analyses and develop full RHA.

### REFERENCES

- Collins, C. and A. T. Green (1994) Decentralisation and Primary Health Care: Some Negative Implications. *International Journal of Health Services* 7 2 , 58–68.
- Federal Bureau of Statistics (2009) National Health Accounts Pakistan 2005-06. Islamabad, <<http://www.statpak.gov.pk/depts/fbs/publications/publications.html>.>
- Federal Bureau of Statistics (2009a) First National Health Accounts for Pakistan Released, Islamabad, <<http://www.statpak.gov.pk/depts/fbs/publications/publications.html>.>
- Lorenz, C. (Forthcoming) Using Household's Health Expenditure Data in NHA—Check with other Survey Results and Adjustment with National Accounts Data.
- Lorenz, C. (2009) Out-of-pocket Household Health Expenditures and their Use in National Health Accounts: Evidence from Pakistan. In Asia Health Policy Programme, No. 9, Stanford University, Walter H. Shorenstein Asia-Pacific Research Centre.
- Mills, Anne, *et al.* (1990) *Health System Decentralisation: Concepts, Issues and Country Experience*. Geneva: World Health Organisation.
- Rannan-Eliya, Ravi P. (2008) National Health Accounts Estimation Methods: Household Out-of-pocket Spending in Private Expenditure. Monograph prepared for WHO/NHA Unit, Geneva, Switzerland. (Draft).
- Rondinelli, D. A. (1981) Government Decentralisation in Comparative Theory and Practice in Developing Countries. *International Review of Administrative Science* 47:2, 133–147.
- Rondinelli, D. A. *et al.* (1983) Decentralisation in Developing Countries. Washington, DC.: World Bank. (Staff Working Paper 581).
- World Health Organisation (n.d.) WHO Estimates for Country NHA Data. <<http://www.who.int/nha/country/pak/en/>.>
- World Health Organisation (2003), Guide to Producing National Health Accounts: With Special Application for Low Income and Middle Income Countries, Geneva.
- World Health Organisation (2008) *World Health Survey 2005*. <<http://www.who.int/healthinfo/survey/en/>.>

## Comments

The paper on regional Health Accounts for Pakistan is a useful exercise to gauge the flow and magnitude of health expenditures at different tiers of administration and get insights into the overall financing structure and financial health of the system to make policy decisions. I would like to commend the authors for their bold initiative in choosing a topic that is much less researched in areas of health, and for using comprehensive data on health expenditures down to district level and making comparisons within provinces to examine health accounts and fiscal autonomy within the country. Since health programmes' implementation and service provision have become a provincial responsibility, this study has its merits in analysis of health accounts at provincial and district levels to seek guidance for future financial requirements and allocations.

This exercise involves a lot of number crunching and data analysis making it a challenging task to yield accurate and reliable estimates on health accounts and the variations in different types of health expenditures incurred in the four provinces and their respective districts. As health systems data are highly inadequate in Pakistan, the results of the study reveal many data inconsistencies and discrepancies in health expenditure patterns which need further explanation and exploration. For example in Punjab province, health expenditure measured by the Asian Development Bank (ADB) is about one percent higher than the government figure (FBS) for fiscal year 2005-06, whereas for district expenditure, the reverse is apparent with FBS showing about 20 percent higher expenditures than the ADB. This raises questions about the precise estimation of relevant health expenditures at district level as the relative importance of different types of expenditures including grants, health administration, hospital services etc., differ greatly between provinces. These discrepancies need further probing and refinement of data used for the analysis.

Given the fact that private sector constitutes a large part (more than 70 percent) of health sector service provision, it is important to accurately assess its contribution to the total health expenditure. The analysis does not sufficiently cover this aspect of health financing. The results show that out of pocket expenses (private expenditures) are quite low in Balochistan, whereas the donor organisations are shown to be the major financial agent in comparison with other provinces. This situation needs further clarification in terms of the varying cost of services between provinces and its impact on service provision and health administration.

Furthermore, per capita health expenditures have been estimated on the basis of population figures of 2005-06 which range from 16 USD in Sindh to 23 USD in Khyber Pakhtunkhwa. The population base used to estimate per capita figures appears to be an underestimate when compared with the population projection figures of NIPS, thereby indicating an upward bias in per capita figures estimated in the study. These estimates need to be compared with other similar calculations to support the accuracy and precision of those estimates.

Overall, some significant differences have been found in health expenditures between single districts and even provinces which need further detailed investigation and analysis in future research to develop a comprehensive health accounts system in Pakistan.

**Naushin Mahmood**

Pakistan Institute of Development Economics,  
Islamabad.

## **Education Order in Punjab: A District Level Study**

AISHA KHAN

### **1. INTRODUCTION**

Development studies have continuously discussed avenues for development and progress with aims to eliminate poverty based on each country's resources, institutions and culture. One aspect that proves to alleviate inequality and poverty has been investment in human capital which is through the investment in development of knowledge and skills. As a result, education policy has been always been a core development issue for developing countries and international institutions. This development issue can truly be tackled once an assessment of education status is attempted. It helps pave decision-making for the future in education across regions. The task of education assessment is not a new consideration. Many attempts have been made in calculating and estimating an Education Index (EI) for countries and regions across the world. The most frequent attempt at estimating education is made by the UNDP in the process of estimating human development through the Human Development Index (HDI). Using the EI method from the HDI, UNDP has been successful in giving policy-makers a concise understanding of the status of education around the world.

In the process of development, Pakistan needs to invest in its human capital and evaluate its path for the future. Although an Education Index alone cannot point out the major hindrances to education, it is a tool which helps understand the level at which investment in human capital has truly made a difference to the nation. This paper aims to estimate the education standards using the latest Punjab MICS 2007-08 dataset and compare the findings with an estimation of the education standards in 1998 for Punjab. Simultaneously, gender based and rural/urban education indices are calculated to further understand trends and patterns in education attainment.

### **2. LITERATURE REVIEW**

Modern economists can trace the understanding of human well-being as far back as Aristotle. Since then the awareness of human well-being has developed into a much larger balloon of academic discussions. The Human Development Index is one of the

Aisha Khan <aisha.khan06@gmail.com> is Teaching and Research Fellow, Centre for Research in Economics and Business, Lahore School of Economics, Lahore.

most widely used and acknowledged measures of human development. This measure, developed and published by the UNDP's first annual Human Development Report (HDR) 1990, helped pave the way for all future debates on human development. The HDI is structured around Amartya Sen's capabilities approach that underlines the importance of a standard of living which allows empowerment to individuals through three social goals: standard of living, health and education [Stanton (2007)]. By using GDP per capita, life expectancy, literacy and enrollment respectively, as proxies to measure each goal, the HDI is calculated to understand the overall state of human development for a particular area. Before the HDI, many cases have used other measures to calculate social well-being in a country such as GNP per capita and other quality of life indices. However, none of the indices has gained as much recognition as Mahbub ul Haq's HDI [HDR (1990)] has since its' introduction.

Critically considered, the HDI is criticised for measuring social well-being and development inaccurately. Some basic criticism surrounds the choice of variables, fixed weighting methodology and its redundancy. Authors advocate that the wrong indicators are used in measuring the three goals and other potential options must be added for better measurement such as civil liberties, distributional effects, and environmental impacts [Stanton (2007)]. Another important concern regarding the HDI is its weighting method. Each dimension of development is given an equal one-third weight which is continuously questioned by literature. Ghaus, Pasha, and Ghaus (1996) and Noorbakhsh (1998) have provided other ways of assigning weights and calculating ranks such as the Principal Component Analysis (PCA) method and Borda method.<sup>1</sup> Lastly, many question the true importance of the HDI and whether more than one dimension is required for the measurement of social wellbeing as compared to a standalone GDP per capita comparison. Regardless of these concerns, the HDI is continuously referred to and is commended for its ease in comparability and calculation across countries.

In estimating the geographic status of education, literature is divided between two branches. One branch evaluates education based on the quality of education. One such example is of Buchmann and Neri (2008), who use two components: average proficiency and passing rate to calculate an index. This index is used to help develop education targets for future evaluation of the Brazilian education system. The other branch of literature examines education ranking and status through the HDI. Many papers have discussed the education index in the process of calculating the HDI or other multi-dimensional development indices. Jordan (2008) presents an interesting case for examining the development levels of different counties in Georgia, USA. Using attainment of high school degree, attainment of Bachelors degree and enrollment from primary to high school, an equally weighted (one-third weight each) education index is calculated. This paper establishes an important finding that the education dimension contributes significantly to the HDI and thus gives argument for the importance of considering education in any development index. Various other studies such as by Agostini and Richardson (1997) and Hanham, *et al.* (2002) all evaluate Human Development Indices and consider the education index in their studies. Similarly, Bedi and Ramachandran (2008) consider the HDI for rural Andhra Pradesh, India. In their paper, they attempt to compare methodologies and ascertain the best technique in finding

<sup>1</sup>Noorbakhsh (1998).

a meaningful measure of well-being. They use literacy rate and enrollment ratios in calculating the education index. They compare UNDP's method to the PCA method to conclude the greater benefit of the PCA method in approximating weights according to the variation within data alone.

In an attempt to study the education index in Punjab, Pakistan, it becomes important to consider literature which has already attempted to create the HDI and the EI for Punjab and/or Pakistan. In the case of Pakistan, data has always been a central problem especially for the purpose of the HDI. However, in calculating the education index, obtaining the necessary variables becomes fairly easier. The oldest attempt at measuring well being in Pakistan was in Ghaus, *et al.* (1996) where literacy rate, primary and secondary enrollment was collected from the District Census Reports of 1981. Both the PCA and the Z-sum technique were used to calculate the rankings of districts within the provinces of Pakistan. Jamal (1995) worked on the calculations of a social development index which considered primary, secondary and tertiary enrollment rates for males and females separately while using PCA. Next, the National Human Development Report (NHDR) for Pakistan was published in 2003. Due to lack of data, literacy rate and gross primary enrollment alone were extracted from the Population Census (1998) and Pakistan Integrated Household Survey (1998) and then used to calculate the HDI rankings. Lastly, the latest set of relevant papers is contributed by Jamal and Jahan (2007). This recent work uses literacy rate and combined gross enrollment for the understanding of how rankings and growth have taken place using the EI as a measurement tool.

### 3. DATA SOURCES AND METHODOLOGY

For the calculations of the year 1998, the annual Punjab Development Statistics 1998 Report and the 1998 Population Census were used. For the calculations of 2008, the data that is being used for this exercise is extracted from the recently conducted Punjab Multiple Indicator Clusters Survey (MICS) 2007-08. MICS is a household survey which was first conducted in 2003-04 for the entire country. Recently for the year 2007-08, the MICS was recollected only for Punjab by the Punjab Bureau of Statistics. It holds information of 91,075 households and lists 592,843 members. One great improvement in the collection of the MICS 2007-08 is that this dataset is also representative at the Tehsil level for Punjab. Such a dataset holds immense potential for more detailed work on the development of Tehsils in Punjab.

In order to calculate the intensity of education for each district, the following variables were extracted from the datasets. Enrollment in three age groups of 5-9 years, 10-14 years and 15-24 years which aim to represent primary, secondary and tertiary levels of education are used.<sup>2</sup> The tertiary grades are further divided into tertiary general (arts of science) and tertiary technical (medicine, law, engineering, business, commerce etc). Lastly, literacy is also included in the education index as the number of literate (who are read and write) individuals to the population of 10 years and above.

The first main concern in calculating the EI is deciding which methodology to use to assign weights to the different indices that enter the EI. There is the original method used by UNDP (in the process of calculating the HDI) which is to assign fixed weights.

<sup>2</sup>The classification of indicators is followed from the recent paper by Jamal and Jahan (2007).

The second method that is mostly used in recent literature is the Principal Components Analysis method which assigns weights depending on the variation within the indicators.

Through the first method, the Education Index (EI) is constructed using the two indicators: adult literacy and combined gross enrollment (primary, secondary and tertiary). These indicators are used to create indices by subtracting from the actual values, the lowest goalpost and dividing by the difference between the maximum and minimum goalposts, as shown below. The maximum goalpost for both is 100 percent and the minimum for both is 0; hence, an index is calculated. These two indices are combined to calculate the Education Index.

$$\text{Adult Literacy Index} = \frac{\text{adult literacy value} - \text{min}}{\text{max} - \text{min}} = \frac{\text{adult literacy value} - 0}{100 - 0} \quad (1)$$

$$\text{Combined Gross Enrolment Index} = \frac{\text{enrolment} - \text{min}}{\text{max} - \text{min}} = \frac{\text{enrolment} - 0}{100 - 0} \quad (2)$$

$$\text{Education Index} = \frac{2}{3} (\text{adult literacy index}) + \frac{1}{3} (\text{enrollment index}) \quad (3)$$

The second method by which the EI can be calculated is the Principal Components Analysis method. For this purpose, the following five components are considered: literacy rate, gross primary enrollment, gross secondary enrollment, gross tertiary (general) enrollment and gross tertiary (technical) enrollment. The advantage of the PCA method allows one to generate and assign weights to each component. The manner of generating weights is such that the variable which has the greatest variance will receive the largest weight. These five components are then weighted and added together to compute the Education Index for each district.

Other methodologies used in literature include the zero sum technique and computing the taxonomic distance between indicators [Ghaus, *et al.* (1996)]. These techniques are not used as widely as the UNDP and PCA method. For this paper, both weighting schemes have been used to calculate the EI for 2008. The need for this exercise is to ascertain the difference in both results. The results of both techniques can be compared to show that either method seems to yield similar results in ranking of the EI. As can be seen from Table 1, the groups of bottom and top ten districts remain the same even though the rankings may shift higher or lower by slight dissimilarity. This shows that regardless of the superiority of the PCA method, the UNDP process is reasonable and acceptable for any basic analysis.

#### 4. PUNJAB: EDUCATION STATISTICS

The MICS 07-08 can hold a wealth of information helpful to development of Punjab. The first statistic that is usually reported when evaluating education is the literacy rate. As Table 2 shows, the literacy ratio for Punjab is 59.3 percent. By observation, the Punjab literacy rate is close to the rural literacy rate unlike the urban literacy rate which stands high at 74.6 percent. This suggests that Punjab could possibly be classified as rural at large. The primary gross attendance ratios seem encouraging for Punjab; however, it must be remembered that "gross" measures include enrollment of individuals of all ages.

Table 1

*Comparing PCA and UNDP Methods*

|                 | PCA  | Ranking |                 | UNDP |
|-----------------|------|---------|-----------------|------|
| Rawalpindi      | 67.8 | 1       | Rawalpindi      | 75.6 |
| Jhelum          | 66.8 | 2       | Jhelum          | 73.4 |
| Chakwal         | 65.1 | 3       | Gujrat          | 71.8 |
| Gujrat          | 64.7 | 4       | Sialkot         | 71.3 |
| Sialkot         | 63.3 | 5       | Chakwal         | 71.0 |
| Lahore          | 61.2 | 6       | Lahore          | 70.2 |
| Gujranwala      | 60.5 | 7       | Gujranwala      | 69.6 |
| Narowal         | 60.3 | 8       | Narowal         | 69.3 |
| Attock          | 59.4 | 9       | Mandi Bahauddin | 66.2 |
| Mandi Bahauddin | 58.4 | 10      | Faisalabad      | 65.0 |
| Toba Tek Singh  | 56.2 | 11      | Toba Tek Singh  | 64.8 |
| Faisalabad      | 55.8 | 12      | Attock          | 64.5 |
| Hafizabad       | 55.4 | 13      | Hafizabad       | 62.1 |
| Sahiwal         | 53.2 | 14      | Mianwali        | 60.4 |
| Mianwali        | 52.5 | 15      | Sargodha        | 60.3 |
| Sheikhupura     | 51.4 | 16      | Sahiwal         | 60.2 |
| Sargodha        | 51.2 | 17      | Sheikhupura     | 60.0 |
| Khushab         | 51.0 | 18      | Layyah          | 59.6 |
| Nankana Sahib   | 50.6 | 19      | Multan          | 59.6 |
| Bhakkar         | 50.3 | 20      | Khanewal        | 59.2 |
| Multan          | 50.1 | 21      | Nankana Sahib   | 59.2 |
| Layyah          | 48.9 | 22      | Khushab         | 59.1 |
| Khanewal        | 48.8 | 23      | Bhakkar         | 58.9 |
| Okara           | 48.7 | 24      | Pakpattan       | 57.5 |
| Kasur           | 48.6 | 25      | Okara           | 57.5 |
| Pakpattan       | 48.1 | 26      | Kasur           | 57.4 |
| Vehari          | 47.9 | 27      | Vehari          | 55.6 |
| Jhang           | 45.1 | 28      | Jhang           | 55.1 |
| Bahawalnagar    | 45.1 | 29      | Bahawalnagar    | 54.6 |
| Lodhran         | 43.0 | 30      | Dera Ghazi Khan | 54.2 |
| Bahawalpur      | 40.6 | 31      | Lodhran         | 52.6 |
| Dera Ghazi Khan | 40.1 | 32      | Muzaffargarh    | 52.4 |
| Muzaffargarh    | 39.6 | 33      | Bahawalpur      | 51.5 |
| Rahim Yar Khan  | 37.5 | 34      | Rahim Yar Khan  | 50.3 |
| Rajanpur        | 34.8 | 35      | Rajanpur        | 48.4 |

Table 2

*Education Profile for Punjab*

|   | Punjab | Male  | Female |
|---|--------|-------|--------|
| Literacy ratio  | 59.3   | 68.7  | 49.5   |
| Rural   | 52.0   | 63.5  | 40.0   |
| Urban   | 74.6   | 79.6  | 69.4   |
| Primary school gross attendance ratio                         | 97.2   | 101.6 | 92.5   |
| Primary school net attendance ratio                           | 52.9   | 54.0  | 51.8   |
| Secondary school net attendance ratio                         | 28.7   | 29.6  | 27.8   |
| Percentage of secondary school age children attending primary | 43.4   | 46.3  | 40.4   |
| Government and private primary school attendance rate         |        |       |        |
| Govt.   | 55.9   | –     | –      |
| Private   | 43.0   | –     | –      |
| Madrassa  | 0.2    | –     | –      |

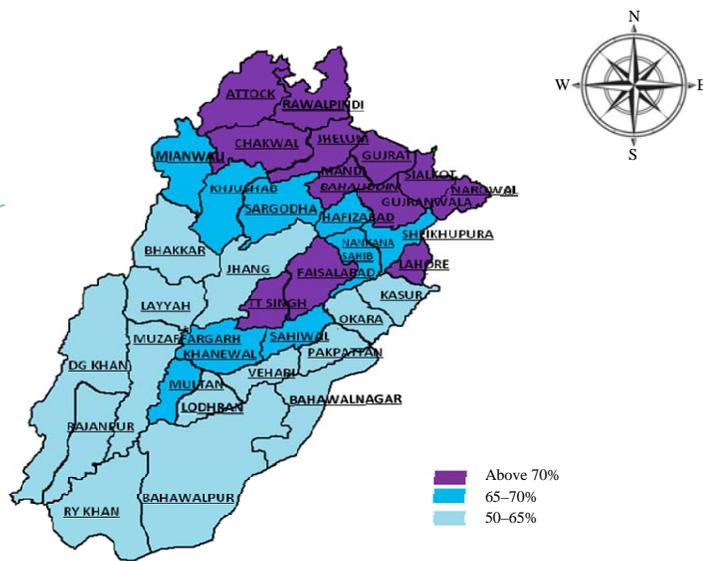
The third statistic on the primary net attendance ratio shows that only approximately 53 percent of eligible population is attending primary school. The rest of the attendees would be students who are older and are not of the eligible population for primary school. Only 29 percent of eligible individuals are attending secondary school and consequently, 43 percent of eligible students for secondary school are actually attending primary school instead. These simple figures for Punjab are important in helping establish how effectively the student population is enrolled in schools. The last indicator shows the division of primary school attendance according to type of school. It seems that the private sector has a very close attendance rate to that of government schools. The large attendance rate of private schools proves its importance in contributing to the education sector of Punjab. District level values for each of the indicators below can give a better focus of the situation as it varies across the province.

## 5. MAIN FINDINGS

Primary schooling has been receiving the most attention in policy circles and has as a result also grown largely through the years. However, it is important that while primary enrollment is an issue so is enrollment at other education levels. Eligible student populations need to be targeted with policies that encourage attendance of eligible grades instead of lower levels of education. Hence, policies that encourage better enrollment at secondary and tertiary education levels will help enhance combined enrollment rates as well.

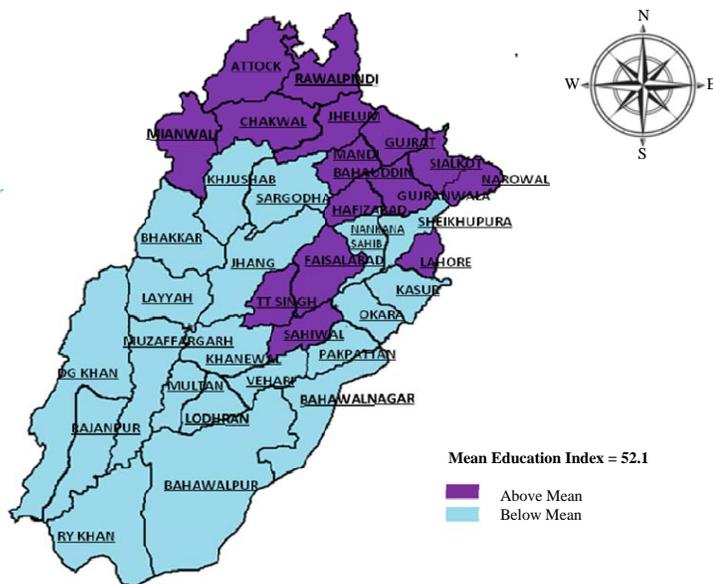
There are some very important considerations that arise from the data in the MICS. A common way of displaying data is in the form of tables; however, a more interesting manner is through color coded maps which help visualise hidden patterns. Consequently, similar maps have been displayed in the Appendix, which help display the results in a far more interesting manner. A compelling result appears consistently. Northern Punjab appears to perform better in all different assessments of education status as compared to Southern Punjab. Figure 1 shows the literacy rate spread for 2008 for all the districts of Punjab. It is clear that the districts which lie in the north of Punjab exhibit

**Fig. 1. Literacy Rate for Punjab MICS 2007-08**



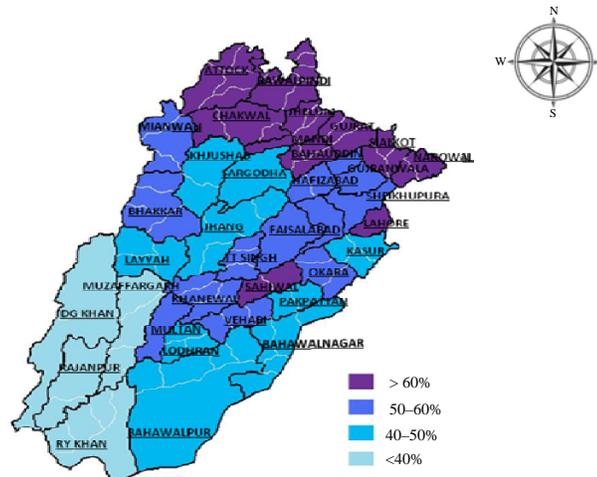
a higher literacy rate compared to the south of Punjab. Even within the southern districts of Punjab the lowest literacy rate does not fall below 50 percent. This same pattern is seen within the 2008 EI for districts: most of the northern districts appear to have an EI which is above the mean (Figure 2). This seems to hold with common understanding of the development of districts in Punjab.

**Fig. 2. Districts above and Below EI Mean (2008)**



Primary enrollment and education has always been a major goal of the World Bank. Hence, it is important to consider net primary enrollment rates in Punjab. Figure 3 shows that southern districts have around 40 percent or lower net primary enrollment ratios. This is a cause for concern for district governments. When comparing male and female enrollment ratios, strikingly, not all of the northern districts seem to have less than 0 percent difference (Figure 4). Only districts in the north-east and DG Khan show very small differences between male and female enrollment ratios (Figure 4). However when considering Punjab, the difference in education attainment between genders appears to be a serious situation even with continuous growth and development.

**Fig. 3. Net Primary Enrolment Ratios (5–9 Years) MICS 2007-08**



**Fig. 4. Percentage Difference in Male and Female Enrolment Ratios MICS 2008**

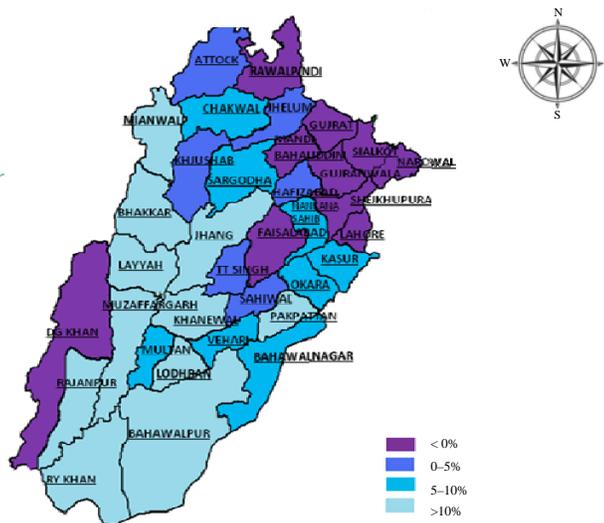




Fig. 6. Difference in Rural and Urban EI MICS 2008

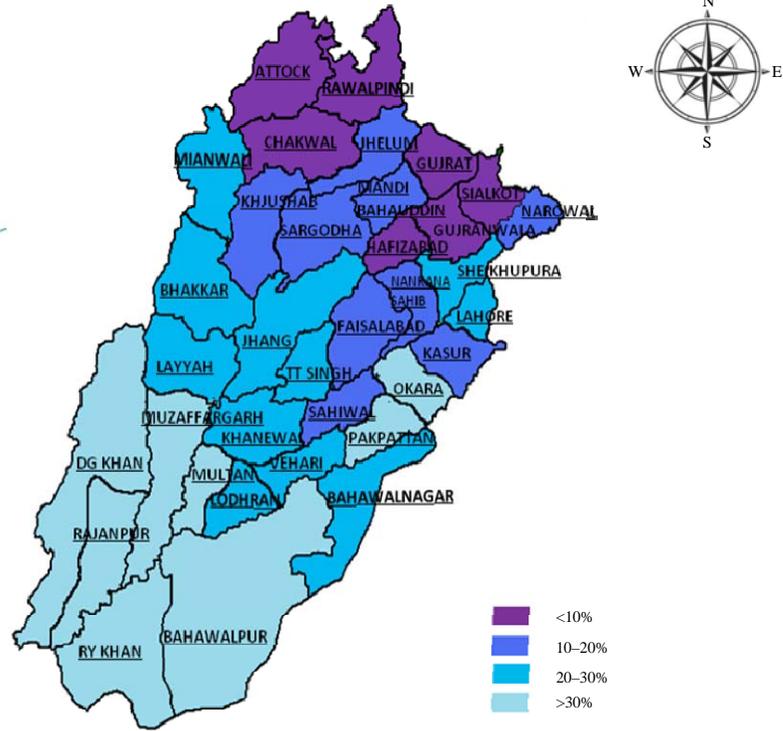
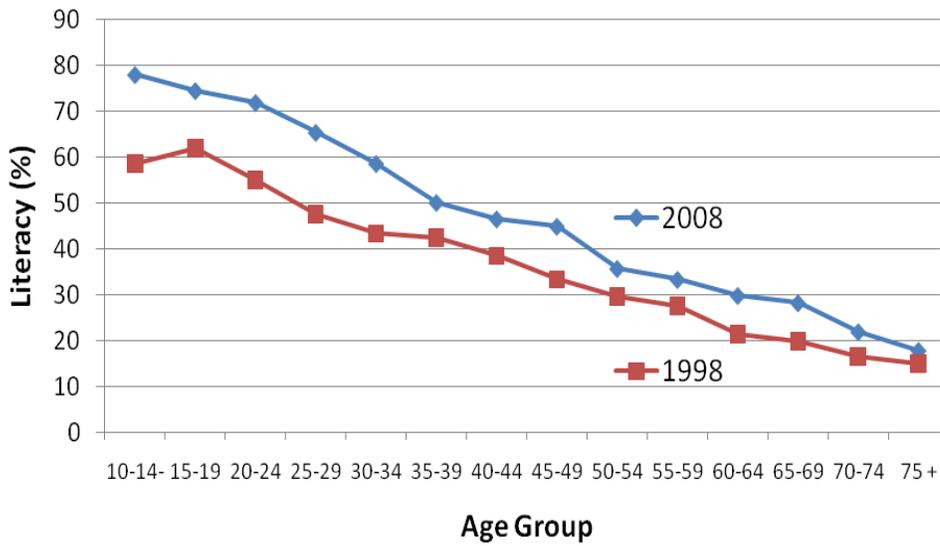
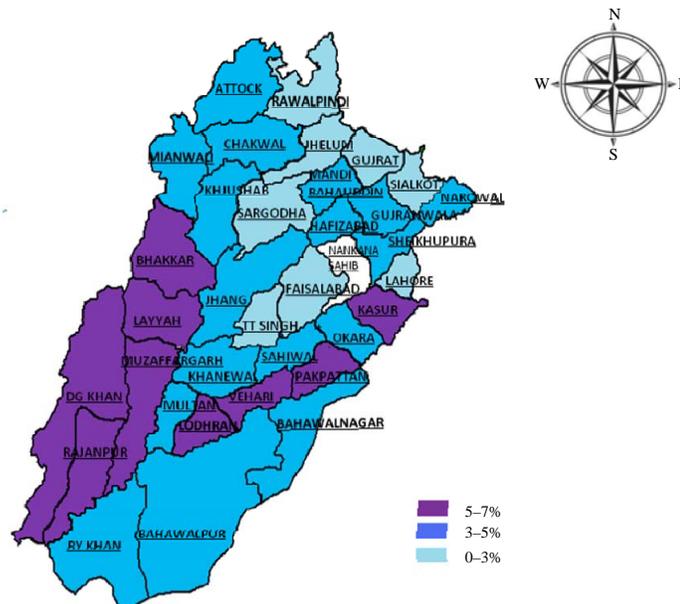


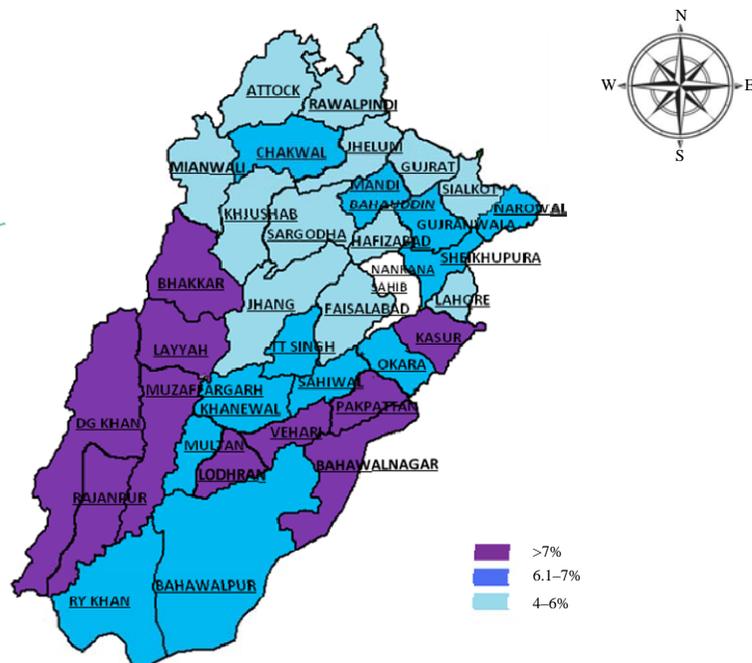
Fig. 7. Literacy Age Profile



**Fig. 8. Annual Growth Rate in Education Index**



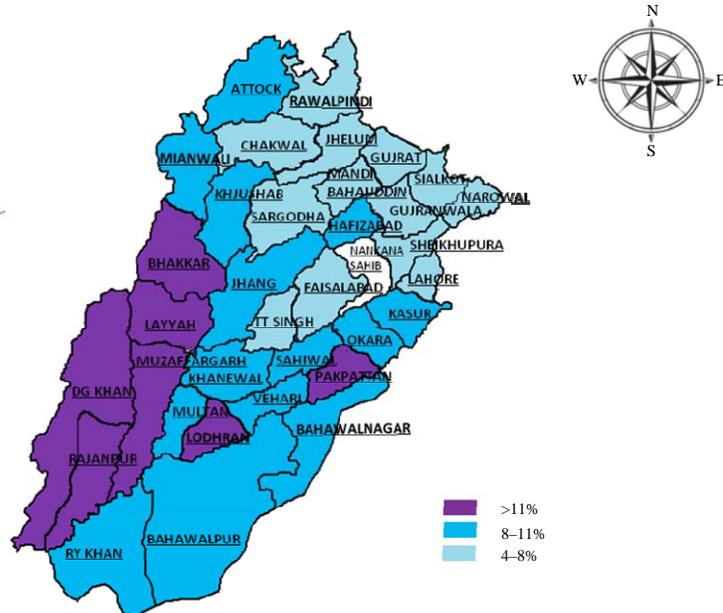
**Fig. 9. Annual Growth Rate in Male Education Index**



Also, the EI for females has seen larger annual growth rates than the growth rates of the EI for males. When comparing the years 1998 to 2008, it becomes clear that the spread of education status and intensity has hardly changed. There has been growth across the province which has yielded a somewhat “catch-up” effect for the southern districts. By

catching up, southern districts have been able to achieve higher literacy rates and enrollment rates which were reflective of the Northern provinces only a decade ago. Nonetheless, the relative pattern of education spread across Punjab seems hardly altered in the last ten years which implies that continuous construction and estimation of the Education Index might remain futile for the future. It is possible that such a pattern is entrenched due to historical and institutional forces within the province. The persistent pattern and divide between the northern and southern districts of Punjab is also reinforced by comparing Figure 2 and Figure 10.<sup>3</sup>

**Fig. 10. Annual Growth Rate in Female Education Index**



This discussion can be extended to estimate education status for the next ten or so years. If the respective average annual growth rate between 1998 and 2008 is assumed to remain constant in the future for each district, it is possible to estimate the value of the EI in 2018 and further. Since the pattern is the same across Punjab, this estimation seems a possible result for reflection. Table 3 shows these estimation results. Estimated EI values of 2018 and 2020 indicate that the literacy and enrollment levels, especially for the bottom ten, will increase considerably to reflect EI values in between 75-90. By projection, the possible education status of the districts in the future can be observed; however, achieving this education status by the proposed years is another task. For this to take place, the average annual growth rate must be sustained which will require simultaneous growth in the supply and demand of education. This responsibility of providing the supply of education will need to be shouldered between both the private and the government.

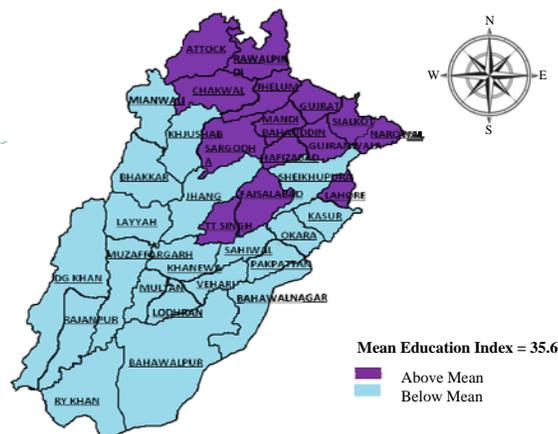
<sup>3</sup>Figures 2 and 10 have been replicated in Figures 11 and 12 with a slight alteration. Figures 11 and 12 show a north and south divide with respect to the median of the Education Index instead of the mean as in Figures 2 and 10.

Table 3

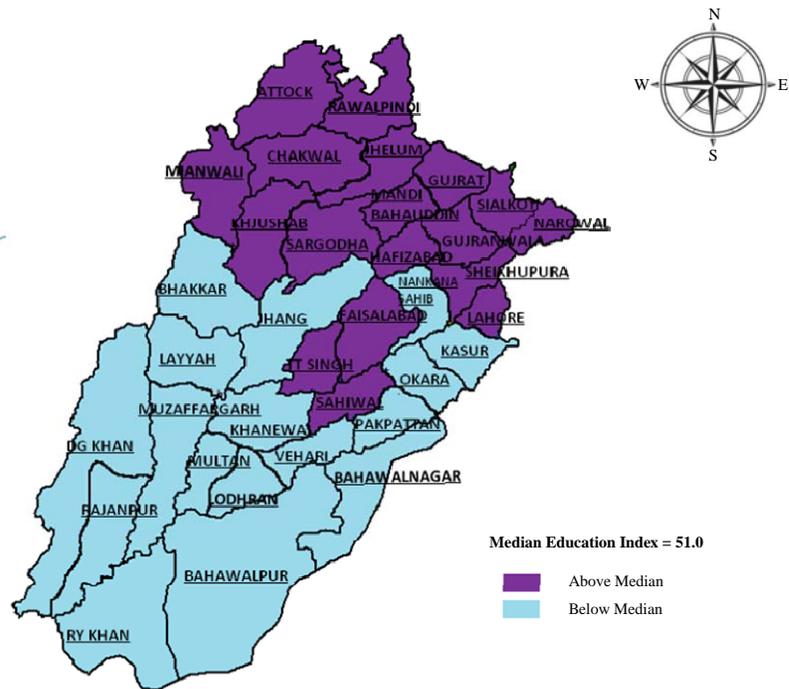
Education Index Projections

|                 | Average Annual Growth 98-08 | Projections |       |
|-----------------|-----------------------------|-------------|-------|
|                 |                             | 2018        | 2020  |
| Attock          | 3.9                         | 86.8        | 93.6  |
| Bahawalnagar    | 4.8                         | 71.9        | 78.9  |
| Bahawalpur      | 4.6                         | 63.8        | 69.9  |
| Bhakkar         | 6.5                         | 94.1        | 106.7 |
| Chakwal         | 3.6                         | 92.4        | 99.2  |
| Dera Ghazi Khan | 7.0                         | 78.7        | 90.1  |
| Faisalabad      | 2.7                         | 72.6        | 76.5  |
| Gujranwala      | 3.2                         | 83.0        | 88.4  |
| Gujrat          | 2.0                         | 78.9        | 82.1  |
| Hafizabad       | 3.7                         | 80.1        | 86.2  |
| Jhang           | 3.9                         | 66.1        | 71.4  |
| Jhelum          | 1.9                         | 81.0        | 84.2  |
| Kasur           | 5.2                         | 80.7        | 89.2  |
| Khanewal        | 4.8                         | 77.6        | 85.1  |
| Khushab         | 4.4                         | 78.6        | 85.7  |
| Lahore          | 1.6                         | 71.7        | 74.0  |
| Layyah          | 5.6                         | 84.3        | 94.0  |
| Lodhran         | 6.5                         | 80.7        | 91.5  |
| Mandi Bahauddin | 3.6                         | 83.1        | 89.2  |
| Mianwali        | 4.0                         | 77.6        | 83.9  |
| Multan          | 4.3                         | 76.6        | 83.4  |
| Muzaffargarh    | 6.6                         | 75.0        | 85.2  |
| Nankana Sahib   |                             | 50.6        | 50.6  |
| Narowal         | 3.7                         | 87.0        | 93.6  |
| Okara           | 4.6                         | 76.3        | 83.4  |
| Pakpattan       | 6.2                         | 87.5        | 98.6  |
| Rahim Yar Khan  | 4.5                         | 58.5        | 63.9  |
| Rajanpur        | 7.1                         | 69.3        | 79.6  |
| Rawalpindi      | 1.0                         | 75.2        | 76.8  |
| Sahiwal         | 4.6                         | 83.3        | 91.0  |
| Sargodha        | 2.7                         | 66.9        | 70.5  |
| Sheikhupura     | 3.9                         | 75.3        | 81.2  |
| Sialkot         | 2.0                         | 77.5        | 80.7  |
| Toba Tek Singh  | 2.9                         | 74.9        | 79.3  |
| Vehari          | 5.5                         | 81.4        | 90.6  |

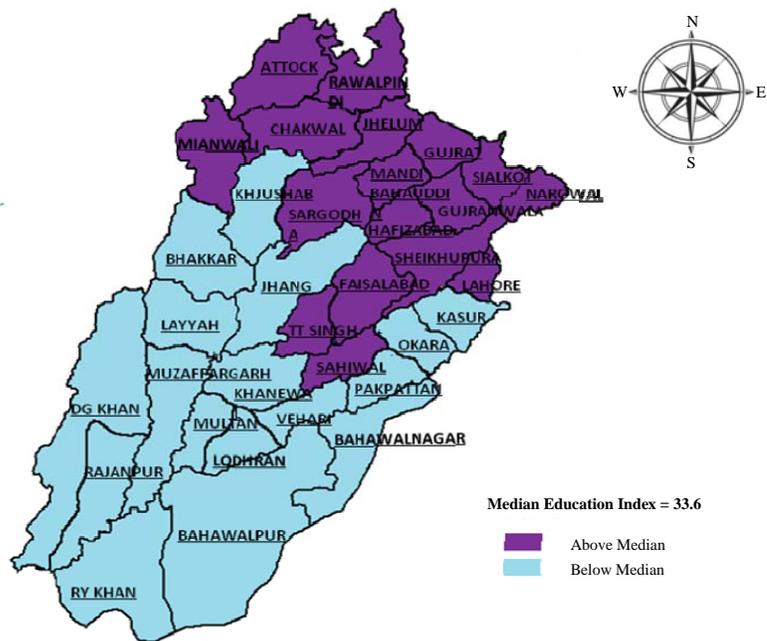
Fig. 11. Districts Above and Below EI Mean (1998)

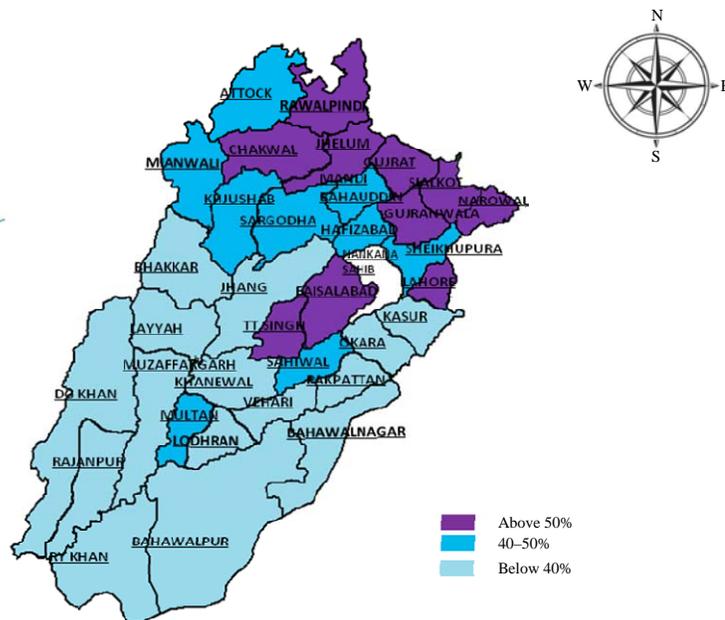


**Fig. 12. Districts Above and Below EI Median MICS 2008**



**Fig. 13. Districts Above and Below EI Median 1998**



**Fig. 14. Literacy Rate for Punjab 1998 Census**

## 6. FURTHER THOUGHTS AND CONSTRAINTS

Based on the observations and results, very interesting concerns arise. The projections show that districts have the possibility of attaining a higher education index in the future but this does not necessarily indicate that universal primary education will be achieved by any target year. If it is possible to achieve universal primary education by a target year, then a certain growth would need to be sustained and once more, it may not be realistic to sustain the growth rate required. Perhaps hopes become too high by observing the growth in the EI in the last ten years. This encouraging growth could possibly be due to the very low initial state of education in these districts. Also, as the 1998–2008 comparison shows a persistent pattern, it is possible that regardless of the fast growth in western and southern districts, the “catch-up” will never truly take place due to institutional, geographical and economical differences. This implies that the education status of western and southern districts may be at or close to its peak. It is also important to keep in mind that the education index itself has drawbacks. The Education Index remains a measure of average achievement and conceals disparities. It does not capture other economic, social, cultural aspects that shape the demand and supply of education across regions. Hence, completely relying on the EI for policymaking is not a proper solution to the inherent issues in the education system of Punjab.

Regardless of the various uncertainties that arise, it is clear that primary enrolment has significantly increased over the decade and thus pulled up education levels. For further development of secondary and tertiary schooling, the incentive structure of families and children based on geographic location needs to be evaluated and targeted. Within areas of Punjab and the rest of Pakistan, rural/urban and male/female and other district level influences need to be reconsidered for better policies.

## 7. CONCLUSION

Considering education indices from different angles is only a window into the numerous issues which need to be improved. A district-level analysis alone can help identify districts and their relative weaknesses. In order to carry the evaluation further, it is important to use data for a more in depth tehsil-wise analysis of each district. The same district case extensions can shed light on the differences between tehsils within a district. This presents a wonderful opportunity to establish further vulnerabilities of a district. Many problems exist that are associated with supply and demand for education at different levels, rural/urban areas and between different genders. In reality, attempts have been made through various policies to alleviate supply and demand side hindrances. However, very few policies are actually assessed post implementation for improvement purposes. Therefore, it is important to see that along with implementation, continuous reevaluation and readjustment is key to true development in the education sector across Punjab and Pakistan.

## REFERENCES

- Agostini, S. J. and S. J. Richardson (1997) A Human Development Index for U.S. Cities: Methodological Issues and Preliminary Findings. *Real Estate Economic*, 25:1, 13–41.
- Asian Development Bank (2002) *Poverty in Pakistan—Issues, Causes and Institutional Responses*.
- Bedi, J. and H. Ramachandran (2004) Human Development Index for Rural Andhra Pradesh, National Council of Applied Economic Research. (Working Paper No. 99).
- Buchanan, G. and M. Neri (2008) The Brazilian Education Quality Index (IDEB): Measurement and Incentives Upgrades, Centre de Politicas Sociais (CPS).
- Ghaus, A., H. Pasha, and R. Ghaus (1996) Social Development Ranking of Districts of Pakistan. *The Pakistan Development Review* 35:4.
- Hanham, A. C., S. Brehanu, and S. Leveridge (2002) A Human Development Index for West Virginia Counties. (Research Paper 2005). Centre for Community, Economic and Workforce Development. West Virginia University Extension Service.
- Jamal, H. and A. Jahan (2007) Education Status of Districts: An Exploration of Inter-temporal Changes. Social Policy and Development Centre, Karachi. (Research Report No. 71).
- Jamal, H. and A. Jahan (2007) Trends in Regional Human Development Indices. Social Policy and Development Centre, Karachi. (Research Report No. 73).
- Jamal, H. (1995) Social Development and Economic Growth: A Statistical Exploration. Research Paper Series, Social Policy and Development Centre, Karachi.
- Jordan, J. (2008) Constructing a Human Development Index for Georgia's Countries. University of Georgia, FS-04-08.
- Noorbakhsh, F. (1998) The Human Development Index: Some Technical Issues and Alternative Indices. *Journal of International Development* 10, 589–605.
- Slottje, D. (1991) Measuring the Quality of Life Across Countries. *The Review of Economics and Statistics* 73:4, 684–593.
- Stanton, E. (2007) The Human Development Index: A History. Political Economy Research Institute, University of Massachusetts Amherst. (Working Paper Series, Number 127).
- Wasti, A. and M. Siddiqui (2002-2008) Development Rank Ordering of Districts of Pakistan: Revisited. *Pakistan Journal of Applied Economics* 18:1&2.

## Comments

The paper addresses an important area of human development—status of education—that determines the economic and social well-being of people. This study attempts to assess the educational progress at district level in Punjab during the period 1998-2008. Literacy rates and enrolment rates are widely used indicators to measure progress in education which requires accurate and reliable data on education by levels, age, and other related characteristics. Using two methods of weighting schemes, the author has calculated a composite Education Index (EI) estimated from data on literacy and combined gross enrolment rates (primary, secondary and tertiary) drawn from the 1998 census, Punjab Development Statistics 1998, and the Multiple Cluster Survey (MICS), 2008 to evaluate educational progress in Punjab—a province with a relatively better education profile than the other provinces.

The study provides some useful insights into progress achieved in education during the decade of 1998-2008 at district level—the information needed for policy direction and financial allocations and can help identify districts in need of further evaluation. The results presented through GIS mapping have their own value in terms of giving ‘at a glance’ picture at district level variations and get clear message for further actions.

Different approaches and methods have been used to measure human development, its ranking and educational development, each having its own merits and limitations. The Education Index (EI) used in the study to measure the spread and variability in education also has limitations as it gives only an aggregate picture of the state of education concealing the large urban-rural and gender gaps and related issues. Moreover, the weighting schemes used to measure the index is subject to inherent biases in the data used on literacy and enrolments. Gross enrolment rates used in measuring Education Index are likely to be overestimates of actual school attendance by level and specific age as has been observed in enrolment data collected from surveys and many studies done on enrolment data analysis. Moreover, the census and survey data on enrolments has its own limitations for making comparisons owing to their different methodologies and concepts used for education data, and may have questions on the reliability of the data from two different sources which have not been discussed by the author in the analysis and interpretation of results.

The findings show that patterns of education progress for districts have not changed much during the period 1998-2008 and this has been attributed to small variation in education over the years—a reason not sufficient enough to explain the district level education pattern as educational attainment is affected by a number of supply and

demand factors. Moreover, owing to the lagging position of girls in educational attainment in Pakistan—a factor affecting the overall education progress including Punjab province—it would be useful to have a gender analysis of data and assess the order of education and prevailing gaps constraining further progress. Overall, the analysis presented does not give enough information for specific policy interventions except for getting the picture at aggregate level.

**Nausin Mahmood**

Pakistan Institute of Development Economics,  
Islamabad.

## Measuring Impact of Education and Socio-economic Factors on Health for Pakistan

ZAHID ASGHAR, NAZIA ATTIQUE, and AMENA UROOJ

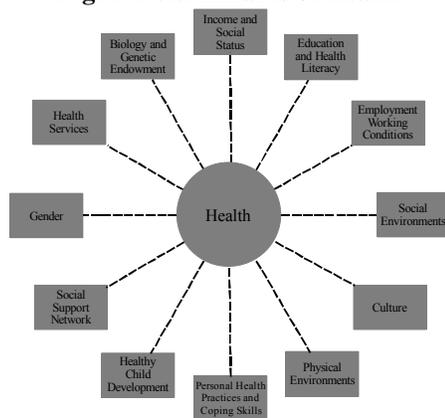
### 1. INTRODUCTION

It is a common understanding that people with higher level of education lead a more healthy life due to their enhanced level of awareness compared to the less educated individuals. Two important prerequisites for an effective health policy are; monitoring and forecasting the population's health and its health determinants. Health of any individual or that of a society or community is not dependent on a particular single factor. In fact it is the product of the interaction of our environments, socio-economic status, psycho-social conditions and cultural norms and beliefs with our genetic inheritance. "The social conditions, in which people live, powerfully influence their chances to be healthy. Indeed factors such as poverty, social exclusion and discrimination, poor housing, unhealthy early childhood conditions and low occupational status are important determinants of most diseases, deaths and health inequalities between and within countries" [WHO (2004)].

The research on the subject reveals that people belonging to different socio-economic groups experience different levels of health, whereas the factors that lead to different health conditions need to be identified. [Wilkinson and Marmot (2003)].

The 'social determinants' are the socio-economic conditions of the people which determine their health. WHO and other health organisations have identified these determinants; which are illustrated in Figure 1.

**Fig. 1. Determinants of Health**



Zahid Asghar <z\_asgar@yahoo.com> is Assistant Professor at Statistics Department, Quaid-i-Azam University, Islamabad. Nazia Attique <naziattique@gmail.com> is Research Executive, OASIS Insights Islamabad. Amena Urooj <dayashka@gmail.com> is Assistant Professor at the Pakistan Institute of Development Economics, Islamabad.

Studies reveal that schooling is associated with several non-market outcomes. Among these non-market returns to schooling, there has recently been a growing interest in the health returns and is believed that besides human capital, health capital also emerges from the education. So it is important to analyse whether education policies help to improve health. The subject study is aimed at estimating the effect of education on health in particular and exploring the relation between health and some other social factors in general in Pakistan. The study has two main objectives; first to elucidate and analyse the effect of education, gender, occupation etc. on health; second to understand the mechanism, by which education, gender and other socio-economic factors can profoundly affect the health status of an individual.

Keeping the objectives of the study we focus on the relation from socio-economic factors to health by applying general linear model in multivariate framework. This is of tremendous importance for our understanding of determinants of health as well as for our understanding of how schooling affects and shape individual lives.

The study is outlined as: In Section 2 brief review of the issue is discussed. Section 3 describes the data and the methodological frame work applied in the study. Section 4 consists of the exploratory data analysis of the variables. Section 5 is about the use of ordinal logistic models, along with the empirical analysis of the estimation techniques used, and finally we conclude the study.

## 2. REVIEW OF LITERATURE

Since long, it has been observed and documented that the educational differences have great impact on health status. Grossman (1972, 1975) has deeply explored the correlation between education and health. Over the decades, a number of important mechanisms are proposed through which direct or indirect influence of schooling on health can be studied. The impact of past health on current health and years of formal schooling is studied by Grossman (1975) where he uses a recursive model to identify the causal relationship between education and health. In his model, health capital is measured in terms of Self-reported Health (SRH) and it is shown that with past health, keeping other variables constant, schooling has a positive and significant effect on present health.

Health disparities between better and less well educated people often increase when a new health technology is introduced. Health disparities between better and less well educated people often increase when a new health technology is introduced [Case (2001)].

Treating schooling as endogenous to health suggests that most of the correlation between schooling and health is attributable to unobserved heterogeneity except possibly at low levels of schooling for individuals with low cognitive ability [Christopher and Sidhu (2005)]. They also identify the role of cognitive ability in the health education relation and shows that both schooling and ability are strongly associated with health at low levels but less related or unrelated at high levels. Arendt (2001) analysed the extent to which heterogeneity in health and endogeneity of education explained the gradient in health. By making use Self-reported Health (SRH), Body Mass Index (BMI) and indicators for high blood pressure and never been smoking, he shows that education is related to SRH when controlling for the three other health measures, which can be interpreted as inputs in health production. The diverse demographic and socio-economic

conditions and the availability of educational facilities affect the extent of heterogeneity in health and health related quality of life. Shumueli (2003) decomposed the demographic and socioeconomic factors to study this heterogeneity.

The complex multidimensional structure of health has been of keen interest for researcher since years. Using the demographic and socio-economic factors, attempts of identifying the complex relation of health and education have been made. Fuchs (2004) observes that there are considerable uncertainties concerning the socio-economic correlates of health, the extent to which they reflect causal chains and their implications for policy and studies the possible reasons for this uncertainty. The inequality in health from the perspective of socio-economic factors is analysed in a study by Syed, *et al.* (2006), in which he has considered two ethnic groups and has found a large diversity of SRH and prevalence of diabetes and distress among the ethnic groups.

The possibility of a causal relationship between education and health is explored by [Arendt (2005)]. Along with SRH, the study includes BMI and an indicator of never been smoking as supplemental outcomes. The study shows that education is associated with better SRH for both men and women. In an attempt to investigate the direct relationship between education and health, Cutler and Lleras (2007) find that better educated individuals have more positive health outcomes even after controlling for job characteristics, income and family background. Ardent (2008) articulates this causal relationship in terms of hospitalisation and finds the significant effect of increase in education on decrease in hospitalisation especially for females. Evidence for a causal relationship running from better schooling to better health can be found in an investigation conducted by Silles (2009). In which by relying on changes in educational participation caused by raising the school the minimum school-leaving age, also provides evidence of the causal effect of schooling on health.

Cutler, *et al.* (2005) described that the link between social status and health as complex, perhaps too complex for a single explanation. Discussing the direct causal mechanisms running from income to health, they have pointed that the link between income and health is a result of the latter causing the former rather than the reverse. There is most likely a direct positive effect of education on health but there are no well stated causal mechanisms.

Hartong and Osterbeek (1998) have studied the returns to education in terms of health status, financial wealth and happiness, and have concluded that IQ independently affects health status, even after controlling for schooling. Returns to education have also been calculated by relating the value of health gain to the average income per capita [Groot and Brink (2007)]. The effect of education on health is analysed by giving some tests for causality, and control for unobserved heterogeneity; it is found that of gender, the education and the number of years of education have a positive effect on the quality of education.

Cutler and Richardson (1998) measured the change in health capital by age, gender, race and income and concluded that measuring changes in health by income or education is more difficult than by measuring it by race and gender. More insight in the size of the quality of health effect can be obtained by relating the value of the health gain to the average income per capita.

Costa and Uchôa (2004) determined the factors associated with self-rated health among adults, considering five dimensions of socio demographic variables. And it has been observed that self-rated health among older adults is multidimensional in structure, being influenced by socioeconomic conditions, social support, health status (with emphasis on mental health), and access /use of healthcare services but not by the life style.

### 3. DATA DESCRIPTION

The data used in this study is collected under National Health Survey of Pakistan (NHSP 1990-1994). NHSP round II by PMRC is under progress and its data is not available till date. It is a cross sectional survey which comprise of sample of size 19862 collected randomly all over Pakistan. The survey uses three separate questionnaires for children, adult male and adults female simultaneously. It gives detailed Information on several health profile of individual and provides a base for the analysis of determinations of health especially education.

In the NHSP (1990-94), the respondent's health is measured in term of self-reported health (SRH) which is measured on ordinal scale having five categories as excellent, very good, good, fair, and poor. The other variables involved in this study are education level, occupation, social status, age, gender, marital status, residence and province.

SRH is subjective in the medical sense of being a state perceptible to the individual and not to those who observe or examine the individual. It is not subjective in the psychological sense of being moodily introspective or illusory. It reports something real, but directly observable only by the individual reporting [Mirowsky (2003)]. In the last three decades, self-reported health has been used increasingly as a measure in the psychological and gerontological areas, as well as in epidemiological surveys [Lima-Costa and Fernanda Uchao (2004)]. Self-reported health shows good reliability and its validity is equivalent to that of other more complex measures of health status [Idler and Benyamini (1997)]. BMI is a reliable indicator of total body fat, which is related to the risk of diseases and death. It's a useful, indirect measure of body composition because it correlates highly with body fat in most people. Weight in kilograms is divided by height in meters squared ( $\text{kg}/\text{m}^2$ ).

Table 1 gives the description of variables used in this study. The across the sample distribution of the variables used is given in Table 1a which is supported by a detailed descriptive analysis of these variables in Section 4.

It seems that now-a-days, people are better aware off about their health and due to several possible factors majority groups and segmentations of the society are believed to be in weaker conditions. As evident from the whole sample being surveyed, as shown in Figure 2, that most of the people report their health as 'fair' or 'poor'. About 33 percent people report their health as 'good' and only 6 percent (approx) have very good or 'excellent' health. This overall distribution highlights the poor condition of health in the society and emphasises the need of attention in this regard. Hence, it is desired to identify the factors which lead to low health. Therefore, now discussing it in detail, we come across some interesting results related to the relation between education and health.

Table 1

*The Profile of the Study Population (Based on NHSP 1990-94)*

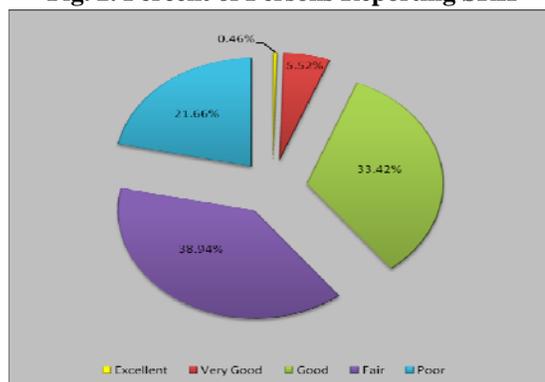
| Variables                         | Description  |
|-----------------------------------|--|
| <b>Health Variables</b>           | <b>Subjective Health</b> We take SRH graded as (1:excellent, 2:very good, 3:good, 4:fair, 5:poor)<br><b>Objective Health</b> Arthritis, asthma, diabetes, hemorrhoids, tuberculosis, heart disease, pain in back, pain in knees, vision problem and dental problem |
| <b>Schooling Variables</b>        | For schooling five different levels of education are taken.<br>i. Less Than Primary<br>ii. Primary But Less Than Middle<br>iii. Middle But Less Than Matric<br>iv. Matric But Less Than Degree<br>v. Degree and Above  |
| <b>Social Status</b>              | It is divided into only two categories high and low  |
| <b>Occupation</b>                 | It includes seven categories employed, self-employed unemployed, work in home, student, disabled and other   |
| <b>Other Background Variables</b> |  |
| Age                               | Age is defined from 20 up to 90 years  |
| Gender                            | Gender is classified as males and females  |
| Marital Status                    | There are three categories, single, married and other  |
| Residence Type                    | It consists of two categories urban and rural  |
| Provinces                         | Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan  |

Table 1a

*Socio-demographic Characteristics of the Sample Population with Descriptive Statistics, NHSP (1990-94)*

| Variables                   | Percentage | Variables              | Percentage | Variables             | Percentage |
|-----------------------------|------------|------------------------|------------|-----------------------|------------|
| <b>Self-reported Health</b> |            | <b>Education Level</b> |            | <b>Age Groups</b>     |            |
| Excellent                   | 0.5        | < primary              | 7.6        | 20-29 years           | 42.7       |
| Very Good                   | 9.2        | Primary but < middle   | 31.4       | 35-39 years           | 27.2       |
| Good                        | 37.6       | Middle but < matric    | 20.5       | 40-49 years           | 15.4       |
| Fair                        | 35.2       | Matric but < degree    | 31.1       | 50-59 years           | 9.4        |
| Poor                        | 17.5       | Degree and above       | 9.4        | 60 years and above    | 5.3        |
| <b>Social Status</b>        |            | <b>Gender</b>          |            | <b>Marital Status</b> |            |
| High                        | 57.2       | Male                   | 70.6       | Single                | 25         |
| Low                         | 42.8       | Female                 | 29.4       | Married               | 72         |
| <b>Occupation</b>           |            | <b>Residence</b>       |            | Others                | 3          |
| Employed                    | 24.7       | Urban                  | 56.5       |                       |            |
| Self-employed               | 28.5       | Rural                  | 43.5       |                       |            |
| Unemployed                  | 1.7        | <b>Provinces</b>       |            |                       |            |
| Student                     | 4.5        | Punjab                 | 50.9       |                       |            |
| Work in Home/ Sick          | 22.7       | Sindh                  | 22.8       |                       |            |
| Disability                  | 3          | Khyber Pakhtunkhwa     | 19.9       |                       |            |
| Other                       | 14.9       | Balochistan            | 6.5        |                       |            |

Fig. 2. Percent of Persons Reporting SRH

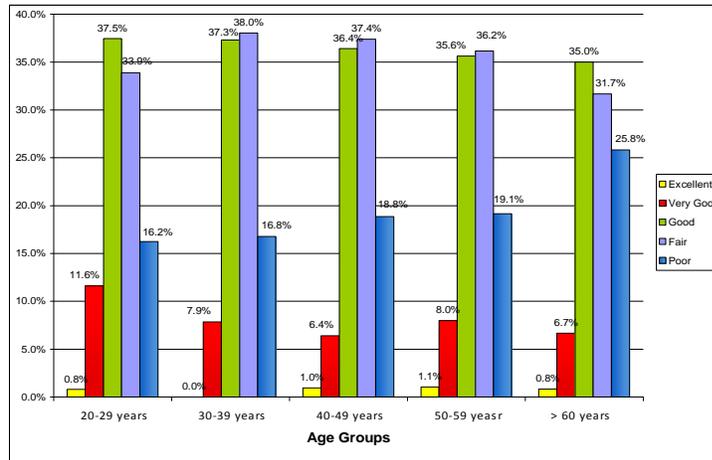


### 4. EXPLORATORY ANALYSIS

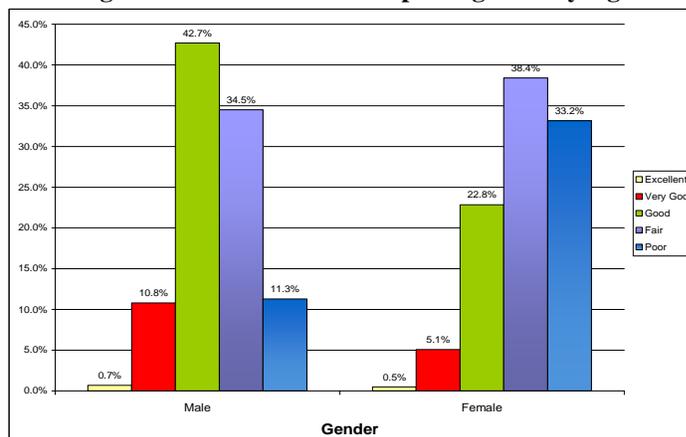
Studying the relationship between the health and education by visually describing the data reveals several interesting aspects. It seems from the graphical display that education, gender play significant role in determining health. There is large variation in the categories of SRH.

According to Figure 3, there is quite large variation among the five categories of SRH over all age groups. However, the category of ‘good’ and ‘fair’ remain stable and almost similar for all age groups. Most of the people from the sample report their health as ‘good’ and ‘fair’. The share of reporting health as ‘poor’ only rises significantly for the people above 60 years of age. From Figure 4, the response of men and women to the SRH reveals significant the gender differentials. The high bars of ‘fair’ and ‘poor’ categories in SRH of females indicate that women report themselves to be in a worse health condition as compared to the men. This may be due to several possible factors/ reasons need to be identified with strong evidence.

**Fig. 3. Percent of Persons Reporting SRH by Gender**

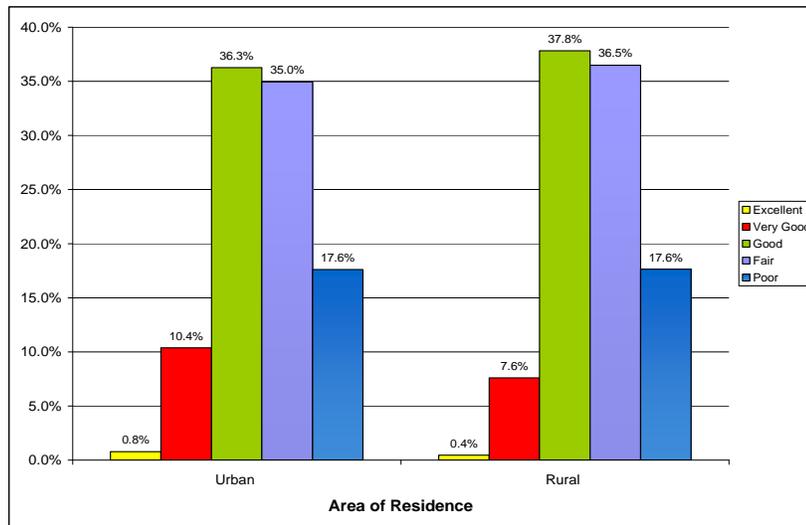


**Fig. 4. Percent of Persons Reporting SRH by Age**

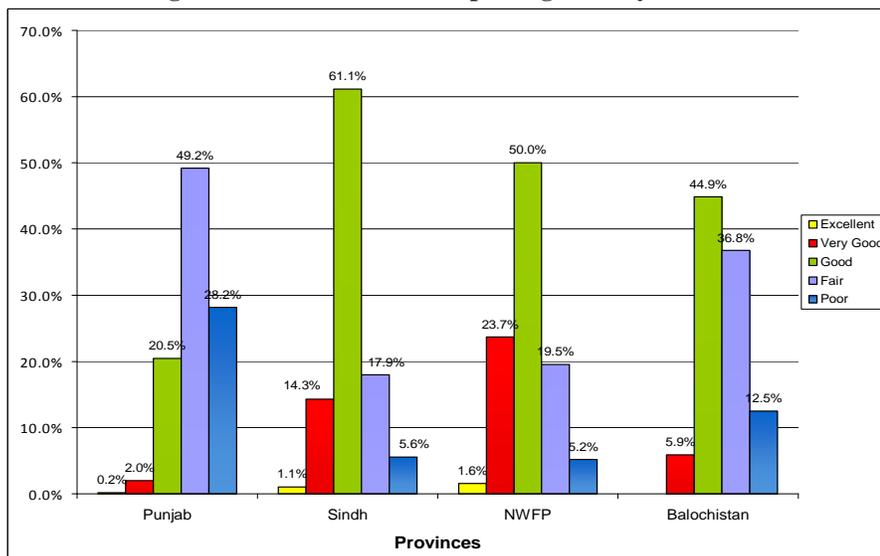


There is a lot of economic and social disparity in urban and rural population but here we do not find any significant pattern in urban-rural area. However, the response pattern is entirely different across the provinces as evident from Figures 5 and 6. It might be due to the lack of awareness about health that a large proportion of sample from Sindh declare them to be in good health. While, major proportion of people from Punjab identifies them to be in the low categories of health. However, evidence is needed to justify this argument.

**Fig. 5. Percent of Persons Reporting SRH by Residence**



**Fig. 6. Percent of Persons Reporting SRH by Province**



The cross tabulation of SRH with respect to education and gender reveals some interesting behaviour patterns. It is evident from the Table 2 that majority of men reported good to excellent health. However, the majority of females lie in the category of fair and poor.

Now we consider the association between education and some more objective measures of health; the self-reported number of chronic conditions. The percentages are shown in Table 3.

Table 2

*Subjective Quality of Health by Education and Gender*

| Education            | Self-reported Health |               |          |          |          |
|----------------------|----------------------|---------------|----------|----------|----------|
|                      | Excellent (%)        | Very Good (%) | Good (%) | Fair (%) | Poor (%) |
| <b>Women</b>         |                      |               |          |          |          |
| < Primary            | –                    | –             | 27.7     | 34       | 38.3     |
| Primary but < Middle | –                    | 1.9           | 14.6     | 36.8     | 46.7     |
| Middle but < Matric  | 0.9                  | 3.4           | 21.4     | 42.7     | 31.6     |
| Matric but < degree  | –                    | 9.8           | 29.9     | 37.4     | 23       |
| Degree and Above     | 4.9                  | 12.2          | 34.1     | 43.9     | 4.9      |
| Total                | 0.5                  | 5.1           | 22.8     | 38.4     | 33.2     |
| <b>Men</b>           |                      |               |          |          |          |
| < Primary            | –                    | 2.8           | 52.8     | 31.1     | 13.2     |
| Primary but < Middle | –                    | 8.5           | 38       | 39.2     | 14.3     |
| Middle but < Matric  | 0.3                  | 5.3           | 43.9     | 38.6     | 11.9     |
| Matric but < degree  | 1.6                  | 12.8          | 41.7     | 34.3     | 9.6      |
| Degree and Above     | 1.2                  | 27            | 49.1     | 17.2     | 5.5      |
| Total                | 0.7                  | 10.9          | 42.8     | 34.3     | 11.3     |

Note: the estimates are based on using study sample (1).

Table 3

*Objective of Health Status by Education*

| Objective Health | Education (Values are in %) |                      |                     |                     |                  |
|------------------|-----------------------------|----------------------|---------------------|---------------------|------------------|
|                  | < Primary>                  | Primary but < Middle | Middle but < Matric | Matric but < degree | Degree and Above |
| Arthritis        | 9.9                         | 45.6                 | 19.8                | 19.8                | 4.8              |
| Asthma           | 9.3                         | 33.3                 | 16.0                | 32.0                | 9.3              |
| Diabetes         | 8.2                         | 26.5                 | 20.4                | 36.7                | 8.2              |
| Hemorrhoids      | 5.5                         | 38.4                 | 23.2                | 24.4                | 8.5              |
| Tuberculosis     | 18.8                        | 28.1                 | 15.6                | 37.5                | 0.0              |
| Heart Disease    | 7.3                         | 29.3                 | 19.5                | 29.3                | 14.6             |
| Pain in Back     | 10.2                        | 41.9                 | 18.6                | 23.8                | 5.4              |
| Pain in Knees    | 9.8                         | 42.9                 | 20.9                | 21.2                | 5.3              |
| Vision Problem   | 6.0                         | 35.8                 | 22.0                | 26.8                | 9.4              |
| Dental Problem   | 9.0                         | 33.6                 | 20.1                | 29.4                | 7.8              |

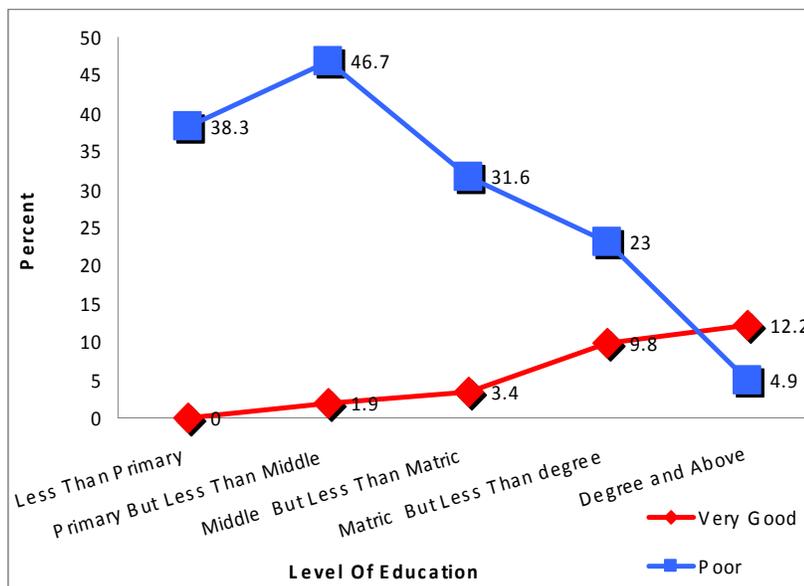
It seems prevalence of the disease or conditions is not same for different levels of education. From the table it can be seen that the individuals having education up to degree level or above have reported lesser diseases as compared to the less educated.

On the other hand, we observe that the ratio of reporting different diseases by individuals having primary or less education is comparatively lower than the other education levels till matric. This may be due to the reason that due to less education and lack of awareness they fail to understand or realise the health problems they face. Some other reasons e.g. financial factors may also play their underlying role here. In general educated persons report the chronic conditions less frequently than less educated persons.

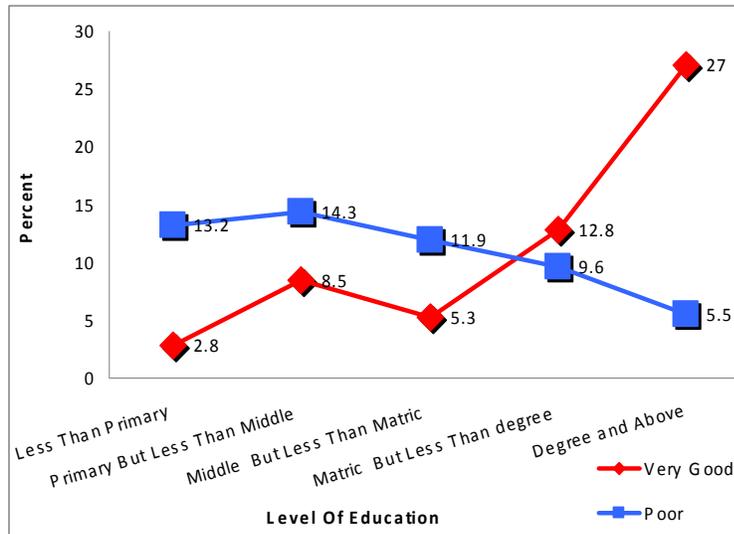
**4.1. Comparison of Different Patterns of Self-reported Health by Education and Social Status**

Now in order to study the effect of education on health status, we make comparison by analysing the pattern of SRH across educational levels. But as noted earlier the response behaviour of men and women are entirely different suggesting that the gender differentials impart a significant effect on health. On comparing the patterns of SRH at different health status, we observe that with the increase in education women are getting more awareness about health as indicated from the decreasing percentage of females under poor social status reporting to be in very good health. However, the pattern is not similar in case of men. The pattern is clear from the Figures 8 and 9 respectively.

**Fig. 8. Pattern of SRH Very Good vs. Poor for Women**

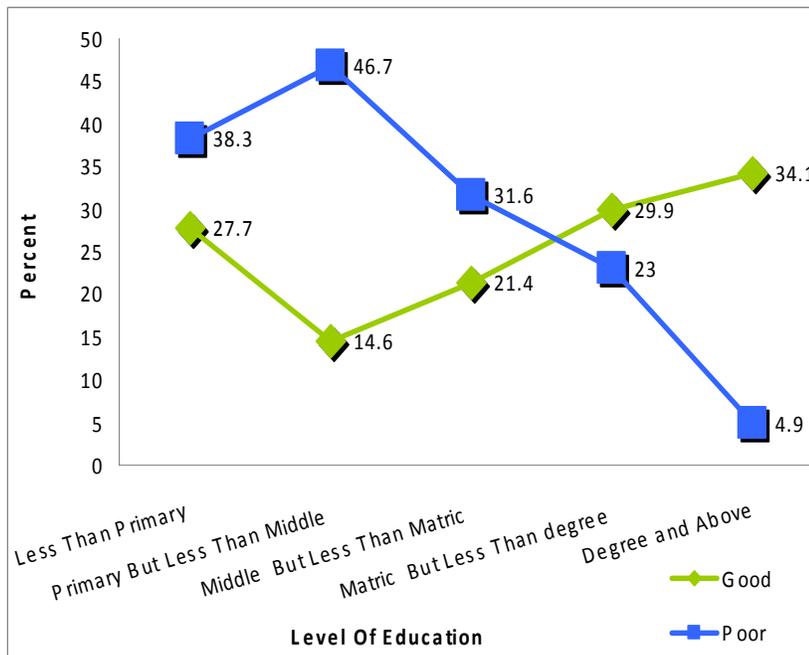


**Fig. 9. Pattern of SRH Very Good vs. Poor for Men**

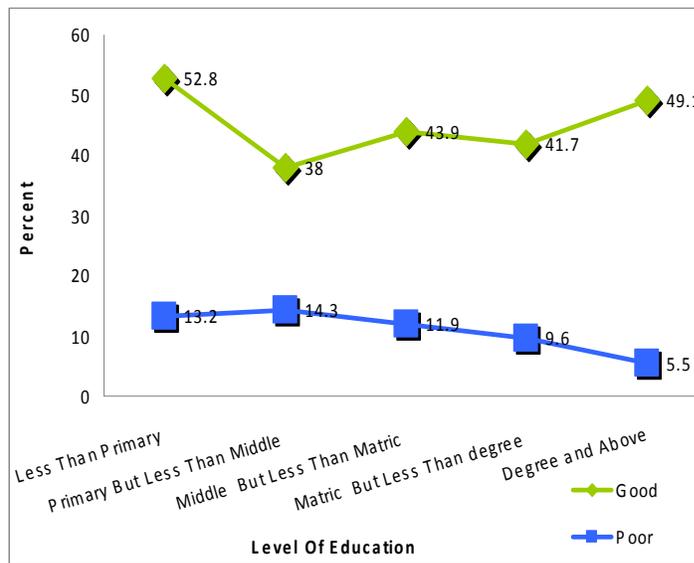


In Figures 10 and 11 we find that as the level of education increases especially above middle there is a very sharp decline in reporting poor health, this decline is steeper in females than in men. However, the increase in reporting very good health is quite gradual for women but is very sharp for men having matric or higher education.

**Fig. 10. Pattern of SRH Good vs. Poor for Women**

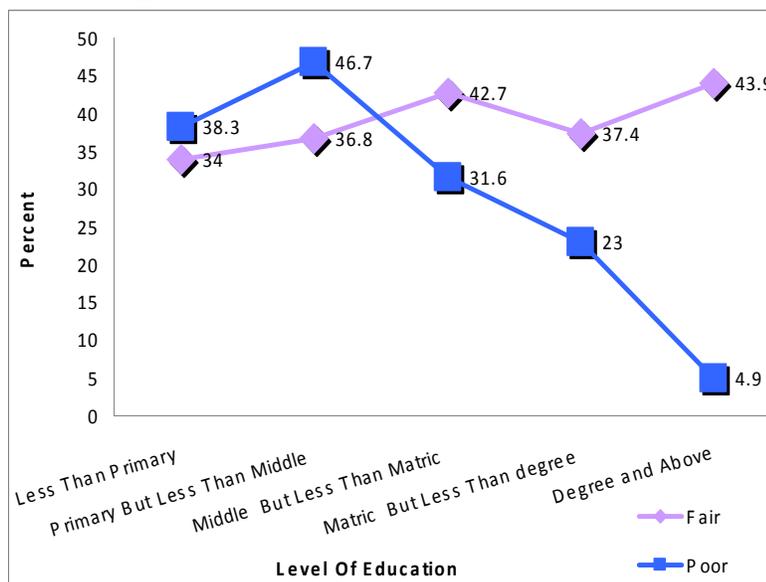


**Fig. 11. Pattern of SRH Good vs. Poor for Men**

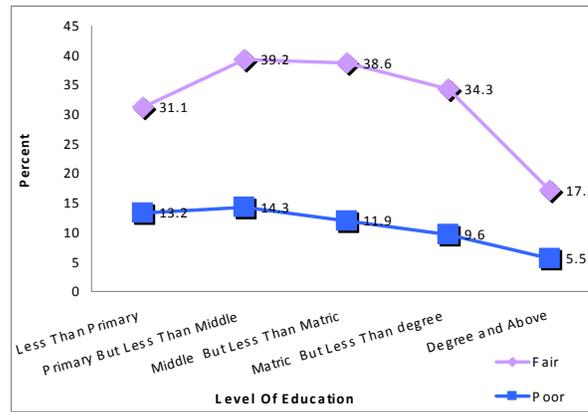


Even in case of declaring their health as good improves with the increase in education. In Figures 10 and 11, on comparing the categories of good vs. poor in SRH, we find very significant role of education in women indicated by sharp increase in good health supported by a sharp decline in reporting poor health among females having middle or higher education. However, the behaviour in men here remains quite stable and the role of education generating awareness etc. is not evident here.

**Fig. 12. Pattern of SRH Fair vs. Poor for Women**



**Fig. 13. Pattern of SRH Fair vs. Poor for Men**



Similarly, reporting health as fair increases with the increase in education among female as evident from Figure 12 and Figure 13. But remarkably, it declines among men. Hence, we may conclude that education plays a significant role in generating awareness about health.

**4.2. Self-reported Health by Body Mass Index**

Now the percentage distribution of the respondents for SRH by body mass index is given as under:

**Fig. 14. SRH Reporting of Persons Belonging to Four Categories of BMI**

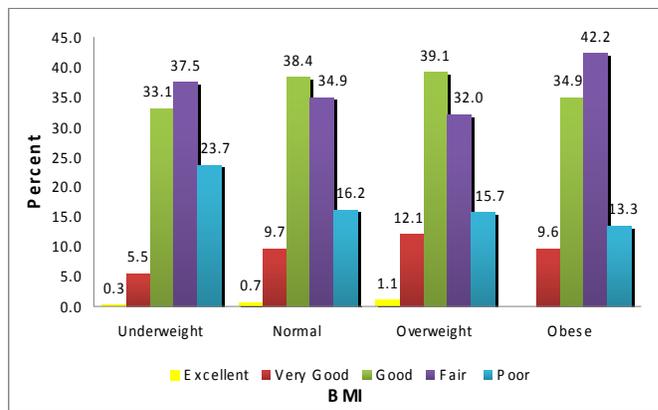


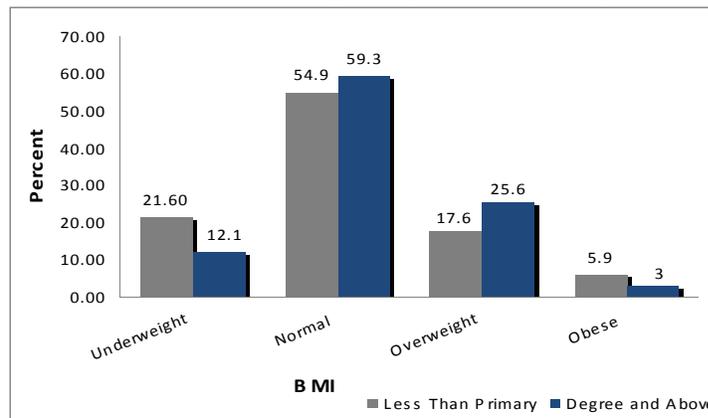
Figure 14 shows the percentage distribution of SRH for each level of BMI. The first thing we observe that though response to an “excellent” health status is at minimal level i.e. 0.3 percent, 0.7 percent and 1.1 percent, but it exist from under weight to over weight respectively. At the same time among obese nobody reports the state of excellent health. Further it seems that there is a gradual increase in the percentage response in favour of “very good” health status. But for the obese it again declines. The overweight

category shows the maximum response of the individuals (39.1 percent), of having “good” health. Again we see that this response increases from underweight up to overweight but again for obese it decrease. So, without the loss of generality, we can conclude here that on the basis of BMI vs. SRH, we can say that reporting different categories of health is close to reality and the general awareness about health has improved. The interesting point here is that people do not consider obesity a disease as evident by the highest bar of ‘fair’ health at the state of obese under BMI.

#### 4.3. Body Mass Index by Education

Now we see the distribution of BMI for only two groups, one is highly educated in our sample and other is poorly educated.

**Fig. 15. Percent of Persons Reporting on BMI Scale by Education**



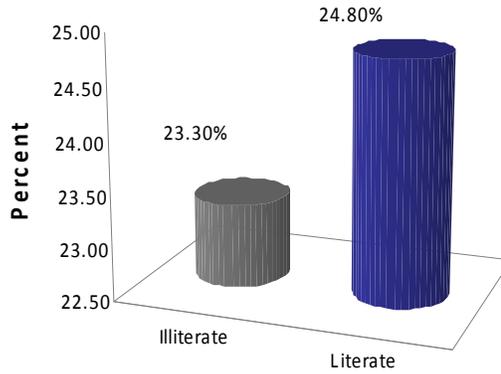
From the Figure15 it is clear that usually less educated appears to report high level of underweight conditions as compared to more educated people. Moreover they are also more obese than the educated persons. About 60 percent of the highly educated persons are healthy. Ignoring some fluctuations these patterns suggest almost negative relationship exist between SRH and BMI, and in BMI and education i.e. with the increase in education people become more aware of their health and hence, we can observe significant change in reporting BMI and health status.

Hence, not only has the general awareness about health had improved enabling them report much better about their health but it also has improved the health conditions as indicated by BMI, that educated people are more concerned about their health and physic.

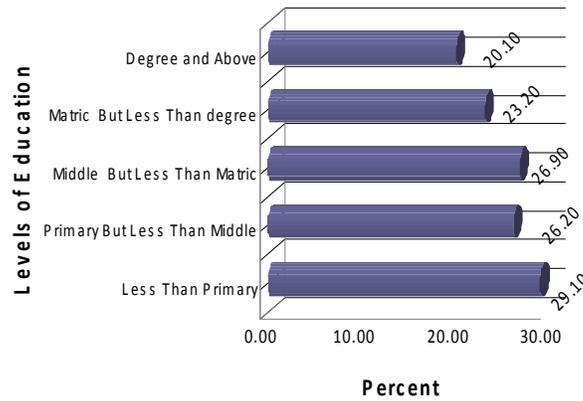
#### 4.4. Health Care Utilisation and Education

We also investigate whether there is any link between health care behaviours and education or not. So for this purpose we make comparison between literates and illiterates. We also illustrate in Figure 16 the behaviour of individuals with in the literate category only. This is based on the response of the persons when they are asked at the time of interview that whether they seek any medical care in the last two weeks before the survey.

**Fig.16. Percent of Persons Seeking Medical Care by Levels of Education**



**Fig. 17. Percent of Persons Seeking Medical Care by Literacy**



From Figure 17, we see that with the increase in level of education, the frequency of seeking any medical care decreases. 29 percent people with education level less than primary seek the medical care, the percentage reduces gradually with an increase in education level and 20 percent with education degree and above seek the medical care.

**5. EMPIRICAL MODEL AND ESTIMATION**

After having descriptive analysis we use ordinal logistic regression models in order to assess the impact of several variables on SRH. We assume that the latent health variable is measured by education,<sup>1</sup> objective health<sup>2</sup> and by some other individual characteristics in the following way:

$$H^* = \beta_0 + H^o\beta_1 + X\beta_2 + \varepsilon$$

<sup>1</sup> Generally the education is included in the model by years of schooling but for this study we use it as dummy variable.

<sup>2</sup> Objective health is also considered as past health.

Where  $\beta$ 's are the vectors of the coefficients and  $C$  is random term capturing unmeasured and immeasurable effects on the true health status. And  $X$  contains the variables i.e. education, occupation or personal characteristic. The subjective health status is taken as dependent variable in the model. As the response variable is measured on ordinal scale, so it is going to be treated as ordinal under the assumption that the levels of SRH have natural ordering ranges from 'excellent' to 'poor', but the distance between adjacent levels are unknown. So for this purpose we have again recoded the data in the following way; "5 excellent, 4 good, 3 fair, 2 poor and 1 very poor" for response variable.

### 5.1. Estimation Results

Specifically, our objective is to estimate the effect of education on health, holding other factors constant. Therefore, taking a closer look at the possible factors and identifying whether they play any significant role in determining the health status. Table 4 presents the results from the estimation of model I to III, model I contains schooling variables, age and gender. Beside education at all levels, gender and age also play a significant role. However, it is interesting to note that the only age group significant here is of 20-29 years old respondents.

Model II contains education, employment level, and social status indicating that the employment level and the socio-economic status play a significant role in determining the subjective health status. Model III is an extension of the model II by including additional individual characteristics i.e. age, gender, marital status, residence type and province. Although controlling for these variables does not alter the significance of education in determining the self-reported health (SRH) but nevertheless the significance of employment status and socio-economic status has changed. Purpose of adding more socio-economic variables in the model II and model III is to make sure that our model should not be misperceived. The marital status and residence type are statistically significant.

Table 5 presents the results from the estimations of model IV where education level and past health are included as regressors. Model IV excludes the insignificant variables and include the objective health measures i.e. disease and conditions, to study their role in determining the self-reported health status. All diseases included as the objective measure of health are significant except the knee pain. It is interesting to note that including the objective health status measure (all diseases) has not hampered the significance of the levels of employment. In model IV the various forms of employment status except the disability are significantly affecting the self-reported health measure. However, the Pseudo  $R^2$  is now reduced. In each of the above considered models we see that by adding more variables the effect of education on SRH remains significant.

Model V contains all socio-economic, past health and education variables. We note that Pseudo  $R^2$  improves in model V as compared to other four possible models. Log likelihood and chi square also support this model over other models. Table 6 presents the results of model V from the estimations of an extensive model containing a large set of potential variables. It can be observed that significance of the category having less than primary education is almost on border line but rests of the categories are highly significant. *As the subjective health variable runs from excellent to poor, a negative sign of the estimate of the coefficients of the explanatory variables indicates that a decrease in the level of the variable is associated with a decrease in the quality of health.*

Table 4

*Ordered Logit Estimates for Health Status*

| Explanatory Variables            | Model I                      |         | Model II                     |         | Model III                    |         |
|----------------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
|                                  | Coefficients<br>(Std. error) | p-value | Coefficients<br>(Std. error) | p-value | Coefficients<br>(Std. error) | p-value |
| < primary                        | -1.275<br>(.213)             | .000    | -1.142<br>(.219)             | .000    | -.868<br>(.231)              | .000    |
| Primary but < middle             | -1.487<br>(.166)             | .000    | -1.331<br>(.173)             | .000    | -.925<br>(.183)              | .000    |
| Middle but < matric              | -1.330<br>(.174)             | .000    | -1.207<br>(.178)             | .000    | -.671<br>(.187)              | .000    |
| Matric but < degree              | -.933<br>(.164)              | .000    | -.858<br>(.165)              | .000    | -.483<br>(.172)              | .005    |
| Employed                         |                              |         | -.534<br>(.143)              | .000    | .035<br>(.164)               | .832    |
| Self-employed                    |                              |         | -.525<br>(.139)              | .000    | .016<br>(.164)               | .924    |
| Unemployed                       |                              |         | -.920<br>(.346)              | .008    | -.790<br>(.366)              | .031    |
| Student                          |                              |         | -.581<br>(.234)              | .013    | .209<br>(.250)               | .404    |
| Work in Home/ Sick               |                              |         | -1.729<br>(.150)             | .000    | .005<br>(.232)               | .983    |
| Disability                       |                              |         | -.770<br>(.270)              | .004    | -.118<br>(.335)              | .725    |
| Social-economic Status<br>Higher |                              |         | .211<br>(.090)               | .019    | .209<br>(.100)               | .036    |
| Urban                            |                              |         |                              |         | -.038<br>(.100)              | .702    |
| Punjab                           |                              |         |                              |         | -1.062<br>(.189)             | .000    |
| Sindh                            |                              |         |                              |         | 1.227<br>(.201)              | .000    |
| Khyber Pakhtunkhwa               |                              |         |                              |         | 1.526<br>(.209)              | .000    |
| Male                             | -1.301<br>(0.1)              | 0.000   |                              |         | -1.501<br>(.186)             | .000    |
| Single                           |                              |         |                              |         | .231<br>(.305)               | .450    |
| Married                          |                              |         |                              |         | .285<br>(.276)               | .301    |
| Age 20 - 29 Years                | -.557<br>(.200)              | .005    |                              |         | .589<br>(.256)               | .021    |
| Age 35 - 39 Years                | -.247<br>(.205)              | .227    |                              |         | .234<br>(.249)               | .348    |
| Age 40 - 49 Years                | -.014<br>(.216)              | .947    |                              |         | -.146<br>(.258)              | .571    |
| Age 50 - 59 Years                | 0.163<br>(.233)              | .483    |                              |         | -.178<br>(.264)              | .499    |
| -2 Log Likelihood                | 580.095                      |         | 706.581                      |         | 2775.392                     |         |
| Chi Square                       | 287.654                      |         | 268.913                      |         | 866.303                      |         |
| Sig.                             | 0.000                        |         | 0.000                        |         | 0.000                        |         |
| Pseudo R-square                  | 0.154                        |         | 0.144                        |         | 0.4                          |         |

Table 5

*Ordered Logit Estimates for Health Status*

| Explanatory Variables  | Model-IV     |          |         |
|------------------------|--------------|----------|---------|
|                        | Coefficients | S.E      | p-value |
| < primary              | -0.952       | 0.224    | 0       |
| Primary but <middle    | -1.141       | 0.176    | 0       |
| Middle but < matric    | -1.142       | 0.18     | 0       |
| Matric but < degree    | -0.826       | 0.167    | 0       |
| Employed               | -0.296       | 0.146    | 0.043   |
| Self-employed          | -0.336       | 0.142    | 0.018   |
| Unemployed             | -0.958       | 0.352    | 0.007   |
| Student                | -0.524       | 0.238    | 0.028   |
| Economically Inactive  | -1.476       | 0.158    | 0       |
| Disability             | -0.233       | 0.281    | 0.406   |
| SES Higher             | 0.206        | 0.092    | 0.026   |
| Urban                  |              |          |         |
| Punjab                 |              |          |         |
| Sindh                  |              |          |         |
| Khyber Pakhtunkhwa     |              |          |         |
| Male                   |              |          |         |
| Single                 |              |          |         |
| Married                |              |          |         |
| Age 20 - 29 Years      |              |          |         |
| Age 35 - 39 Years      |              |          |         |
| Age 40 - 49 Years      |              |          |         |
| Age 50 - 59 Years      |              |          |         |
| Disease and Conditions |              |          |         |
| Arthritis              | -0.895       | 0.149    | 0       |
| Asthma                 | -1.013       | 0.24     | 0       |
| Diabetes               | -0.82        | 0.286    | 0       |
| Hemorrhoids            | -0.543       | 0.17     | .001    |
| Tuberculosis           | -0.946       | 0.366    | 0.01    |
| Heart Disease          | -0.562       | 0.312    | 0.072   |
| Pain in back           | -0.508       | 0.11     | 0       |
| Pain in knees          | 0.165        | 0.148    | 0.267   |
| Vision Problem         | -0.836       | 0.111    | 0       |
| Dental Problem         | -0.554       | 0.096    | 0       |
| -2Log Likelihood       |              | 2624.119 |         |
| Chi Square             |              | 504.825  |         |
| Sig.                   |              | 0        |         |
| Pseudo R-sq            |              | 0.271    |         |

Table 6

*Ordered Logit Estimates for Health Status*

| Explanatory Variables        | Coefficients      |             | Explanatory Variables | Coefficients      |         |
|------------------------------|-------------------|-------------|-----------------------|-------------------|---------|
|                              | (Std. error)      | p-value     |                       | (Std. error)      | p-value |
| Urban                        | -.044<br>(0.103)  | 0.670       | Employed              | +.035<br>(0.166)  | 0.835   |
| Punjab                       | -1.249<br>(0.196) | 0.000       | Self Employed         | -.025<br>(0.166)  | 0.883   |
| Sindh                        | .976<br>(0.208)   | 0.000       | Unemployed            | -.862<br>(0.372)  | 0.020   |
| Khyber Pakhtunkhwa           | 1.114<br>(0.217)  | 0.000       | Student               | .168<br>(0.253)   | 0.507   |
| Male                         | 1.387<br>(0.195)  | 0.000       | work in home/ Sick    | -.009<br>(0.237)  | 0.968   |
| Single                       | .256<br>(0.315)   | 0.416       | Disabled              | .070<br>(0.343)   | 0.838   |
| <b>Health Conditions</b>     |                   |             |                       |                   |         |
| Married                      | .422<br>(0.285)   | 0.139       | Arthritis             | -.775<br>(0.155)  | 0.000   |
| Age 20-29 years              | .305<br>(0.265)   | 0.250       | Asthma                | -1.154<br>(0.251) | 0.000   |
| Age 35-39 years              | .032<br>(0.258)   | 0.902       | Diabetes              | -.725<br>(0.304)  | 0.017   |
| Age 40-49 years              | -.215<br>(0.265)  | 0.416       | Hemorrhoids           | -.358<br>(0.178)  | 0.045   |
| Age 50-59 years              | -.155<br>(0.270)  | 0.565       | Tuberculosis          | -1.187<br>(0.388) | 0.002   |
| SES higher                   | -.200<br>(0.101)  | 0.048       | Heart disease         | -.674<br>(0.326)  | 0.039   |
| Less than primary            | .751<br>(0.235)   | 0.001       | Pain back             | -.438<br>(0.116)  | 0.000   |
| Primary but less than middle | .805<br>(0.185)   | 0.000       | Pain knee             | +.067<br>(0.155)  | 0.665   |
| Middle but less than matric  | .640<br>(0.189)   | 0.001       | Vision problem        | -.554<br>(0.118)  | 0.000   |
| Matric but less than degree  | .452<br>(0.173)   | 0.009       | dental problem        | -.314<br>(0.101)  | 0.002   |
| <b>-2Log Likelihood</b>      | 3501.102          | Chi square  | 1030.974              |                   |         |
| P value                      | .000              | Pseudo R sq | 0.457                 |                   |         |

**6. CONCLUSION**

The existing literature documents extensively on the existence of the educational differences in health. The need for investigating whether any causal component lies in the observed relationship between health and education has been emphasised since long. Often reported literature largely reflects a causal effect of schooling and education on health. By analysing the responses to self-reported health, we get a body of empirical evidence that a variety of socioeconomic and socio-demographic characteristics lead to perception of health, among individuals, in a varied manner. Among several socio-economic variables, schooling, gender, occupation, economic status and provinces are the significant determinants of self-reported health. However, schooling (education) seems to have the most significant impact on health status. Moreover, the association both between health and education is not very sensitive to either including or excluding the other

variables. As the level of education increases the health of the individuals seems to be affected in a positive way. It is likely that these health differences are the result of the differences in behaviour across education groups. An exogenous increase in education causes better health among individuals. Hence, those with more years of education can take care of the risks factors leading to health. Thus, health policy researchers and analysts should emphasize that health and education represent a mutual approach in improving population health.

### REFERENCES

- Arendt, J. N. (2001) Education Effects on Health: Causal or from Unobserved Components? A Panel Data Analysis with Endogenous Education. Submitted for publication at Institute of Economics, University of Copenhagen. Available on [www.econ.ku.dk/okojn/Public/Research/jarendt.pdf](http://www.econ.ku.dk/okojn/Public/Research/jarendt.pdf)
- Arendt, J. N. (2005) Does Education Cause Better Health? A Panel Data Analysis using School Reforms for Identification. *Economics of Education Review* 24,149–160.
- Arendt, J. N. (2008) In Sicknes and In Health-Till Education Do Us Part: Education Effects on Hospitalisation. *Economics of Education Review* 27, 61–172.
- Case, A. (2001) The Primacy of Education. Research Program in Development Studies, Princeton University. (Working Paper No. 203.)
- Christopher, M. and N. Sidhu (2005) *Schooling, Cognitive Ability and the Health. Health Economics*. John Wiley & Sons, Ltd. 14:10, 1019–1034.
- Cutler, D. and E. Richardson (1998) The Value of Health: 1970-90. *American Economic Review* 88, 97–100.
- Cutler, D., A. Deaton, and A. M. Lleras (2005) The Determinants of Mortality. *Journal of Economic Perspective* 20, 1–50.
- Cutter, D. and A. M. Lleras (2007) Education and Health: Theories and Evidences. (NBER Working Paper No. 12352 ). available on <http://www.npc.umich.edu>
- Fuchs, V. R. (2004) Reflections on Socio-economic Correlates of Health. *Journal of Health Economics* 23, 653–661.
- Groot, W. and H. Brink (2007) The Health Effects of Education. *Economics of Education Review* 26,186–200.
- Grossman, M. (1972) On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy* 80, 223–255.
- Grossman, M. (1975) The Correlation between Health and Education. (NBER Working Paper No. 22).
- Hartong, J. and H. Osterbeek (1998) Health, Wealth and Happiness: Why Pursue a High Education. *Economics of Education Review* 17, 245–256
- Idler EL, Benyamini Y. (1999) Self-Rated Health and Mortality: A Review of Twenty Seven Community Studies. *Journal of Health and Social Behaviour* 38, 21–37.
- Lima-coasta, M. F. and Fernanda Uchao (2004) The Structure of Self Rated Health among Older Adults: The Bambui Health and Aging Study (BHAS). *Rev. Saúde Pública* 38:6, São Paulo.
- Mirowsky, J. and C. E. Ross (2003) *Education, Social Status, and Health*. Published by Aldine de Gruyter. 242 pp.

- Pakistan, Government of (1998) *National Health Survey of Pakistan 1990-1994*. Islamabad: Pakistan Medical Research Council.
- Shumueli, A. (2003) Socio Economic and Demographic Variation in Health and Its Measures, The Issue of Reporting Heterogeneity. *Social Science and Medicine* 57, 125–134.
- Silles, M. A. (2009) The Causal Effect of Education on Health: Evidence from United Kingdom. *Economics of Education Review* 28, 122–128.
- Syed, H. R., *et al.* (2006) Inequalities in Health: A Comparative Study between Ethnic Norwegians and Pakistanis in Oslo, Norway. *International Journal of Equity Health*. 5: 7.
- The World Health Report (2004) [http://www.who.int/whr/2004/en/report04\\_en.pdf](http://www.who.int/whr/2004/en/report04_en.pdf)
- Wilkinson, R. and M. Marmot (eds.) (2003) *Social Determinants of Health: The Solid Facts*. 2nd edition/edited for World Health Organisation 2003 published by International Centre for Health and Society.

## Comments

The paper analyses the socio-economic determinants of health with special focus on education. There is ample evidence to support the notion that educational level and health status are positively correlated and the findings of the study endorse and reinforce this viewpoint. To begin with, the authors give a brief account of the literature explaining that educational differences have great impact on health status and describe that education has a direct effect on health but there are no well stated causal mechanisms to explain the relationship.

The authors have used self reported health (SRH) as an indicator of health status measured on ordinal scale with five categories reflecting the respondents' perceptions of health status and not of those who observe or examine the individual. Using data from National Health Survey of Pakistan (NHSP, 1990-94), exploratory data analysis and ordinal logistic regression models are used to assess relationship between health, education and other socio-economic variables.

I would like to appreciate the authors' effort to undertake a comprehensive analysis of data on pattern of SRH and relate them to educational differences. The results, however are questionable as individuals with less than primary education have reported lower prevalence of diseases than those with middle, matric and degree levels of education—a finding contrary to our expectation which needs further exploration.

My comments pertain to three major areas—the methodology; the data set used, and the results and analysis—which all have limitations and interpretation biases. First the methodology used specifies self-reported health (SRH) as dependent variable ordered in five response categories as excellent, very good, good, fair, and poor. One major limitation to use ordinal logistic regression is the difficulty to quantify and interpret the distance between categories of responses which in turn are subjective perceptions of respondents about their health status. The data set used is the National Health Survey of 1990-94 which is about 15-20 years old. Since that time, tremendous changes in health related perceptions and disease patterns have occurred, and the results may not be reflective of the current situation of the relationship studied.

Looking at the characteristics of respondents (as shown in Table 1a), it appears that the sampled population has a young age structure (70 percent between ages 20-39 years), of which 70 percent are males, has education mostly between primary and matric levels, and the majority has reported health status between good and fair categories, thereby reflecting the biases of the self reported health status.

As for the results and its analysis, the education categories used are not precise but indicate a range such as primary < middle; middle < matric; matric < degree—etc. It would be more appropriate to make more precise categories of education since education as predictor of health is the main focus of the study.

Looking at the ordered logit estimates in Table 4, there are some contradictory results that need further explanation. For example, among age categories, the coefficient is significant only for age group of 20-29 years and has a negative sign, implying that

younger people have lower self-reported health status than the older age groups—a finding contrary to one’s expectations. Similar is the situation with male and urban residence indicating lower self-reported health than the corresponding category in comparison which needs further investigation.

Overall, the results of the study reinforce the fact that increase in level of education is positively related to health status of individuals, but the analysis raises questions about the usefulness and efficacy of using self-reported health perceptions as best indicators of health status. The question needs to be addressed for further research with a more recent and precise data set on health related matters.

**Naushin Mahmood**

Pakistan Institute of Development Economics,  
Islamabad.

## **Consumer Satisfaction in Social Security Hospital: A Case Study of Punjab Employees Social Security Institution Hospital, Rawalpindi**

NASIR AYAT and MAHMOOD KHALID

### **1. INTRODUCTION**

Over the years, quality of services has assumed far greater importance in health systems of both developed and developing countries. In WHO's framework for health system performance assessment; health, responsiveness and fairness of financing are three major goals of a health system [Murray and Frenk (1999)]. With each component having particular importance, the responsiveness element entails safeguarding the rights of patients to adequate and timely care.<sup>1</sup>

With numerous assessment measures, consumer satisfaction—which overlaps responsiveness in various dimensions—is one important evaluation measure of quality and performance of any health system.<sup>2</sup> Similarly, 'legitimate' expectations about service quality also serve as key tool in understanding patients' aspirations and needs for better health care.<sup>3</sup> The evaluation of services *vis-à-vis* consumer satisfaction is, therefore, a dynamic rather than a static process. It provides time continuous information regarding relative improvements (or shortfalls) in health care standards.<sup>4</sup>

Generally, in the case of developing countries, it has been noted that patient satisfaction is not given much importance. It is a self explanatory fact that formal evaluation mechanisms including consumer satisfaction are absent in the health systems of most developing countries. It has been argued that consumer perceptions on health care are largely ignored by health care providers in low income countries [Yildiz (2004)]. Moreover, it is also noted that health being the exclusive industry—unlike others—which ignores its clients. The prehistoric mindset of doctors that only they understand what

Nasir Ayat <nasirayat@yahoo.com> is Consultant Health Economist and Mahmood Khalid <mahmoodkhd@yahoo.com> is Research Economist at the Pakistan Institute of Development Economics, Islamabad, respectively.

<sup>1</sup>Responsiveness is a relatively newer area in health research. It has often been defined, in the context of a system, as the outcome that can be achieved when institutions and institutional relationships are designed in such a manner that these are cognisant and respond appropriately to universal expectations of individuals.

<sup>2</sup>In addition to evaluation of health status through morbidity and mortality estimates, there has been equal emphasis on quality of care indicators in health systems research [Shaikh and Rabbani (2004)]. Therefore, patient satisfaction can be used as an instrument in health management information system which can improve the quality of services by tracking certain dimensions of quality.

<sup>3</sup>Legitimate needs are defined as being universal rather than individualistic and conforms to recognised principals or accepted rules and standards.

<sup>4</sup>In developed countries, patient satisfaction surveys are conducted in hospitals on a timely basis as a measure to monitor the performance of health establishments.

should be done ignore patients' inputs, which is not living in reality [White (1999)]. Generally, these arguments appear to hold ground in countries such as Pakistan where patient satisfaction is the ignored element in improving health care quality and HMIS.<sup>5</sup> It is argued that absence of accredited standards, lack of health care evaluation, and insensitive attitude of management towards patients' needs are few of the factors responsible for low quality of health care in both public and private sectors.<sup>6</sup>

In macro context, low public sector spending on health is also cited as a significant factor for deteriorating quality of health care in Pakistan. With critical social and economic issues including burgeoning population, low nutrition levels, increasing incidence of poverty and disease, widening of income disparities, inflationary pressures, and increasing health costs; government spending on health is miniscule. According to the Economic Survey of Pakistan, in 2005-06, the government spent merely 0.75 percent of GDP on the health sector [*Economic Survey of Pakistan* (2005)]. Therefore, public expenditure on health is abysmally low estimated at \$ 4 per capita [ADB Report (2005)]. Therefore, limited accessibility (equity) and deteriorating standards of health care (efficiency) are key issues for health regime in the country.

With ineffectuality of public sector in health care provision; over the years, private referral and medical treatment has become an increasing phenomenon. Based on 2005 figures, private spending on health (including household expenditures) is estimated at \$ 14 per capita—almost four times more than public health expenditure per capita [ADB Report (2005)]. Akram and Khan (2007) have noted that relatively higher income groups in urban centres despite access to public hospitals and tertiary medical institutions prefer to consult and receive treatment in private hospitals, which are considered as more quality oriented [Akram and Fahim Jehangir (2007)]. Generally, in absence of accreditation of health establishments in Pakistan, studies have noted that for-profit establishments also compromise on quality standards [Shaikh and Rabbani (2004)].

Poor provision of health care services, relevant health indicators unambiguously demonstrate a trend towards increasing impoverishment and vulnerability of the populace. Tightening of fiscal space and limited budget allocations, and underutilisation of public sector development expenditures; 'health for all' appears a distant reality in Pakistan. Therefore, the concept of social protection of health—through risk pooling—appears to have assumed critical importance. The mechanism not only can serve as an important policy instrument to prevent vulnerable households from falling into 'health poverty' but it can also provide them access to health services.

Social protection schemes—with health component—for poor, indigent, and lower income groups exist in Pakistan. However, their efficacy in terms of scope, service delivery, and quality requires comprehensive evaluation. Among others, it presents a strong case to examine the quality of health services provided under these schemes.<sup>7</sup> This present study is designed with the objective to evaluate quality of health services from consumer perspective at Punjab Employees Social Security Institution's hospital in Rawalpindi.

<sup>5</sup>Presently, in most hospitals in Pakistan, majority of facility-based HMIS systems only track type and quantity of services which are related to improvement in health status indicators.

<sup>6</sup>The concepts of patient satisfaction, patient rights, and protection, therefore, carry little significance in most hospitals and medical establishments of Pakistan.

<sup>7</sup>For a brief review of the health component of social security schemes in Pakistan, see Section 3.

## 2. REVIEW OF LITERATURE

### 2.1. Patient as Consumer

The importance of 'patient' perceptions, also referred as consumer, in health care systems from the fact that consumer assessment not only identifies pitfalls in quality but their expectations also provides a way forward to improve the existent status of a health care services [Owens and Batchelor (1996)].<sup>8</sup> Usually in market-based health systems, among various factors, patients' satisfaction is considered as an important indicator which enhances the reputation of hospitals and medical establishments in health provision. Therefore, it is argued in the literature that traditional term 'patient' needs to be replaced with customer or client for service improvements and also to develop a respectful relationship. It has been stated that term 'consumer' dignifies professional-patient relationship whereas the traditional term represents powerlessness against the medical establishment [Sitzia and Wood (1997)]. In addition, reinventing the term strengthens the importance of patient, consumer rights, and protection.

### 2.2. Consumer Perceptions: Influences and Variations

With complex nature of human perceptions, patient satisfaction is rather a complex phenomenon. Consumer perceptions represent a diverse mixture of perceived needs, expectations, and experience of health care [Smith (1992)]. They seem to be influenced by various and often diverse factors. For instance socio-demographic factors, economic status, gender, and culture have been found to be significant in influencing perceptions. It is stated: 'The clients' perspective is not simply a matter of individual preferences but is mediated through the social and cultural environment [AbouZahr, *et al.* (1996)]. Therefore, with influence of multiple factors, patients' perceptions have the tendency to vary drastically across individuals, hospitals, regions, or countries.

In literature, perceptions on satisfaction have been identified as relative judgements, based on comparison of perceived performance and patient aspiration, a proposition referred as the 'multiple discrepancy' theory [Michalos (2003)]. It is noted that patient's aspirations can be unrealistic in view of available financial and non-financial resources and performance evaluation can differ significantly. Therefore, it is argued that legitimate rather than individual expectations needs to be accounted for which could assist in reducing measurement discrepancies in patient satisfaction [Carr-Hill (1992)].

### 2.3. Dimensions of Quality in Consumer Satisfaction

Interestingly, patient satisfaction with quality cannot be examined unless the multidimensionality of quality should be taken into context. It not only entails the technical aspects of health care but also involve non-technical dimensions including physical environment, access to information, courtesy of medical professionals, interpersonal relationships, responsive behaviour, time cost involved, and other miscellaneous aspects. In health care literature, 'structural quality' is defined as dimensions related to

<sup>8</sup>It is suggested that the patient should be defined as a consumer, a rationale that originates from the emphasis on the market mechanism.

continuity of care, costs, accommodation and accessibility. Process quality has been defined to include aspects of courtesy, information, autonomy and competence [Van, *et al.* (1998)]. Similarly, service quality is referred as a set of aspects which include communication, sign posting, information provision and staff interaction with patients [Kenagy, *et al.* (1999)]. Interpersonal aspects of quality, amenities of care, with *technical* aspects comprise the three components of health care quality [Donabedian (1980)]. Interpersonal aspect is defined as the quality of interaction between the patient and the service provider concerning responsiveness, friendliness, and attentiveness [Haas (1994)]. In the literature, various studies therefore have examined quality specific contexts and dimensions.

#### **2.4. Socio-demographic Factors Influencing Consumer Satisfaction**

Most studies examining relationship of patient characteristics with hospital satisfaction scores have found certain variables to be significantly related. Most prominently, patient age along with self-reported health status are been noted to be statistically significant. It has been examined in almost every study that these two factors are strongly correlated with hospital satisfaction [Rosenheck, *et al.* (1997) and Young, *et al.* (2000)], whether these variables have been analysed for obstetrical patients [Finkelstein, *et al.* (1998)], for various patient satisfaction measures [Marshall, *et al.* (1996)], and across different countries [Thi (2002)]. Moreover, it has also been noted that there is greater tendency of research studies to concentrate on older patients. It seems to be based on the presumption that old people are the major recipients of health care services. Generally, it has been found that older patients have the tendency to report greater satisfaction while sicker patients tend to be less satisfied [Finkelstein, *et al.* (1998); Young (2000); Rosenheck, *et al.* (1997)]. Other patient characteristics that have been noted to be significantly related to patient satisfaction include race/ethnicity, gender, education, insurance status, income, and past consumer experience in the hospital [Finkelstein, *et al.* (1998); Rosenheck, *et al.* (1997); Hargraves (2001)].

#### **2.5. Measurement of Consumer Satisfaction**

Similar to multidimensional nature of quality, its measurement through patient satisfaction also has varied approaches. One factor which account for variation in patient perceptions of hospital care is differences in measures of satisfaction [Barr and Banks (2002)]. Certain measures focus on 'experience of care' while examining problem-oriented approach scrutinising questions concerning what did or did not happen while receiving health care regarding numerous aspects of care [Cleary, *et al.* (1991)]. Other patient satisfaction measures take into account the 'satisfaction with care' approach which involves patients to rate satisfaction with various aspects of care they received [Finkelstein, *et al.* (1998); Marshall, *et al.* (1996)]. These two approaches to assess patients' views on hospital experiences reflect two complementary but often conflicting goals for developing information i.e. quality improvement by hospitals and public reporting for use by consumers [Barr and Banks (2002)]. To assist hospitals in quality improvement measures, specific questions identifying problem areas needs to be used [Cleary, *et al.* (1991)].

## 2.6. PSQ—Global Approach in Measuring Consumer Satisfaction

In developed countries, interest in measuring patient satisfaction assumed more importance during the mid 1980s, the first health questionnaire was developed almost forty years ago [Engs (1970)]. Some thirty years back Ware, *et al.* (1986) developed a multifaceted and universally applicable approach to measure patient satisfaction through Patient Satisfaction Questionnaire (PSQ) [Ware, *et al.* (1976)]. The goal was to develop a short, self-administered satisfaction survey having application to general population studies yielding reliable and valid measures. These measures should have both theoretical and practical significance for planning, administration, and evaluation of health service programmes [Ware, *et al.* (1986)]. Importantly, the salient feature of PSQ approach is its development of taxonomy of characteristics of health care providers and services which can influence patients' attitudes towards satisfaction with medical care. Since its development, the modified PSQ method has been extensively used by studies to evaluate health care services in specific contexts in various countries. Its validity has been supported by empirical findings since its development [Ware, *et al.* (1986)].<sup>9</sup>

## 2.7. Scarcity of Consumer Satisfaction Literature in Pakistan

With bulk of international literature on customer satisfaction in health care, it appears to be highly scarce in context of Pakistan. Except for handful project studies conducted by NGOs and few research articles, health care literature on patient satisfaction is grossly lacking. With general absence of information on the subject, we find no evidence on any research conducted on customer satisfaction with health care services, in particular, of health schemes under social protection mechanisms. Therefore, this neglected area provides a broad scope to review health care services not only in terms of customer satisfaction but also coverage and structure of delivery mechanisms. In context of Pakistan, it seems pertinent for both policy analysis and health protection reforms in delivering better health services to citizens of the country.

## 3. REVIEW OF HEALTH PROTECTION IN PAKISTAN

Before examining the quality of services provided at PESSI hospital, this section briefly reviews the health protection of individuals covered under the various social security schemes in Pakistan. As mentioned earlier, accessibility of health services and health protection of poor, indigent, and vulnerable individuals is the source of social concern in the country; therefore, this section succinctly examines such schemes in particular.

In developing countries; social protection of poor, indigent, and lower income groups is an important policy instrument. In the midst of various protection programmes, health protection of households carries immense significance. Generally, evidence suggests that there is a strong relationship between poverty and health. In particular, poor people have higher probability of having health issues. Conversely, poor health can aggravate household poverty or even bankrupt families through health incidents/accidents of catastrophic dimensions. In Pakistan, evidence seems to suggest that high prevalence of disease among poor is the major factor pushing people into poverty [Mahmood and Ali (2003)].

<sup>9</sup>Shorter versions of PSQ have been designed and utilised for conducting two national surveys in the United States and was also used in RAND's Health Insurance Experiment [Ware, *et al.* (1986)].

In case of serious health contingencies, it has been noted that when poor households are not health protected, they have the tendency to borrow or reallocate expenditures towards health care from other important consumption items such as food. This also adversely impacts the health status through low nutrition levels.

With no significant 'trickle down' impact of economic growth coupled with low public sector spending on health, financial costs of health care services has been shifting to households in Pakistan. Therefore, it appears indispensable to devise a broad based social health protection mechanism in the country.

#### **4. RATIONALE OF THE STUDY**

The rationale for conducting this study is based by taking into context the following considerations:

- (i) Literature on patient perceptions to evaluate the quality of health care is scarce in Pakistan.
- (ii) There is no previous study which has examined quality dimensions of health risk-pooling model in Pakistan. Therefore, quality evaluation of Provincial Employees Social Security Institution (PESSI) hospital *vis-à-vis* patient satisfaction provides this research opportunity.
- (iii) Based on review of existing literature, we find no evidence that PSQ technique has been used by any research study in Pakistan.
- (iv) Assessment of the quality dimension of health risk financing will hopefully guide in formulating recommendations about improving the system of health care delivery.

#### **5. AIM AND OBJECTIVES OF THE STUDY**

The primary aim of the study is suggest improvements in health care services at PESSI hospital.

The objectives of the study are to:

- (i) Construct health care scales for examination of various health care services provided at PESSI hospital, Rawalpindi.
- (ii) Examine the influence of socio-economic factors on multiple quality scale at the hospital.
- (iii) Propose recommendations for improvement in health care services at the hospital.

#### **6. STUDY DESIGN, SAMPLE SELECTION AND SIZE, AND DATA COLLECTION METHODOLOGY, DATA RELIABILITY, ETHICAL CONSIDERATION IN DATA COLLECTION AND LIMITATION OF THE STUDY**

##### **6.1. Study Design**

This cross-sectional study is designed on the basis of PSQ approach [Ware, *et al.* 1976]. It represents a relatively shorter version of the approach comprising 40 questions.

These are related to different aspects of health care services provided at the PESSI hospital, Rawalpindi.

On the basis of these questions (or items), seven broad scales have been constructed representing key dimensions of services provided by the hospital. These broad scales are: (i) general satisfaction (ii) technical quality (iii) interpersonal aspects (iv) communication (v) financial aspects (vi) time spent with the doctor, and (vii) access and availability aspects. In each scale, consumer responses on items have been captured through five relative scores (Likert scales) which represent consumers' relative judgements on quality of health care service received at the hospital (see Table 1 below).

Table 1

*Likert Scales of Consumer Responses*

|                            | Value | Explanation   |
|----------------------------|-------|---|
| Strongly Agree             | 1     | Indicates highest level of satisfaction with hospital services. |
| Agree                      | 2     | Indicates high level of satisfaction with hospital services.    |
| Neither Agree Nor Disagree | 3     | Indicates medium level of satisfaction with hospital services.  |
| Disagree                   | 4     | Indicates low level of satisfaction with hospital services.     |
| Strongly Disagree          | 5     | Indicates lowest level of satisfaction with hospital services.  |

The pre-coded responses were recoded to attain higher item scores for favourably worded items i.e., indicating greater satisfaction in numeric values. For example, numeric value of 'strongly agreed' in the questionnaire was recoded from 1 to 5, and numeric value of 'agreed' in the questionnaire was recoded from 2 to 4. Likewise, similar procedure of recoding was adopted for the remaining three Likert scales.

After attaining relative numeric values of satisfaction for each item and doing their recoding, the number of items under each of the 7 quality measurement scales were summed up to attain aggregate score for each scale. For instance, the quality scale of general satisfaction comprising eight items (i.e., PSQ1, PSQ2, PSQ3, PSQ4, PSQ5, PSQ6, PSQ7, and PSQ8) were added up to receive the total grand score of general satisfaction.

In consumer satisfaction studies, categorisation of numeric values of scales measuring quality has been extensively used in various studies for relative analysis of satisfaction. For instance, [see Theodosopoulou, *et al.* (2007)]. To facilitate comparative analysis of consumer perceptions, aggregate scale scores have been classified into three broad categories which are: (i) High level of satisfaction, (ii) Medium level of satisfaction, and (iii) Low level of satisfaction. Distinction between these categories (or satisfaction ranges), for instance in low satisfaction, is calculated by taking average point of minimum cumulated value of dissatisfaction score and minimum cumulated value of neither agree nor disagree scale. For example, in general satisfaction scale, the minimum cumulative score of dissatisfaction is 16 whereas the minimum cumulative score of

uncertainly is twenty four.<sup>10</sup> Therefore, the average point is estimated as 20. All summated values which are  $\leq 20$  represent low satisfaction ranking.

On a similar note, the minimum cumulative point of neither agree nor disagree and minimum cumulative point of satisfaction have been averaged to estimate the point that differentiates between medium and high satisfaction levels (or ranges). For example, under this method, 28 being the average point, all summated values  $>$  than 28 represent relatively higher levels of satisfaction whereas scores  $\leq 28$ , but  $>$  than 20 represent medium levels of satisfaction (see Table 2). Similar technique is applied for categorisation of consumer satisfaction levels for other scales.

Table 2

*Levels of Consumer Satisfaction (General Satisfaction)*

| Level                        | Range                          |
|------------------------------|--------------------------------|
| High Level of Satisfaction   | Summated Scores $>$ than 28    |
| Medium Level of Satisfaction | Summated Scores from 21 and 28 |
| Low Level of Satisfaction    | Summated Scores from 8 and 20  |

## 6.2. Sample Selection and Size

At PESSI hospital, Rawalpindi; around 37,000 workers are registered under the health protection scheme. In addition, approximately 200,000 dependents (of registered workers) are recipients of health services at the hospital. Based on hospital estimates, on average, 400 customers visit the premises each day. Broadly, there are two types of patients: (i) OPD patients, and (iii) Inpatients. As an inclusion criterion, the survey exclusively involves interviews with the first type of patients. Inpatient perceptions of care, therefore, are not under the purview of the study.

In addition, respondents with minimum age of 18 years (i.e. adults) were selected for the study sample. It is based on the presumption that children possess little comprehension about complex medical procedures and quality of hospital services. The purpose of excluding children from the survey, therefore, was to increase the response rate. The sample, however, makes no distinction on the basis of registration status of respondents i.e. whether if they are employed workers (registered with PESSI) or dependents of registered workers.

Of total OPD patients who represent the sampling frame, following formula has been used to select sample size.

$$\text{Sample size} = \pi (1-\pi)/e^2$$

Where

$\pi$  = proportion

e = required size of standard error

It is assumed that  $\pi = 0.5$  whereas  $e = 0.05$  (at 95 percent confidence interval). The total sample size was estimated to be 100 patients (or respondents). To adjust for non-

<sup>10</sup>In general satisfaction scale comprising eight items, the minimum score of strong dissatisfaction is eight.

participation (or non-responsiveness) factor of consumers, 120 individuals were interviewed in total.<sup>11</sup>

### 6.3. Data Collection Methodology

Data collection was done by a structured questionnaire comprised of forty questions (or items) related to different aspects of hospital services. As mentioned previously, the questionnaire was designed using PSQ-III as a reference point. A pilot survey of ten respondents was conducted before carrying out the complete hospital survey. To overcome difficulties in identifying OPD patients from the consumer list, respondents were identified through 'random selection' process on days when data was collected. Since consumers were interviewed in hospital's premises, the data collection procedure was time-efficient and convenient while keeping all the survey requirements of the study.

### 6.4. Data Reliability

In psychometric studies, estimation of data reliability is a requisite procedure. In literature on perception studies (including consumer satisfaction), it is indicated that multi-item scales generally meet the reliability criteria when exceeds the 0.50 value for group comparisons.<sup>12</sup> Among various techniques, we have estimated Cronbach  $\alpha$ , the most frequently used in international studies. Item reliability is estimated at 0.80 whereas scales reliability comes to be 0.74.

### 6.5. Ethical Considerations in Data Collection

During data collection, all methodological and ethical considerations were taken care of. Before each interview, patient was informed about the purpose and objectives of the study. The anticipated participants were also informed about keeping strict confidentiality of data that will be provided by them. Therefore, after receiving personal consent, the data was collected from each survey participant. It was also strictly made sure that interview process is carried out in privacy not affected by presence of hospital staff, management, or any other interference. After execution of the survey, patient data was entered in SPSS 15 and before conducting analysis, it was thoroughly cleaned for errors.

### 6.6. Limitations of the Study

Despite the fact that the present study is a benchmark on estimating patient satisfaction at the PESSI hospital, it has certain limitations. These are as following:

- It exclusively examines the perceptions of patients to evaluate the quality of health services at the hospital. It has not incorporated the views of the medical staff.
- It is a particular case study of patient satisfaction at the PESSI hospital, Rawalpindi. Its findings, therefore, cannot be generalised to other PESSI hospitals in Pakistan.

<sup>11</sup>The response rate of the sample is estimated to be 97 percent.

<sup>12</sup>However, some studies have estimated less than 0.40 reliability values which do not infer insignificance. Such data estimates are reliable but relatively weak at high confidence intervals.

- It exclusively takes into account perceptions provided by OPD patients at the hospital. The findings do not apply to perceptions of inpatients who are admitted at the hospital.

## 7. RESULTS

### 7.1. Socio-economic Characteristics of Study Sample

Table 3 given below presents descriptive statistics of the sample. In the study sample (N = 116), 56 percent of respondents were males whereas 44 percent were females. In sub-sample of males, 92 percent were employed workers (registered) with a miniscule share of male dependents (8 percent). On the other hand, in sub-sample of females, only 9 percent of respondents were employed workers (registered) while majority 91 percent includes dependents. The average age of respondents is estimated to be 37 years. By age classification of sample, concentration of respondents is in the age group of 31-45 years (48.3 percent) followed by 18-30 years (33.6 percent) and 46 and above (18 percent).

On average, education of respondents was found to be abysmally low i.e. 6 years of schooling. According to categories, around 28 percent of respondents were illiterate, 16 percent had receive education from Grade I-VIII, 38 percent were matriculates (high school education), whereas 18 percent were college graduates.

In the sample, average household income per month, is estimated to be significantly low i.e. Rs 5,938 (or \$ 87.3). If this mean value is taken as the cut-off point, it is estimated that 61 percent of households had monthly income below the mean value whereas remaining 39 percent of households had incomes above this point. These results clearly suggests that majority of respondents in the sample belong to poor income strata.

The range of utilising health services, in terms of years, at the hospital is fairly large (2-30 years). Its average value is estimated as 7 years. In terms of time duration of services availed from the hospital by category; majority of respondents were found using health services for < than 5 years (47 percent). It was followed by 5-9 years (28 percent), and 10 years and more (25 percent). The descriptive statistics of socio-economic indicators are presented in Table 3 below.

Table 3

*Descriptive Statistics of Sample*

| Variables                               | Min   | Max    | Mean  | Standard Deviation (S.D) |
|---|-------|--------|-------|--------------------------|
| Age                                     | 18    | 77     | 37    | 11.43                    |
| Years of Education                      | 0     | 14     | 6.4   | 4.77                     |
| Monthly Income (in Rs)                  | 3,000 | 24,000 | 5,883 | 2,520                    |
| Number of Years availing PESSI Services | 2     | 30     | 7     | 5.69                     |

Consumer satisfaction literature presents mixed response to estimating either single item responses or multiple-item scales of satisfaction with services. For analysing psychological attributes of consumer perceptions, potential weakness of using single item approach has been discussed. It is argued that this approach can result in random measurement error as individual item lack scope. Therefore, it is very unlikely that an item can fully represent a complex theoretical concept. Hence, summated scores have been perceived as better indices to apply in studies pertaining to consumer perceptions on satisfaction. On the contrary, studies on consumer satisfaction have also adopted single item analysis with meaningful significance in inferential statistics.

With benefits of each approach in interpreting data, we have examined individual item statistics as well as summated scales of quality to evaluate hospital services.

## 7.2 (a) Descriptive Statistics of Scale Items

### (i) General Satisfaction

The GS scale primarily entails physical environment of the hospital. It includes items related to consumers' level of comfort in diverse hospital premises. In terms of consumer satisfaction, cleanliness and airy waiting area was highly ranked (mean = 4.06). It is closely followed by cleanliness of doctor's room and moderately maintained temperature of waiting area (mean values of 4.03). Comfort of laboratory rooms was also found to be skewed towards relatively higher satisfaction (mean= 4.0). Relatively, ease in getting the seat (mean= 3.26) and spacious sitting area (mean= 3.17) were found to have lower satisfaction ranking compared to above items. These values tend to suggest that despite cleanliness in hospital waiting area for consumers, there is some evidence of physical congestion signified by bulk of patients who wait in the area before referral. The congestion can also be explained not only in terms of load of consumers waiting for referral but partly also due to number of caregivers (or attendants) which accompany them. However, overall OPD satisfaction as well as medical care satisfaction was ranked higher by consumers (see Table 4).

Table 4

*Descriptive Statistics of General Satisfaction Scale Items*

| Items  | Min  | Max  | Mean | S.D  |
|--|------|------|------|------|
| Spacious Sitting Area with Appropriate Sitting Arrangement | 1.00 | 5.00 | 3.17 | 1.12 |
| Clean/Airy Waiting Area                                    | 2.00 | 5.00 | 4.06 | 0.33 |
| Ease in Getting Seat                                       | 1.00 | 5.00 | 3.26 | 1.10 |
| Moderately Maintained Temperature in Waiting Area          | 4.00 | 5.00 | 4.03 | 0.18 |
| Cleanliness in Doctor's Office                             | 3.00 | 5.00 | 4.03 | 0.23 |
| Comfort of Laboratories                                    | 2.00 | 5.00 | 4.00 | 0.48 |
| Overall OPD visit Satisfaction                             | 1.00 | 5.00 | 3.97 | 0.79 |
| Satisfaction from Medical Care Received                    | 1.00 | 5.00 | 3.99 | 0.79 |

### (ii) Technical Quality

Consumers evaluated highest satisfaction with efficacy of medicine under the technical quality scale (mean= 4.07). Simply, this suggests that majority of patients were satisfied with the doctor prescriptions of drugs at the hospital. It was followed by

satisfaction with efficient laboratory examination (mean= 3.89), and careful examination by the hospital doctor (mean= 3.65). Compared to other dimensions, monitoring weight of under 5 years old children (mean= 3.14) was also found to be relatively low in terms of consumer satisfaction.

### (iii) *Interpersonal Aspects*

The IP scale mainly takes into account consumer relationship with hospital staff. It includes aspects such as general courteous behaviour, caring attitude, and personal respect for the consumer while he/she is in diverse situations while receiving health care. In the midst of various scale items, courteous nature of reception staff received the highest rank from consumers (mean= 4.19). It was proceeded by high consumer satisfaction with doctors treating patients with respect (mean= 4.0), doctors respect for patients' privacy (mean= 3.79), and courteous attitude of laboratory staff (mean= 3.73).

Contrary to above estimates, average response of consumers tends to suggest that consumers, in general, were relatively dissatisfied with laboratory examination (mean= 2.96). The estimate indicates that while queuing for laboratory examination, patients are not treated on first come first serve basis which results in wastage of time. It may also be inferred that queuing for laboratory checks lack discipline and often favouritism in bestowed by laboratory staff to certain consumers over others.

Doctor's familiarity with patient history also received a low ranking by consumers in general (mean = 2.84) in addition to their knowledge of treatment (mean= 2.67). These estimates tend to suggest that, although, doctors are careful in examining patients, they generally do not refer to consumer's previous medical history and earlier diagnosis done by another doctor. This seems to suggest that mostly doctors prefer their own way of treatment rather than adhering to previous medical history and diagnosis of the patient. These estimates require further exploration of such practices from doctors' perceptions, which is beyond the purview of this study (for details of other statistics of IP scale, see Table 5).

Table 5

#### *Descriptive Statistics of Interpersonal Aspects Scale Items*

| Items  | Min | Max | Mean | S.D  |
|--|-----|-----|------|------|
| Reception Staff was Courteous                                      | 4   | 5   | 4.19 | 0.39 |
| Doctor Respect for Patient Privacy                                 | 1   | 5   | 3.79 | 0.84 |
| Doctor Treat Patient with Respect                                  | 1   | 5   | 4.04 | 0.55 |
| Doctor's Familiar with Patient's Recent Medical History            | 1   | 5   | 2.84 | 1.27 |
| Doctor's Knowledge about Change in Patient's Treatment             | 1   | 5   | 2.67 | 1.01 |
| Attitude of Nurses and Ancillary Staff was Good                    | 1   | 5   | 3.44 | 1.02 |
| Attitude of Laboratory Staff was Courteous                         | 1   | 5   | 3.73 | 0.80 |
| Laboratory Staff Examined on First Come First Basis (Fair Queuing) | 1   | 5   | 2.96 | 1.07 |

### (iv) *Communication*

In COM scale, seven out of eight items examine consumer satisfaction while doing communication with the doctor, primarily regarding diagnosis. Generally, the mean values of responses of items indicate mixed satisfaction. Use of complicated medical terminologies by doctors not understandable to the patient received highest dissatisfaction

from the patients (mean= 4.16).<sup>13</sup> It can be partly explained that since most of the consumers in the sample are lowly educated, therefore, it seems difficult for them to comprehend simple or more sophisticated medical terms used by doctors. It was also noted that doctors explanation to consumers about dosage of medicine was given a relatively moderate ranking (mean= 3.06), it appears that doctors do not bother much if the patient has understood the dosage. It received a very low satisfaction score (mean= 1.47). These descriptive seem to suggest existence of communication gap between doctor and consumer partly explained by low education of consumers and may be doctors' reluctance to explain these aspects in detail. In addition, most of the patients indicated that they do not receive any published material from the doctor pertaining to their disease or issues of general healthcare (mean= 1.24). Conversely, doctors giving further medical appointment (mean= 3.86), and doctors' willingness to listen to patient's health issues (mean= 3.73) received relatively high consumer satisfaction ranking.

Table 6

*Descriptive Statistics of Communication Scale Items*

| Items  | Min | Max | Mean | S.D  |
|--|-----|-----|------|------|
| Doctor Show Willingness to Listen to Patient                       | 1   | 5   | 3.73 | 0.96 |
| Doctor Inform Patient about Health Condition                       | 1   | 5   | 2.25 | 1.28 |
| Use of Medical Terminology while Explaining to Patient             | 1   | 5   | 4.16 | 1.20 |
| Doctor Guides Patient about Dosage of Medicine                     | 1   | 5   | 3.06 | 1.18 |
| Reassurance by Doctor about Understanding of Dosage                | 1   | 5   | 1.47 | 1.04 |
| Doctor Tell Patient When to Come for Next Follow Up                | 1   | 5   | 3.86 | 1.15 |
| Patient Get General Health Education about Weight of the Child     | 1   | 5   | 2.68 | 0.98 |
| Doctor gives Patients Take Away Written Material about Health Care | 1   | 5   | 1.24 | 0.68 |

**(v) Financial Aspect**

An important estimate that has come out of descriptive analysis is the satisfaction of patients with financial health protection at the hospital. With average value of 4.78, it is apparent that most consumers are very highly satisfied with the financial aspect. In proportional terms, a staggering 97 percent of consumers indicated high level of satisfaction with financial protection they receive from PESSI. A miniscule 3 percent consumers mentioning dissatisfaction with the financial aspect of health care service provided by PESSI.

**(vi) Time Spent**

Similar to relatively high satisfaction with willingness of doctor to listen to patient, time spent with doctor was ranked relatively higher by consumers (mean= 3.66).

**(vii) Access and Availability**

The descriptive statistics of AA are presented in Table 7. The scale is a representative of mixture items concerning access and availability aspects. It represents physical accessibility to the hospital, facilities, and miscellaneous services

<sup>13</sup>It is a negatively worded item. See methodology for negative and positive worded items in the questionnaire.

provided at the hospital. Interestingly, availability of medicines from hospital's pharmacy received a high satisfaction ranking by consumers (mean= 4.23). It is followed by accessibility to radiography and laboratory facilities (mean= 4.16), and having appointments for these medical facilities (mean = 4.14). In addition, outside signage to assist patients and caregivers about health care departments and other hospital premises was also found to be highly helpful by consumers (mean=3.88). It is noted that consumers have to spent significant time before having access to referral (mean= 2.80). Based on earlier argument, it also partly indicates burden of patients visiting the hospital on a daily basis. Moreover, accessibility to clean toilets and availability of clean drinking water at the hospital were other key concerns of consumers at the hospital (mean values of 1.91). It tends to indicate cleanliness and hygiene in washrooms is one of the major issues of the hospital along with inaccessibility of clean drinking water. It may be inferred that partly cleanliness in toilets are not maintained by the janitors and might be due to excessive burden of individuals using these facilities.

Physical accessibility to hospital (in terms of distance covered) also received low satisfaction ranking by consumers (mean= 2.5). The estimate suggests that hospital for most consumers is not in close vicinity of their residences. Therefore majority of patients have to travel considerable distances to avail health facilities. Since the hospital is the only medical establishment in the region which covers a large circumference of rural as well as urban areas, congestion of consumers at the hospital may also be explained by it being the lone facility in the area.

Table 7

*Descriptive Statistics of Access and Availability Scale Items*

|  | Min | Max | Mean | S.D  |
|--|-----|-----|------|------|
| Hospital is easily approachable                                | 1   | 5   | 2.50 | 1.26 |
| Outside signage  | 1   | 5   | 3.88 | 0.66 |
| Kept waiting for long to see doctor                            | 1   | 5   | 2.80 | 1.23 |
| Clean and separate WC  | 1   | 4   | 1.91 | 1.07 |
| Clean drinking water for patients                              | 1   | 4   | 1.91 | 0.98 |
| Easy to get medicine from the hospital                         | 2   | 5   | 4.23 | 0.91 |
| Easy to get appointment at radiography and lab                 | 1   | 5   | 4.14 | 0.64 |
| Confident for choosing days to perform radiography examination | 1   | 5   | 3.19 | 1.13 |
| Usually kept waiting for lab and radiography examination       | 1   | 5   | 2.79 | 1.21 |
| Easy to approach radiography and laboratory examination        | 2   | 5   | 4.16 | 0.49 |

Table 8 presents descriptive statistics of scales. As estimates suggest GS scale indicates skewed distribution from medium to high level of satisfaction. Average values and frequency distribution of technical quality and interpersonal aspects tends to indicates increasing concentration from high to medium satisfaction. Communication scale is highly skewed towards medium to low satisfaction levels (see Table 8 for descriptive statistics).

Table 8

*Descriptive Statistics of Scales*

| Scale                        | No. of Items | Min | Max | Mean | S.D  |
|------------------------------|--------------|-----|-----|------|------|
| General Satisfaction (GS)    | 8            | 24  | 39  | 30.5 | 2.94 |
| Technical Quality (TQ)       | 4            | 8   | 19  | 14.7 | 2.11 |
| Interpersonal Aspects (IP)   | 8            | 15  | 36  | 27.7 | 3.56 |
| Communication (COM)          | 8            | 14  | 35  | 22.4 | 4.18 |
| Financial Aspect (FA)        | 1            | 1   | 5   | 4.8  | 0.67 |
| Time Spent with Doctor (TD)  | 1            | 1   | 5   | 3.7  | 1.02 |
| Access and Availability (AA) | 10           | 19  | 41  | 31.5 | 3.67 |

**7.2 (b) Socio-economic Factors in Measuring Comparative Perceptions**

The study has examined socio-economic factors such as gender, education, age groups, income, and registration status of respondents i.e. registered worker or dependent affects on measuring comparative perceptions.

**Gender**

As indicated earlier, financial aspect (comprised of one item) is the most highly ranked aspect. In overall sample, a staggering proportion of patients indicated high levels of satisfaction with health protection at PESSI (around 97 percent). With no statistical significant variation across gender ( $P > 0.05$ ), female consumers expressed relatively complete satisfaction with the scale compared to 94 percent of male consumers. In total, more than three-fourths of patients indicated high satisfaction with 'time spent with doctor'. Female patients expressed high satisfaction with the scale (84.3 percent) compared to males (70.8 percent). This difference is not found statistically significant with greater variation by gender ( $P > 0.05$ ). However, interestingly, a noticeable proportion of consumers (more than one fifth) in overall sample expressed dissatisfaction with the scale, which is mainly influenced by male consumers ranking of the scale (26.2 percent).

In total, general satisfaction scale also represents high level of satisfaction (66.4 percent of consumers) whereas a noticeable one-third of patients also ranked it in medium level of satisfaction. No significant variation in perceptions was found by gender i.e. chi square is  $P=0.197$ . Overall, most patients ranked communication scale in terms of medium satisfaction (62.1 percent). Male consumers appear more satisfied than females in communication, which represent a noticeable share of low satisfaction (35.3 percent) with  $P= 0.663$ . More than three-tenths of consumers also ranked low satisfaction level with communication scale which is mainly influenced by female estimates. Mixed responses were noted in interpersonal aspects with almost equally proportionate responses in medium to high levels of patient satisfaction. Female consumers were found to be relatively less satisfied compared to male consumers. Conversely, under technical quality, female consumers expressed high satisfaction than males (68.6 and 58.5 percent respectively) whereas noticeable share of medium satisfaction was also estimated across females and males (29.4 and 33.8 percent respectively). All differences by gender were statistically not significant in technical quality. Access and availability was ranked medium level in quality with no statistical significant variation by gender  $P= 0.131$ . For detailed statistics, see Table 9 below.

Table 9

*Levels of Consumer Satisfaction by Gender (in Percentage)*

|     | Male (65)   |             |             | Female (51)  |             |             | Total (116)  |              |             | Chi-Sq |
|-----|-------------|-------------|-------------|--------------|-------------|-------------|--------------|--------------|-------------|--------|
|     | High        | Med         | Low         | High         | Med         | Low         | High         | Med          | Low         |        |
| GS  | 42<br>64.6% | 23<br>35.4% |             | 35<br>68.6%  | 16<br>31.4% |             | 77<br>66.4%  | 39<br>33.6%  |             | 0.65   |
| TQ  | 38<br>58.5% | 22<br>33.8% | 5<br>7.7%   | 35<br>68.6%  | 15<br>29.4% | 1<br>2.0%   | 73<br>62.9%  | 37<br>31.9%  | 6<br>5.2%   | 0.292  |
| IPA | 32<br>49.2% | 32<br>49.2% | 1<br>1.5%   | 23<br>45.1%  | 26<br>51.0% | 2<br>3.9%   | 55<br>47.4%  | 58<br>50.0%  | 3<br>2.6%   | 0.688  |
| COM | 5<br>7.7%   | 42<br>64.6% | 18<br>27.7% | 3<br>5.9%    | 30<br>58.8% | 18<br>35.3% | 8<br>6.9%    | 72<br>62.1%  | 36<br>31.0% | 0.663  |
| FA  | 61<br>93.8% | 1<br>1.5%   | 3<br>4.6%   | 51<br>100.0% | 0<br>0.0%   | 0<br>0.0%   | 112<br>96.6% | 1<br>0.9%    | 3<br>2.6%   | 0.197  |
| TS  | 46<br>70.8% | 2<br>3.1%   | 17<br>26.2% | 43<br>84.3%  | 0<br>0.0%   | 8<br>15.7%  | 89<br>76.7%  | 2<br>1.7%    | 25<br>21.6% | 0.157  |
| AA  | 10<br>15.4% | 53<br>81.5% | 2<br>3.1%   | 2<br>3.9%    | 47<br>92.2% | 2<br>3.9%   | 12<br>10.3%  | 100<br>86.2% | 4<br>3.4%   | 0.131  |

### **Education**

Consumer satisfaction ranking with respect to education are given in Table 10. Excluding financial aspect, ranked consistently high with no significant variation by education  $P=0.148$ , technical quality was the highest ranked scale of satisfaction across education followed by medium ranking. There was significant variation in perceptions in technical quality having no statistical significance by education having  $P = 0.167$ . High ranking of technical quality is estimated to be inversely related to successive years of education till high school educated consumers. Generally, GS scale mostly represents high consumer satisfaction (with greater proportion of respondents) across education whereas noticeable share of patients across all education groups also noted as ranking the scale with low levels of satisfaction. The lower rankings are mainly influenced by college and literate categories. In our data, high satisfaction with Interpersonal aspects shows a consistent inverse relationship with each successive increase of education group. It declines from 60.6 percent to 40 percent between college educated consumers and illiterates. However, no statistically significant variation was estimated in responses by education.

Across education, communication scale was primarily ranked in medium satisfaction category; however, it also represents highest proportion of consumers who expressed dissatisfaction with the scale (low ranking). College educated consumers expressed highest proportion of dissatisfaction compared to other education groups.

The interesting finding is that, excluding access and availability scale, illiterate consumers expressed high levels of satisfaction with all scales compared to other education groups. These comparative estimates tend to suggest that consumers with no education have low aspirations; little comprehension about quality of services due to confined exposure to other health facilities, and resultantly has high satisfaction levels.

Table 10

*Level of Consumer Satisfaction by Education (in Percentage)*

|     | Illet(33) |       |       | Liter(17) |       |       | High School(46) |       |       | College(20) |       |       | Total(116) |       |       | CHI-SQ |
|-----|-----------|-------|-------|-----------|-------|-------|-----------------|-------|-------|-------------|-------|-------|------------|-------|-------|--------|
|     | High      | Med   | Low   | High      | Med   | Low   | High            | Med   | Low   | High        | Med   | Low   | High       | Med   | Low   |        |
| GS  | 23        | 10    |       | 10        | 7     |       | 33              | 13    |       | 11          | 9     |       | 77         | 39    |       | 0.503  |
|     | 69.7%     | 30.3% |       | 58.8%     | 41.2% |       | 71.7%           | 28.3% |       | 55.0%       | 45.0% |       | 66.4%      | 33.6% |       |        |
| TQ  | 24        | 9     | 0     | 10        | 4     | 3     | 26              | 18    | 2     | 13          | 6     | 1     | 73         | 37    | 6     | 0.167  |
|     | 72.7%     | 27.3% | 0.0%  | 58.8%     | 23.5% | 17.6% | 56.5%           | 39.1% | 4.3%  | 65.0%       | 30.0% | 5.0%  | 62.9%      | 31.9% | 5.2%  |        |
| IPA | 20        | 13    | 0     | 8         | 9     | 0     | 19              | 25    | 2     | 8           | 11    | 1     | 55         | 58    | 3     | 0.525  |
|     | 60.6%     | 39.4% | 0.0%  | 47.1%     | 52.9% | 0.0%  | 41.3%           | 54.3% | 4.3%  | 40.0%       | 55.0% | 5.0%  | 47.4%      | 50.0% | 2.6%  |        |
| COM | 1.7%      | 8.6%  | 6.9%  | 1         | 10    | 6     | 1               | 32    | 13    | 2           | 10    | 8     | 8          | 72    | 36    | 0.556  |
|     | 4         | 20    | 9     | 5.9%      | 58.8% | 35.3% | 2.2%            | 69.6% | 28.3% | 10.0%       | 50.0% | 40.0% | 6.9%       | 62.1% | 31.0% |        |
| FAC | 33        | 0     | 0     | 17        | 0     | 0     | 43              | 0     | 3     | 19          | 1     | 0     | 112        | 1     | 3     | 0.148  |
|     | 100.0%    | 0.0%  | 0.0%  | 100.0%    | 0.0%  | 0.0%  | 93.5%           | 0.0%  | 6.5%  | 95.0%       | 5.0%  | 0.0%  | 96.6%      | 0.9%  | 2.6%  |        |
| TS  | 27        | 0     | 6     | 12        | 0     | 5     | 35              | 2     | 9     | 15          | 0     | 5     | 89         | 2     | 25    | 0.663  |
|     | 81.8%     | 0.0%  | 18.2% | 70.6%     | 0.0%  | 29.4% | 76.1%           | 4.3%  | 19.6% | 75.0%       | 0.0%  | 25.0% | 76.7%      | 1.7%  | 21.6% |        |
| ACC | 3         | 28    | 2     | 3         | 14    | 0     | 5               | 39    | 2     | 1           | 19    | 0     | 12         | 100   | 4     | 0.710  |
|     | 9.1%      | 84.8% | 6.1%  | 17.6%     | 82.4% | 0.0%  | 10.9%           | 84.8% | 4.3%  | 5.0%        | 95.0% | 0.0%  | 10.3%      | 86.2% | 3.4%  |        |

### Age Groups

Almost every study has estimated significance of patient age along with self-reported health status. In particular, older patients have drawn more research interest in consumer perceptions. It seems to be based on the proposition that older populations (usually > 60 years) are the most frequent recipient of health care services. It has also been noted as a consistent finding that older patients tend to be more satisfied with their health care [Thiedke (2007)]. The study estimates appear to confirm these findings.<sup>14</sup>

As the statistics *indicate*, almost across all scales (excluding communication), consumers with ages of 46 years and above, ranked high satisfaction compared to other age categories. Under general satisfaction, 90.5 percent of older consumers expressed satisfaction with health care services followed by 18-30 years age group (69 percent). Likewise, with technical quality, 71 percent of older consumers expressed high levels of satisfaction, which is estimated as a consistent decline across younger consumer groups. In interpersonal aspects, a significant proportion of consumers across all age groups expressed medium levels of satisfaction whereas in communication scale, a noticeable proportion of consumers expressed dissatisfaction with services provided under the scale. This was found consistent across all age groups. Similar to interpersonal aspects, access and availability was predominantly ranked in medium satisfaction category across age groups.

Table 11

#### *Level of Consumer Satisfaction by Age (in Percentage)*

|     | 18-30 Years (39) |       |       | 31-45 Years (56) |       |       | 46 & above (21) |       |       | Total (116) |       |       | Chi-Sq |
|-----|------------------|-------|-------|------------------|-------|-------|-----------------|-------|-------|-------------|-------|-------|--------|
|     | High             | Med   | Low   | High             | Med   | Low   | High            | Med   | Low   | High        | Med   | Low   |        |
| GS  | 27               | 12    |       | 31               | 25    |       | 19              | 2     |       | 77          | 39    |       | 0.013  |
|     | 69.2%            | 30.8% |       | 55.4%            | 44.6% |       | 90.5%           | 9.5%  |       | 66.4%       | 33.6% |       |        |
| TQ  | 22               | 14    | 3     | 36               | 18    | 2     | 15              | 5     | 1     | 73          | 37    | 6     | 0.752  |
|     | 56.4%            | 35.9% | 7.7%  | 64.3%            | 32.1% | 3.6%  | 71.4%           | 23.8% | 4.8%  | 62.9%       | 31.9% | 5.2%  |        |
| IPA | 15               | 23    | 1     | 28               | 26    | 2     | 12              | 9     | 0     | 55          | 58    | 3     | 0.575  |
|     | 38.5%            | 59.0% | 2.6%  | 50.0%            | 46.4% | 3.6%  | 57.1%           | 42.9% | 0.0%  | 47.4%       | 50.0% | 2.6%  |        |
| COM | 3                | 25    | 11    | 4                | 33    | 19    | 1               | 14    | 6     | 8           | 72    | 36    | 0.956  |
|     | 7.7%             | 64.1% | 28.2% | 7.1%             | 58.9% | 33.9% | 4.8%            | 66.7% | 28.6% | 6.9%        | 62.1% | 31.0% |        |
| FA  | 38               | 0     | 1     | 55               | 0     | 1     | 19              | 1     | 1     | 112         | 1     | 3     | 0.273  |
|     | 97.4%            | 0.0%  | 2.6%  | 98.2%            | 0.0%  | 1.8%  | 90.5%           | 4.8%  | 4.8%  | 96.6%       | 0.9%  | 2.6%  |        |
| TS  | 28               | 1     | 10    | 44               | 1     | 11    | 17              | 0     | 4     | 89          | 2     | 25    | 0.882  |
|     | 71.8%            | 2.6%  | 25.6% | 78.6%            | 1.8%  | 19.6% | 81.0%           | 0.0%  | 19.0% | 76.7%       | 1.7%  | 21.6% |        |
| ACC | 4                | 34    | 1     | 4                | 49    | 3     | 4               | 17    | 0     | 12          | 100   | 4     | 0.466  |
|     | 10.3%            | 87.2% | 2.6%  | 7.1%             | 87.5% | 5.4%  | 19.0%           | 81.0% | 0.0%  | 10.3%       | 86.2% | 3.4%  |        |

### Household Income

As mentioned earlier, industrial workers earning up to Rs 5,000 per month (and their dependents) are eligible for registration and medical benefits at PESSI hospitals over all Pakistan. For analysis of data, we have categorised income groups on the basis of

<sup>14</sup>Although, in our study sample, only 12 percent of the respondents were greater than fifty years. Only 3 percent consumers had a minimum age of sixty years compared to international studies where older patients comprise significant proportions.

this income level. Based on tests of significance, variation in satisfaction levels by income groups have been estimated to be significant.

Consumers by both income categories apparently ranked technical quality as the most highly satisfied scale. It was followed by general satisfaction scale i.e., 72.2 percent of consumers (monthly household income > Rs 5,000) expressed higher satisfaction compared to around 55 percent with monthly household income < Rs 5,000. However, there is a significant proportion in both categories which also ranked GS as medium satisfaction scale. In both categories, medium satisfaction with access and availability, and interpersonal aspects is noted for the scale.

Table 12

|     | <i>Level of Consumer Satisfaction by Household Income (in Percentage)</i> |       |       |                   |       |       |             |       |       | Chi-Sq |
|-----|---|-------|-------|-------------------|-------|-------|-------------|-------|-------|--------|
|     | Income > 5000(54)   |       |       | Income > 5000(62) |       |       | Total (116) |       |       |        |
|     | High  | Med   | Low   | High              | Med   | Low   | High        | Med   | Low   |        |
| GS  | 36  | 18    |       | 41                | 21    |       | 77          | 39    |       | 0.951  |
|     | 66.7%   | 33.3% |       | 66.1%             | 33.9% |       | 66.4%       | 33.6% |       |        |
| TQ  | 39  | 14    | 1     | 34                | 23    | 5     | 73          | 37    | 6     | 0.097  |
|     | 72.2%   | 25.9% | 1.9%  | 54.8%             | 37.1% | 8.1%  | 62.9%       | 31.9% | 5.2%  |        |
| IPA | 29  | 22    | 3     | 26                | 36    | 0     | 55          | 58    | 3     | 0.049  |
|     | 53.7%   | 40.7% | 5.6%  | 41.9%             | 58.1% | 0.0%  | 47.4%       | 50.0% | 2.6%  |        |
| COM | 4   | 35    | 15    | 4                 | 37    | 21    | 8           | 72    | 36    | 0.776  |
|     | 7.4%  | 64.8% | 27.8% | 6.5%              | 59.7% | 33.9% | 6.9%        | 62.1% | 31.0% |        |
| FAC | 51  | 1     | 2     | 61                | 0     | 1     | 112         | 1     | 3     | 0.431  |
|     | 94.4%   | 1.9%  | 3.7%  | 98.4%             | 0.0%  | 1.6%  | 96.6%       | 0.9%  | 2.6%  |        |
| TS  | 42  | 1     | 11    | 47                | 1     | 14    | 89          | 2     | 25    | 0.956  |
|     | 77.8%   | 1.9%  | 20.4% | 75.8%             | 1.6%  | 22.6% | 76.7%       | 1.7%  | 21.6% |        |
| ACC | 7   | 46    | 1     | 5                 | 54    | 3     | 12          | 100   | 4     | 0.490  |
|     | 13.0%   | 85.2% | 1.9%  | 8.1%              | 87.1% | 4.8%  | 10.3%       | 86.2% | 3.4%  |        |

### **Registration Status**

According to estimates (Table 13), across all scales, dependents were found to be more satisfied with services provided at the hospital. In general satisfaction scale, 72.5 percent of dependents expressed high level of satisfaction. Almost, 39 percent of secured workers indicated medium level of satisfaction. Similarly, more than two-thirds of dependents indicated high satisfaction with aspects of technical quality (29.4 percent indicated medium satisfaction) whereas more than one thirds of secured workers mentioned medium satisfaction. In interpersonal and communication scales, high satisfaction with quality of services is estimated to be relatively lower mainly concentrated in medium satisfaction scale. Almost similar results have been estimated for access and availability scale.

Table 13

*Level of Consumer Satisfaction by Registration Status (in Percentage)*

|     | Secured (65) |       |       | Dependent (61) |       |       | Total (116) |       |       | Chi-Sq |
|-----|--------------|-------|-------|----------------|-------|-------|-------------|-------|-------|--------|
|     | High         | Med   | Low   | High           | Med   | Low   | High        | Med   | Low   |        |
| GS  | 40           | 25    |       | 37             | 14    |       | 77          | 39    |       | 0.213  |
|     | 61.5%        | 38.5% |       | 72.5%          | 27.5% |       | 66.4%       | 33.6% |       |        |
| TQ  | 38           | 22    | 5     | 35             | 15    | 1     | 73          | 37    | 6     | 0.292  |
|     | 58.5%        | 33.8% | 7.7%  | 68.6%          | 29.4% | 2.0%  | 62.9%       | 31.9% | 5.2%  |        |
| IPA | 27           | 36    | 2     | 28             | 22    | 1     | 55          | 58    | 3     | 0.355  |
|     | 41.5%        | 55.4% | 3.1%  | 54.9%          | 43.1% | 2.0%  | 47.4%       | 50.0% | 2.6%  |        |
| COM | 3            | 41    | 21    | 5              | 31    | 15    | 8           | 72    | 36    | 0.544  |
|     | 4.6%         | 63.1% | 32.3% | 9.8%           | 60.8% | 29.4% | 6.9%        | 62.1% | 31.0% |        |
| FA  | 61           | 1     | 3     | 51             | 0     | 0     | 112         | 1     | 3     | 0.197  |
|     | 93.8%        | 1.5%  | 4.6%  | 100.0%         | 0.0%  | 0.0%  | 96.6%       | 0.9%  | 2.6%  |        |
| TS  | 45           | 2     | 18    | 44             | 0     | 7     | 89          | 2     | 25    | 0.073  |
|     | 69.2%        | 3.1%  | 27.7% | 86.3%          | 0.0%  | 13.7% | 76.7%       | 1.7%  | 21.6% |        |
| ACC | 10           | 53    | 2     | 2              | 47    | 2     | 12          | 100   | 4     | 0.131  |
|     | 15.4%        | 81.5% | 3.1%  | 3.9%           | 92.2% | 3.9%  | 10.3%       | 86.2% | 3.4%  |        |

## 8. DISCUSSION, CONCLUSION AND RECOMMENDATION

Recent research considers consumer perceptions with health care services as an essential part of understanding and assessing quality. In market-based health systems, most notably in developed countries, patient satisfaction has become an integral part in evaluating quality of health services. It is principally based on recognition of patient as a consumer and also payer of services has acknowledged rights and protection. In addition, the importance of consumer satisfaction also stems from the fact that quality perceptions are one of the important indicators which measure the reputation of hospitals and thereby draws more consumers if the reputation of services is high.

Many studies have explored patient's perceived satisfaction for outpatient services from different dimensions, such as waiting times, courtesy and interpersonal skills, professionalism and so on. However, in Pakistan, such evaluation of services is rare in Pakistan and particularly for PESSI hospitals, they are non-existent. In this study, we have examined outpatient satisfaction in terms of isolated items representing services as well as perceptions on quality of scales. Furthermore, socio-economic characteristics of patients have been examined in influencing ranking of quality of scales. Both methodologies have been important in explaining the influence of multiple factors on satisfaction. For this present study, we have only focussed on patient perceptions about satisfaction level; however, it is felt that there is room for further analysis in terms of understanding customer expectation about health services in context of socio-economic characteristics of patients.

Regarding patients satisfaction in terms of education, it has been observed that illiterate patients generally expressed higher satisfaction with quality of scales compared to other education groups. In our study we have illiterate (36.4 percent), literate (14.5 percent), matriculate (34.5 percent) and above metric (14.5 percent) patients showing high level of satisfaction. Further in our analysis, satisfaction levels of females generally were found to be higher for most scales in comparison to males. This may be due to the

sub-sample of females which predominantly comprise dependents. Being dependents in social context of Pakistan, women have presumably limited exposure to variety of services available in the health market. Being economically subjugated as dependents, they also have little aspirations. It may be inferred that, partly due to influence of these factors, women generally tend to have higher satisfaction. Interestingly, patient satisfaction may not necessarily mean that quality is good; it may only indicate that expectations are low

Over all, based on evaluation of services at PESSI hospital through customer satisfaction, it is noted that there is good evidence available that the hospital offers certain benefits to its customers which are usually lacking in most government sector hospitals. First and foremost is the aspect of social health protection in terms of financial security that has been given to registered workers and their dependents. In a country like Pakistan where health protection is a luxury for majority of population, risk pooling mechanism of the hospital offers considerable fiscal relief to its recipients. Other aspects like free availability of medicines, relatively better treatment of doctors, generally courteous behaviour of medical staff including doctors, accessibility of radiographic facilities, and relatively comfortable physical environment are some other significant benefits which are offered by the hospital.

On the other hand, it has been noted that partly due to relative advantages of the hospital (presumably from public sector hospitals), there is excessive influx of patients at the hospital from far off areas on a daily basis involving high travel costs. It has been noted that patients may prefer to travel to a more distant facility if they feel that it provides better services, including a range of care options [Creel, *et al.* (2002)]. However, there is resultant congestion and some of the standards for certain health care items are jeopardised. For instance, cleanliness and hygiene of certain physical premises such as washrooms is noted as a major health issue at the hospital. Likewise, unavailability of clean drinking water was also a source of concern for customers. The element of hospital congestion may also be inferred in terms of waiting time customers have to go through before consultation with the doctor. In addition, communication scale in general has received particularly low rating. Also, there is a need to improve the quality of items in other scales including general satisfaction, interpersonal skills, and access and availability aspects. In the absence of any indigenous HMIS system, the hospital needs to focus on improving the quality of these scales since it has been catering to significant population of workers and their dependents.

## REFERENCES

- AbouZahr, C., *et al.* (1996) Quality Health Care for Women: A Global Challenge. *Health Care for Women International* 17, 449–67.
- Akram, M. and Fahim Jehangir Khan (2007) Health Care Services and Government Spending in Pakistan. Pakistan Institute of Development Economics, Islamabad, Pakistan. (PIDE Working Papers 32).
- Asian Development Bank (2005) Technical Assistance to the Islamic Republic of Pakistan for the Developing Social Health Insurance Project. Asian Development Bank, Islamabad, Pakistan (TAR: PAK 37359).

- Barr, K. J. and S. Banks (2002) Public Reporting of Hospital Patient Satisfaction: A Review of Survey Methods and Statistical Approaches. Prepared for the Rhode Island Department of Health, Health Quality Performance Measurement and Reporting Programme.
- Carr-Hill, R. A. (1992) The Measurement of Patient Satisfaction. *Journal of Public Health Medicine* 14: 3, 236–249.
- Cleary, P. D., S. Edgman-Levitan, and M. Roberts, *et al.* (1991) Patients Evaluate Their Hospital Care: A National Survey. *Health Affairs* 254-267, Winter.
- Creel, L. C., J. V. Sass, and N. V. Yinger (2002) Client-Centred Quality: Clients. Perspectives and Barriers to Receiving Care. Population Reference Bureau Measure, Connecticut, USA.
- Donabedian, A. (1980) Explorations in Quality Assessment and Monitoring: The Definition of Quality and Approaches to Assessment; Ann Arbor, MI: Health Administration Press.
- Engs, R. C. (1970) The Health Concern Questionnaire. University of Oregon, Eugene.
- Finkelstein, B. S., J. Singh, and J. B. Silvers, *et al.* (1998) Patient and Hospital Characteristics Associated with Patient Assessments of Hospital Obstetrical Care. *Medical Care* 36: 8, 68–78.
- Haas, D. W. (1994) The Relationships between the Dimensions of Health Care Quality and Price: The Case of Eye Care. *Medical Care* 32: 2, 175–183.
- Hargraves, J. L., I. B. Wilson, and A. Zaslavsky, *et al.* (2001) Adjusting for Patient Characteristics when Analysing Reports from Patients About Hospital Care. *Medical Care* 39: 6, 635–641.
- Kenagy, J. W., D. M. Berwick, and M. F. Shore (1999) Service Quality in Health Care. *JAMA* 281: 7, 661–665.
- Mahmood, N., and S. M. Ali (2003) The Disease Pattern and Utilisation of Health Care Services in Pakistan. *The Pakistan Development Review* 41: 4, 745–757.
- Marshall, G. N., R. D. Hays, and R. Mazel (1996) Health Status and Satisfaction with Health Care: Results from the Medical Outcomes Study. *Journal of Consulting and Clinical Psychology* 64: 2, 380–390.
- Michalos, A. C. (2003) *Essays on the Quality of Life*. Kluwer Academic Publishers, Norwell, MA 02061, USA.
- Murray, C. J. L., and J. Frenk (1999) WHO Framework for Health System Performance Assessment. WHO, Geneva. (GEP Discussion Paper No. 6).
- Owens, D. J., and C. Batchelor (1996) Patient Satisfaction and the Elderly. *Social Science and Medicine* 42:11,1483–1491.
- Pakistan, Government of (2005) *Economic Survey of Pakistan*. Islamabad: Ministry of Finance and Economic Affairs.
- Rosenheck, R., N. J. Wilson, and M. Meterko (1997) Influence of Patient and Hospital Factors on Consumer Satisfaction with Inpatient Mental Health Treatment. *Psychiatric Services* 48: 12, 1553–1561.
- Shaikh, B. T., and F. Rabbani (2004) Health Management Information System: A Tool to Gauge Patient Satisfaction and Quality of Care. Health Systems Division, Department of Community Health Sciences, Aga Khan University, Karachi, Pakistan.

- Sitzia, J. and N. Wood (1997) Patient Satisfaction: A Review of Issues and Concepts. *Social Science and Medicine* 45:12, 1829–1843.
- Smith, C. (1992) Validation of a Patient Satisfaction System in the United Kingdom. *Quality Assurance in Health Care* 4:3, 171–177.
- Theodosopoulou, E., V. Raftopoulos and E. Krajewska-Kułak, *et al.* (2007) A Study to Ascertain the Patients' Satisfaction of the Quality of Hospital Care in Greece Compared with the Patients' Satisfaction in Poland. *Advance Medical Science* 52 (Suppl. 1), 36–39.
- Thi, P. L., S. Briancon, F. Empeur, and F. Guillemin (2002) Factors Determining Inpatient Satisfaction with Care. *Social Science and Medicine* 54: 4, 493–504.
- Thiedke, Carolyn C. (2007) What Do We Really Know About Patient Satisfaction? Family Practice Management, American Academy of Family Physicians, USA.
- Van, C. C., H. J. Sixma, J. J. Kressens, L. Peters, and J. J. Rasker (1998) Assessing Patients' Priorities and Perceptions of the Quality of Health Care: The Development of the QUOTE-Rheumatic Patients' Instrument. *British Journal of Rheumatology* 37, 362–368.
- Ware, J. E., M. K. Snyder and W. R. Wright (1976) Development and Validation of Scales to Measure Patient Satisfaction with Medical Care Services. Vol. I, Part A: *Review of Literature, Overview of Methods, and Results Regarding Construction of Scales.* (NTIS Publ. No. PB 288-329) Springfield, VA, National Technical Information Service.
- Ware, J. E., M. K. Snyder, W. R. Wright, and A. R. Davies (1986) Defining and Measuring Patient Satisfaction with Medical Care. *Evaluation and Program Planning* 6, 247–263.
- White, Brandi (1999) Measuring Patient Satisfaction: How to Do It and Why to Bother. Family Practice Management. American Academy of Family Physicians.
- Yıldız, Z. (2004) Measuring Patient Satisfaction of the Quality of Health Care: A Study of Hospitals in Turkey. *Journal of Medical Systems* 28:6, 581–589.
- Young, G. J., M. Meterko, and K. R. Desai (2000) Patient Satisfaction with Hospital Care: Effect of Demographic and Institutional Characteristics. *Medical Care* 38:3, 325–334.

## Comments

The study is focused on evaluating the quality aspects of health care provision using consumer satisfaction as an instrument to assess patients' perceptions about the use of services. I appreciate the authors' effort to address a crucial topic for evaluating health care systems and its quality for which limited information and research is available in Pakistan. Using Patient Satisfaction Questionnaire (PSQ) technique measured on a five category scale ranging from 'strongly agree' to 'strongly disagree', self perceptions of individuals, the study analyses consumer satisfaction about health care services. The sampled population is drawn from a Social Security Hospital in Rawalpindi, established under the social protection scheme in the Punjab province.

After a comprehensive review of literature on dimensions of quality in consumer satisfaction and the operating of health protection schemes in Pakistan, the authors have tried to justify the relevance of the study in using evaluation of its quality through patients' satisfaction criteria. However, the paper has a number of limitations regarding the study design, sample selection and its size, data collection methodology and data reliability which will be discussed briefly.

Based on the sampled population of a social security hospital in Rawalpindi, the study has strong built-in selection bias by presenting a case study of a small hospital. From a pool of 37,000 hospital employees and 200,000 dependents as service users, the data has been collected from only 120 respondents—a sample too small to be representative for a meaningful analysis.

As for the data collection methodology, only outpatients visiting the hospital for seeking health services during certain hours have been interviewed about the satisfaction of services, whereas in-patients who are admitted in the hospital and spend longer time and use multiple services for curative and treatment process, as well as the medical staff who provide those services, have been left out. The results thus represent the perceptions of outpatients only leaving out the input by the medical staff and inpatients who are equally important in giving opinion about health service provision and its quality. Moreover, the consumers' responses on the quality of services provided at the hospital have been captured through five relative scores based on personal perceptions (see Table 1 in the paper) that are hard to quantify and explain the distance between categories of responses.

Looking at the socio-economic characteristics of the study sample (Table 3), it is apparent that the respondents with a mean age of 37 years have largely low education level, low monthly household income, and an average family size of 5.4 children—factors that are all reflective of low socioeconomic status. However, a majority of respondents have indicated high level of satisfaction about the quality of services. This might reflect the biased perceptions of respondents because the hospital selected is managed by the Social Security Scheme of the government with services offered at very

low price or user charges mainly to facilitate medical benefits to the registered employees and its dependent families, who mostly have low socio-economic status and hence feel satisfied with free availability of services. Certainly, the perceptions of consumer satisfaction in private hospitals with high costs and user charges would be different than presented here and the results would become more meaningful if compared with a privately managed hospital with high price charged for services. Moreover, many other quality indicators such as patient/doctor ratio, client inflow, type of services offered, quality of the paramedic and technical staff, etc., would be useful additions to assess service quality and consumer satisfaction.

In all, the study is stretched far with detailed data and tabulations on only 120 respondents raising many questions than giving answers about the utility of this approach to assess quality aspects of health services, and about how to improve services at social security institutions and making policy interventions at other health service outlets. I suggest that some sections of the paper including literature review, health protection and social assistance schemes could be synthesised to present it as a conference paper.

**Naushin Mahmood**

Pakistan Institute of Development Economics,  
Islamabad.

## **Inter-Governmental Funds Flows in Pakistan: Are they Reducing Poverty?**

QAZI MASOOD AHMED and AKHTAR LODHI

### **1. INTRODUCTION**

Pakistan is a constituent of four federating units—Punjab, Sindh, Khyber Paktunkhwa and Balochistan. There is a huge difference in the extent and quality of public services provision among these provinces. The variation in public service provision, that was mainly the result of intergovernmental fiscal transfers has created vertical and horizontal imbalances among the provinces, which were further translated into the districts of each province.

In Pakistan, like other developing countries, well defined and constitutionally protected intergovernmental fiscal transfer systems are operational. The National Finance Commission is a prime arrangement for the distribution of funds among the federal and provincial governments. Whereas the Provincial Finance Commission is responsible for the distribution of funds among the provincial, districts and sub-district governments. In Pakistan the prime responsibility of tax collection lies with the federal government, whereas, the responsibilities of the provision of social, economic and community services lies with the provincial and districts government. The purpose of the transfers in Pakistan from higher to lower level governments is to bridge the gap between the revenue and expenditures and to promote the equitable growth. This will also help reducing poverty among the districts.

The new system of devolution implemented in 2001 has brought several changes in the intergovernmental fiscal relationship among the provinces and districts. After devolution 2001 the provision of social services and few economic services were transferred to the district governments. This entails and envisages a new and comprehensive fiscal relationship between the Province and the Districts. The Provincial Finance Commission (PFC), a special feature of the 2001 devolution, announces a three year horizon and formula for the distribution of resources which predicts the flow of funds to the districts from the province.

The intergovernmental transfer systems have various objectives. However, the fiscal equalisation and redistribution of funds among the different tiers of government are the prime objectives of the fiscal transfer. The PFC gives a formula based allocation of

Qazi Masood Ahmed <qmasood@iba.edu.pk> is Director Research, Institute of Business Administration, Karachi. Akhtar Lodhi <akhtar.lodhi@aerc.edu.pk> is Research Economist, Applied Economics Research Centre, University of Karachi, Karachi.

funds among the districts to minimise the deprivation among the districts. The PFC deals with both vertical inequity—the inequity between the provincial government and districts governments—and horizontal inequity—inequities among the districts.

Since 2001 in each province the two PFC awards have been announced so far, first in 2001 and second in 2007. Similarly, attempts were also made to construct district wise deprivation index in each province like Social Policy and Development Centre (SPDC) in 1998 and in 2005. The Deprivation Index indicates in each district of each province the number of people who do not access to basic needs of education, health, clean water and housing. Haroon (2007) constructed deprivation index for each district in Pakistan. The selection of indicators is based on the theory and district-wise data availability. These include literacy rate and out of School children, housing quality and congestion, residential housing services and employment status. The gender disparity is incorporated taking these measures separately for male and female population.

The purpose of this paper is to see whether any link can be ascertained between the PFC transfer and the deprivation index. The link between the funds transfer and deprivation index will indicate whether the funds transfer is pro-poor districts and fiscal equaliser or not.

The paper is organised as follow. Section 2 reviews the literature on the theoretical and applied issues of fiscal equalisation. Section 3 gives data collection, methodology and results and Section 4 gives the conclusion and policy implication.

## 2. REVIEW OF LITERATURE

There is a rich literature on fiscal federalism both on theoretical and applied aspects. Bhal, Boex and Vazquez (2002) discuss the issues of designing of intergovernmental fiscal transfer. This study mentions the generally accepted reasons for intergovernmental fiscal transfer are—improving vertical fiscal imbalances, improving the horizontal fiscal balances, compensating for externalities and funding for merits goods. Boex (2002) develop allocation formula for Decentralised Financing and Development Programme in Nepal. Boex (2002) included relative weight of rural population, relative weight of fiscal need and relative weight of development in the distributional formula. The paper highlight when there is suspect of measurement errors the Human Development Index should not be used as it will not be fiscal equaliser.

Qiao, *et al.* (2002) using panel data between 1985 and 1998 in China find that there is positive relationship exists between the growth and inequality, which implies higher growth will lead more inequality. Hofman and Guerra (2002) explain causes and consequences of fiscal inequities among sub-national government in East Asia. This study using the data of five countries China, Indonesia, Philippines, Thailand and Viet Nam reveals that endowment and fiscal capacities among sub-national entities are large and reason for larger inequities before equalisation efforts. The study concludes that current system of equalisation in East Asia is mildly equaliser and even after such efforts the disparity is still large. Yan (2003) concludes that fiscal reforms of 1985 and 1994 failed to bring any fiscal equalisation. Ahmad and other (2000) conclude that the fiscal reforms have increased income distribution.

### 3. DATA, METHODOLOGY AND RESULTS

In this section we will discuss the results which will show whether the transfers are reducing poverty and deprivation at districts level or not? The results also touched upon the fiscal equalisation or income inequality among the districts. The “equalisation” or “fiscal equalisation” means “the capability of sub-national government to deliver similar level of services at similar levels of taxes,” [Searle (2002) and Hofman and Guerra (2002)].

The data for the study is collected from different sources of Provincial and local budget documents. The Provincial development Statistics are used for the data on transfers, population and other provincial and districts variables. The government of Pakistan website [www.gov.pk](http://www.gov.pk) is also used. The data for 98 districts of Pakistan are collected –34 from Punjab, 16 from Sindh, 24 from Khyber Pakhtunkhwa and 24 for Balochistan. The deprivation indexes are constructed by SPDC in 1998 and 2005 based on District Census Report 1998 and Pakistan Standard of Living Measurement Survey 2004 [www.spdc-pak.com](http://www.spdc-pak.com).

The purpose of the paper is seeing whether the transfer from the provincial government to the districts government is fiscal equalisers or not. To answer this question this paper uses different statistical results, which we discuss one by one.

Table 1

*Rank Correlation between Deprivation Index and per Capita Grants*

|                    | Rank Correlation |          |
|--------------------|------------------|----------|
|                    | 2003             | 2007     |
| Punjab             | 0.1804           | 0.4133   |
| Sindh              | -0.0882          | 0.0382   |
| Khyber Pakhtunkhwa | -0.0652          | 0.4287   |
| Balochistan        | -0.2626          | -0.36261 |

The Table 1 (detailed relevant tables are given in the Appendix) gives the Rank Correlation between the first ranking on the basis of district deprivation index and the second ranking on the basis of per capita transfers to the districts. Table 1 gives two Rank Correlations one for 2003 and second for 2007 that indicate inter-temporal changes in the nature of transfers. The rank correlation for 2003 are based on the SPDC deprivation index 1998 and transfer on the basis of 2001 Provincial Finance Commission award. Where as the Rank Correlation of 2007 are based on the deprivation index 2005 and transfer on the basis of Provincial Finance Commission award 2007. In the deprivation index the most deprived district get rank 1 and least deprived district (most developed) gets last rank, where as the per capita transfer ranking is arranged on ascending order i.e. the district get maximum per capita transfer gets rank 1 and the district which get minimum per capita transfer gets last rank. The value of rank correlation indicates to what extent the per capita transfers from provincial government to districts government are based on the district deprivation index. If the rank correlation is one it means the transfers are completely based on deprivation index and it is most desirable distribution system and minus one means most undesirable distribution system.

Table 1 gives rank correlation for the districts of Punjab province, which is the most developed and populated province of Pakistan. The first rank correlation for 2003 was 0.1804 which increased to 0, 4132 in 2007. This shows new PFC of Punjab government 2007 is more pro poor districts. This implies the per capita transfer has increased for those districts which are more deprived in terms of social and community services. Similar trend prevail for North West Frontier Province (Table 1) where the rank correlation which was  $-0.06512$  for 2003 increased to 0.4286 for 2007. This implies even in this province the new PFC is more pro-poor districts. The province Sindh which is the second largest province in terms of population shows both rank correlations has very little values implies insignificant link between the per capita transfer and deprivation level exist. The forth province Balochistan which is the largest province in terms of area but smallest in term of population the value of the rank correlation was  $-0.2626$  in 2003 and further worsen  $-0.3626$  in 2007. This implies that in this province the transfer are not based on deprivation level of districts and rich province gets higher transfers. This analysis shows in Punjab and Khyber Pakhtunkhwa over time the fiscal transfers are pro poor districts, whereas in Balochistan the transfers over time become less pro-poor districts and in Sindh it remained neutral.

Table 2

| <i>Regression Equation Analysing the Stability of Deprivation Index</i> |         |         |                    |             |          |
|---|---------|---------|--------------------|-------------|----------|
|   | Punjab  | Sindh   | Khyber Pakhtunkhwa | Balochistan | Pakistan |
| Constant  | 6.3592  | 1.34660 | 6.8723             | 6.5587      | 0.0232   |
| t-Values  | 2.6867  | 0.23243 | 1.4253             | 1.2761      | 0.0112   |
| BETA  | 0.7905  | 0.86409 | 0.7792             | 0.8562      | 0.9057   |
| t-Values  | 19.7614 | 9.39948 | 10.7573            | 12.2657     | 28.6506  |
| R-Squire  | 0.9243  | 0.86321 | 0.8403             | 0.8724      | 0.8953   |
| Observations  | 34      | 16      | 24                 | 24          | 98       |

This paper also tests the significance of regression coefficient of deprivation indices of 2005 and 1998. To test this significance the dependent variable is new deprivation index of 2005 and independent variable is deprivation index of 1998 and an intercept. The results of five regressions correspond to Pakistan, Punjab, Sindh, Khyber Pakhtunkhwa Balochistan shows very high and significant regression coefficient (Table 2). These results show the coefficients between new and old deprivation indices are 0.905, 0.790 and 0.864 for Pakistan, Punjab and Sindh respectively, whereas 0.779 and 0.856 for Khyber Pakhtunkhwa and Baluchistan respectively. The variables in all these equations are significant at 95 percent level and shows at-least little changes are observed between two indices which imply that fiscal transfers have made little effects on deprivation rankings.

Table 3 gives province wise district wise summary of per capita transfer and deprivation profile for 2003 and 2007. This Table gives value of maximum, minimum and average deprived level of districts, the ratio of maximum to minimum deprivation and its coefficient of variation. This Table also gives value of maximum, minimum and average per capita transfers to each district, the ratio of maximum to minimum per capita transfer and its coefficient of variation. Table 3 indicate inter provincial and intra provincial (inter district) deprivation and disparity profile and per capita transfers and help us to evaluate whether the fiscal transfer in last few years have reduced deprivation and disparity both at inter provincial and intra provincial level.

Table 3

*Disparities in Province-wise Deprivation and Fiscal Transfers*

| Province              |                     | Deprivation | Deprivation | Per Capita | Per Capita |
|-----------------------|---------------------|-------------|-------------|------------|------------|
|                       |                     | Index       | Index       | Transfers  | Transfers  |
|                       |                     | 2003        | 2007        | 2003       | 2007       |
| Punjab                | Max                 | 74.78       | 64.91       | 966.71     | 1653.29    |
|                       | Min                 | 34.34       | 29.22       | 425.87     | 638.85     |
|                       | Ave                 | 58.41       | 52.53       | 635.65     | 1098.92    |
|                       | Std. dev.           | 9.62        | 7.91        | 130.12     | 189.21     |
|                       | Ratio max/min       | 2.18        | 2.22        | 2.27       | 2.59       |
|                       | Coeff. of Variation | 0.16        | 0.15        | 0.20       | 0.17       |
| Sindh                 | Max                 | 75.44       | 65.34       | 1060.88    | 1728.83    |
|                       | Min                 | 24.59       | 20.94       | 459.90     | 669.43     |
|                       | Ave                 | 62.03       | 54.95       | 772.04     | 1390.12    |
|                       | Std. dev.           | 11.51       | 10.71       | 146.40     | 260.30     |
|                       | Ratio Max/Min       | 3.07        | 3.12        | 2.31       | 2.58       |
|                       | Coeff. of Variation | 0.19        | 0.19        | 0.19       | 0.19       |
| Khyber<br>Pakhtunkhwa | Max                 | 82.96       | 71.72       | 1227.56    | 5431.50    |
|                       | Min                 | 50.78       | 44.24       | 619.94     | 389.44     |
|                       | Ave                 | 66.17       | 58.43       | 796.72     | 1493.76    |
|                       | Std. dev.           | 7.38        | 6.27        | 151.88     | 1232.37    |
|                       | Ratio max/min       | 1.63        | 1.62        | 1.98       | 13.95      |
|                       | Coeff. of Variation | 0.11        | 0.11        | 0.19       | 0.83       |
| Balochistan           | Max                 | 89.06       | 82.76       | 4476.36    | 5694.92    |
|                       | Min                 | 46.00       | 45.99       | 444.66     | 634.87     |
|                       | Ave                 | 73.16       | 69.20       | 1275.21    | 1532.92    |
|                       | Std. dev.           | 8.52        | 7.81        | 798.41     | 1012.41    |
|                       | Ratio Max/Min       | 1.94        | 1.80        | 10.07      | 8.97       |
|                       | Coeff. of Variation | 0.12        | 0.11        | 0.63       | 0.66       |
| Pakistan<br>(Overall) | Max                 | 89.06       | 82.76       | 4476.36    | 5694.92    |
|                       | Min                 | 24.59       | 20.94       | 425.87     | 389.44     |
|                       | Ave                 | 64.51       | 58.45       | 853.99     | 1349.44    |
|                       | Std. Dev.           | 7.95        | 7.66        | 255.27     | 442.25     |
|                       | Ratio Max/Min       | 3.62        | 3.95        | 10.51      | 14.62      |
|                       | Coeff. of Variation | 0.12        | 0.13        | 0.30       | 0.33       |

This Table 3 shows at overall Pakistan level for 2003 the average per capita transfer level among district was 855.9 and increased to 1349.4 in 2007 which implies the per capita transfer, on average, have increased in the districts. The level of maximum value of transfer was 4476.36 increased to 5694.92 whereas the minimum value of transfer decreased from 425.3 to 389.4. The ratio of maximum to minimum transfer has increased from 10.51 to 14.62 and coefficient of variation of transfer increased from 0.2989 to 0.3277.

This Table 3 also shows at overall Pakistan level for 2003 the average deprived level among district was 64.51 but reduced to 58.45 in 2007 which implies the per capita transfer, on average, have reduced deprivation in the districts. This Table further shows the level of maximum deprived district which had value of 89.06 reduced to 82.76 whereas the minimum value of deprivation reduced from 24.59 to 20.59. However, the Table 3 shows that these fiscal transfers fail to reduce deprivation disparity, in fact, it has worsened it. The ratio of maximum to minimum deprivation has increased from 3.62 to 3.95 and coefficient of variation of deprivation increased from 0.123 to 0.131.

The analysis of per capita transfers and deprivation index for overall Pakistan show very clear trends. The per capita transfer has increased and average deprivation has decreased. The figures also show the ratio of maximum to minimum transfer increased and consequently the ratio of maximum to minimum deprivation has also increased. The figures also indicate the movement in the coefficient of variations in the transfers and the deprivation indices are in the same direction and increasing.

As for as the province wise changes in the per capita transfer and the deprivation levels are concerned, all four provinces also gives similar trends. In Punjab which is the largest populated province, the average deprivation level declined from 58.41 to 52.53 as a result of increase in average per capita transfer from 635.65 to 1098.92. The Punjab results show the extreme inequality in deprivation increases as indicated by the increase in the ratio of maximum to minimum transfer and maximum to minimum deprivation. However, the coefficient of variation of both per capita transfer and deprivation has decreased over time. This explains the inequality at average level has decreased over time.

The least populated but area wise largest province, Balochistan, show the average level deprivation has decreased from 73.16 to 69.20 as a result of average increase in per capita transfer from 1275.21 to 1532.92. The results also show the reduction in deprivation inequality but this can partially be explained by the ratio of maximum to minimum transfers.

The average decline in deprivation in other two provinces Sindh and Khyber Pakhtunkhwa from 62.03 to 54.95 and 66.17 to 58.43 respectively can be explained by the average increase in transfers both in Sindh and Khyber Pakhtunkhwa. The extreme deprivation inequality in Sindh has increased overtime and can be explained both by the increasing ratio of maximum to minimum transfer. However, the inequality in Khyber Pakhtunkhwa did not change despite a very high increase in the ratio of maximum to minimum transfer and coefficient of variation in the transfers.

#### 4. CONCLUSIONS

There are several results of the study based on several statistical analyses. First, the analysis based on rank correlation shows in Punjab and Khyber Pakhtunkhwa over time

the fiscal transfers are pro poor districts, whereas in Balochistan the transfers over time become less pro-poor districts and in Sindh it remained neutral. Second, there is significant increase in per capita transfers in all districts of Pakistan. These increases are due to increase in economic growth more than 6 per cent GDP growth for the last few years and special recognition of the devolution phenomenon in last several years. Third, deprivation has decreased almost in all districts in last few years because of significant increase in per capita transfers.

Fourth, the results of the study shows the deprivation inequalities have not reduced as a result of increase in fiscal transfers. In fact, in most of the cases, the deprivation inequalities have been increased. One, because the per capita increase to the least deprived districts equivalently the developed districts are much more than the per capita increase to more deprived districts. Two, per unit cost of service delivery is much higher in those districts which are very large in area and in those districts where infrastructure is weak and perhaps these aspects are ignored in the designing of transfers. Three, the own revenues as percentage of transfers are much less in most deprived districts compare to least deprived districts and the capability of using available funds is also more in least deprived districts. Four, the least deprived districts which are rich districts are also politically very strong districts. They can also in position to attract parallel funding from the higher level government and borrowing from the foreign donors. Fifth, reason that can be given why the deprivation has decreased but disparity did not, is the deliberate effort and perception of the government to take steps to improve deprivation situation first and then income distribution aspect will be taken into consideration.

Table A1

*Rank Correlation Data for Punjab*

| Districts    | Rank Per Capita   | Rank                | Rank Per Capita   | Rank                |
|--------------|-------------------|---------------------|-------------------|---------------------|
|              | Transfers<br>2003 | Deprivation<br>2003 | Transfers<br>2007 | Deprivation<br>2007 |
| Attock       | 12                | 26                  | 7                 | 25                  |
| Bahawalnagar | 5                 | 11                  | 10                | 15                  |
| Bahwalpur    | 25                | 9                   | 23                | 8                   |
| Bhakkar      | 3                 | 6                   | 2                 | 14                  |
| Chakwal      | 1                 | 21                  | 3                 | 27                  |
| D.G. Khan    | 14                | 3                   | 9                 | 5                   |
| Faisalabad   | 33                | 30                  | 29                | 29                  |
| Gujranwala   | 26                | 31                  | 30                | 33                  |
| Gujrat       | 20                | 29                  | 28                | 30                  |
| Hafizabad    | 2                 | 20                  | 16                | 19                  |
| Jhang        | 18                | 10                  | 20                | 10                  |
| Jhelum       | 6                 | 28                  | 11                | 26                  |
| Kasur        | 28                | 19                  | 25                | 21                  |
| Khanewal     | 22                | 12                  | 19                | 11                  |
| Khushab      | 4                 | 16                  | 4                 | 13                  |
| Lahore       | 34                | 34                  | 32                | 34                  |
| Layyah       | 9                 | 4                   | 6                 | 4                   |
| Lodhran      | 32                | 5                   | 14                | 1                   |
| M.B.Din      | 21                | 23                  | 22                | 23                  |
| Mianwali     | 11                | 13                  | 5                 | 16                  |
| Multan       | 31                | 22                  | 27                | 20                  |
| Muzaffargarh | 30                | 2                   | 24                | 2                   |
| Narowal      | 8                 | 24                  | 8                 | 22                  |
| Okara        | 24                | 15                  | 1                 | 12                  |
| Pakpattan    | 29                | 7                   | 17                | 6                   |
| R.Y. Khan    | 10                | 8                   | 26                | 7                   |
| Rajanpur     | 13                | 1                   | 13                | 3                   |
| Rawalpindi   | 23                | 32                  | 33                | 31                  |
| Sahiwal      | 15                | 17                  | 18                | 18                  |
| Sargodha     | 16                | 18                  | 12                | 17                  |
| Sheikhpura   | 27                | 25                  | 34                | 28                  |
| Sialkot      | 19                | 33                  | 31                | 32                  |
| T. T. Singh  | 17                | 27                  | 15                | 24                  |
| Vehari       | 7                 | 14                  | 21                | 9                   |

Table A2

*Rank Correlation Data for Sindh*

| Districts      | Rank                            | Rank                | Rank                            | Rank                |
|----------------|---------------------------------|---------------------|---------------------------------|---------------------|
|                | Per Capita<br>Transfers<br>2003 | Deprivation<br>2003 | Per Capita<br>Transfers<br>2007 | Deprivation<br>2007 |
| Badin          | 9                               | 3                   | 12                              | 5                   |
| Dadu           | 8                               | 9                   | 7                               | 3                   |
| Ghotki         | 13                              | 5                   | 14                              | 11                  |
| Hyderabad      | 10                              | 15                  | 4                               | 14                  |
| Jacobabad      | 15                              | 4                   | 1                               | 6                   |
| Karachi City   | 16                              | 16                  | 16                              | 16                  |
| Khairpur       | 4                               | 10                  | 10                              | 8                   |
| Larkana        | 12                              | 13                  | 11                              | 4                   |
| Mirpurkhas     | 11                              | 6                   | 15                              | 10                  |
| Nausheroferoze | 6                               | 12                  | 3                               | 12                  |
| Nawabshah      | 7                               | 11                  | 13                              | 9                   |
| Sanghar        | 5                               | 7                   | 9                               | 7                   |
| Shikarpur      | 2                               | 8                   | 6                               | 13                  |
| Sukkur         | 1                               | 14                  | 2                               | 15                  |
| Thar At Mithi  | 14                              | 1                   | 5                               | 2                   |
| Thatta         | 3                               | 2                   | 8                               | 1                   |

Table A3

*Rank Correlation Data for Khyber Pakhtunkhwa*

| Districts       | Rank                            | Rank                | Rank                            | Rank                |
|-----------------|---------------------------------|---------------------|---------------------------------|---------------------|
|                 | Per Capita<br>Transfers<br>2003 | Deprivation<br>2003 | Per Capita<br>Transfers<br>2007 | Deprivation<br>2007 |
| Abbottabad      | 6                               | 22                  | 22                              | 10                  |
| Bannu           | 12                              | 18                  | 20                              | 12                  |
| Battagram       | 10                              | 3                   | 2                               | 13                  |
| Buner           | 19                              | 5                   | 6                               | 15                  |
| Charsadda       | 23                              | 14                  | 11                              | 14                  |
| Chitral         | 1                               | 7                   | 3                               | 5                   |
| D.I.Khan        | 4                               | 9                   | 15                              | 11                  |
| Hangu           | 15                              | 6                   | 9                               | 3                   |
| Haripur         | 3                               | 23                  | 23                              | 18                  |
| Karak           | 2                               | 13                  | 8                               | 4                   |
| Kohat           | 5                               | 19                  | 16                              | 21                  |
| Kohistan        | 16                              | 1                   | 1                               | 8                   |
| Lakki Marwat    | 9                               | 17                  | 14                              | 7                   |
| Lower Dir       | 11                              | 10                  | 17                              | 22                  |
| Malakand Agency | 8                               | 15                  | 12                              | 9                   |
| Mansehra        | 13                              | 12                  | 10                              | 20                  |
| Mardan          | 22                              | 20                  | 18                              | 16                  |
| Newshehra       | 14                              | 21                  | 21                              | 6                   |
| Peshawar        | 24                              | 24                  | 24                              | 23                  |
| Shangla         | 17                              | 2                   | 5                               | 2                   |
| Swabi           | 20                              | 16                  | 19                              | 24                  |
| Swat            | 18                              | 11                  | 13                              | 17                  |
| Tank            | 7                               | 8                   | 7                               | 1                   |
| Upper Dir       | 21                              | 4                   | 4                               | 19                  |

Table A4

*Rank Correlation Data for Balochistan*

| Districts       | Rank                            | Rank                | Rank                            | Rank                |
|-----------------|---------------------------------|---------------------|---------------------------------|---------------------|
|                 | Per Capita<br>Transfers<br>2003 | Deprivation<br>2003 | Per capita<br>Transfers<br>2007 | Deprivation<br>2007 |
| Awaran          | 9                               | 3                   | 9                               | 2                   |
| Barkhan         | 5                               | 8                   | 5                               | 11                  |
| Bolan           | 17                              | 12                  | 18                              | 13                  |
| Chagai          | 24                              | 14                  | 24                              | 10                  |
| Gwadar          | 16                              | 20                  | 16                              | 18                  |
| Jafarabad       | 19                              | 16                  | 20                              | 22                  |
| Jhal Magsi      | 6                               | 5                   | 6                               | 7                   |
| Kalat           | 13                              | 18                  | 11                              | 20                  |
| Kech(Turbat)    | 12                              | 19                  | 12                              | 12                  |
| Kharan          | 7                               | 2                   | 22                              | 3                   |
| Khuzdar         | 15                              | 7                   | 14                              | 9                   |
| Killa Abdullah  | 23                              | 11                  | 23                              | 8                   |
| Killa Saifullah | 10                              | 10                  | 10                              | 5                   |
| Lasbela         | 18                              | 15                  | 15                              | 16                  |
| Loralai         | 8                               | 17                  | 8                               | 17                  |
| Mastung         | 4                               | 13                  | 4                               | 14                  |
| Musa Khail      | 20                              | 1                   | 17                              | 1                   |
| Nasirabad       | 22                              | 9                   | 21                              | 15                  |
| Panjgur         | 21                              | 6                   | 19                              | 6                   |
| Pishin          | 3                               | 22                  | 3                               | 23                  |
| Quetta          | 11                              | 24                  | 7                               | 24                  |
| Sibi            | 2                               | 21                  | 2                               | 19                  |
| Zhob            | 14                              | 4                   | 13                              | 4                   |
| Ziarat          | 1                               | 23                  | 1                               | 21                  |

**REFERENCES**

- Ahmad, Ehtisham, and Li Keping, and Thomas Richardson (2000) Recentralisation in China? Conference on Fiscal Decentralisation.
- Ahmed, Qazi Masood (1997) The Issues in Intergovernmental Fiscal Relationship in Developing Countries. Review of FAO (1998) Rome Italy. Earlier this Paper was presented at the Conference on the 'Technical Consultations on Decentralisation' in Rome, December 16-18.
- Bahl, Roy, Jamie Boex, and Marknez-vazquez (2002) The Design and Implementation of Fiscal Transfer. Fiscal Decentralisation Workshop in Nepal.
- Boex, Jamie (2002) Developing an Allocation Formula for the Decentralised Financing and Development Programme and Implication for the Design of a System of Intergovernmental Fiscal Relation in Nepal.

- Hofman, Bert, and Susana Cordeira Guerra (2002) Ensuring Inter-regional Equity and Poverty Reduction. World Bank Report.
- Jamal, Haroon (2005) Mapping the Spatial Deprivation of Pakistan. *The Pakistan Development Review* 42:2
- Jamal, Haroon and Amir Jehan Khan (2007) Indices of Multiple Deprivation 2005. (SPDC Research Report No. 72).
- Pakistan Government of (Various Issues) *Pakistan Economic Survey*. Islamabad: Finance Division.
- Pakistan, Government of (Various Issues) *Provincial Finance Statistics*.
- Qiao, Baoyun, Jorge Martinez-Vazquez, and Yongsheng Xu (2003) Growth and Equity Trade-off in Decentralisation Policy : China's Experience. Georgia State University.
- Rao, M. Govinda (2001) Challenges in Fiscal Decentralisation: An Asian Perspective. Paper presented at Public Finance in Developing and Transitional Countries. Atlanta, Georgia.
- Rao, M. Govinda, Richard M. Birds, and Jennie Litvack (2001) Fiscal Decentralisation and Poverty Alleviation in a Transitional Economies: A Case of Viet Nam. *Asian Economic Journal*.
- Searle, Bob (2002) Federal Fiscal Relations in Australia. International Centre for Economic Research. Torino, Italy
- Yan (2003) Regional Equalisation in China's Public Finances.

## Comments

The authors have made a good attempt to examine whether there is any link between the inter-governmental fiscal transfers and the deprivation index in the districts of Pakistan. The authors have used the data for this study which was collected from 98 districts of four provinces of Pakistan for 2003 and 2007.

Although text is very well written but there are some repetitions. At some place authors merely replaced the variable and used the same sentence while presenting results of the next variable.

Secondly, I would like to comment that while presenting disparities using different measures for deprivation and fiscal transfers in Table 3, authors have got contradictory results. For example, in Punjab according to ratio of maximum/minimum, disparities in deprivation and fiscal transfers have increased while according to coefficient of variation disparity has declined. Similar is the case with Sindh and Balochistan where both of these indicators gave contradictory results.

This is mainly because of the fact that coefficient of variation do not satisfy the transfer-sensitivity property. The Pigou-Dalton principle of transfer requires that whenever a unit of income is transferred from a richer person to a poorer person and such a does not reverse the ranking of two individuals, the inequality index should decline. The Coefficient of Variation is more sensitive to upper part than other part of the distribution and therefore it may give misleading results. The well know Gini coefficient satisfy the principle of transfer sensitivity. It is, therefore, important to use Gini coefficient to resolve this issue to some extent.

Thirdly, the authors results that the transfers have reduced deprivation across the board but unable to solve disparity issue are in line with the trends in reducing deprivation in term of absolute poverty but increasing inequality. Finally, while authors have summarised the result in conclusions, some policy recommendations should be given in discussion.

**Talat Anwar**

Canadian International Development Agency (CIDA),  
Programme Support Unit, Islamabad.

## Do Foreign Inflows Benefit Pakistani Poor?

MUHAMMAD ALI and MUHAMMAD NISHAT

### I. INTRODUCTION

Foreign Inflows plays an important role in development of a country. Although significance of such inflows is much larger in developing countries but it is not limited to them. Emerging economies, even developed countries, also need foreign inflows to manage their economy. However, size and the composition of such inflows are determined on the basis of country specific requirements. The need of foreign capital generally arises with the lack of capital in host country and low saving and investment ratios. Low household income reduces the government's earning from taxes and hence it reduces government expenditures and consequently growth of the country slows down. With the passage of time, less developed countries have become more and more dependent on foreign inflows due to which their growth is completely reliant on funds from other countries. The dependence usually results in a shock on host country when these inflows are completely or partially dried-up. Moreover, misallocation of funds is also a very critical issue. If inflows are not well directed and not supported with sufficient research on host country, they may adversely affect growth of a country because of increasing poverty and unemployment rate with low investment on human capital.

Foreign inflows are of critical importance to Pakistan. In addition to the low saving and investment ratios and lack of physical and human capital, Pakistan is faced with political and macroeconomic instability due to which large and continuous flow of foreign inflows is required to supplement its growth. As far as the composition is concerned, it has changed over the years for Pakistan. Share of remittances in total inflows decreased from 16.35 percent in 1980 to 12.48 percent in 2008 on the contrary share of FDI increased from 0.26 percent to 9.96 percent in the same period; depicting a huge shift in inflow concentration. Share of foreign debt on the other hand, followed increasing trend from 1985 to 2000 but in 2008 it fell to 76.5 percent as compared to 93.91 percent in 2000.

The impact of foreign inflows on poverty and economic development is found to be controversial in the literature. In some studies positive impact of foreign inflows was proved on poverty and economic development, while other studies highlighted its negative effects [Mohey-ud-din (2006)]. In case of Pakistan there are only few studies on the relationship between inflows and poverty, for example Siddiqui, *et al.* (2006), Zaman,

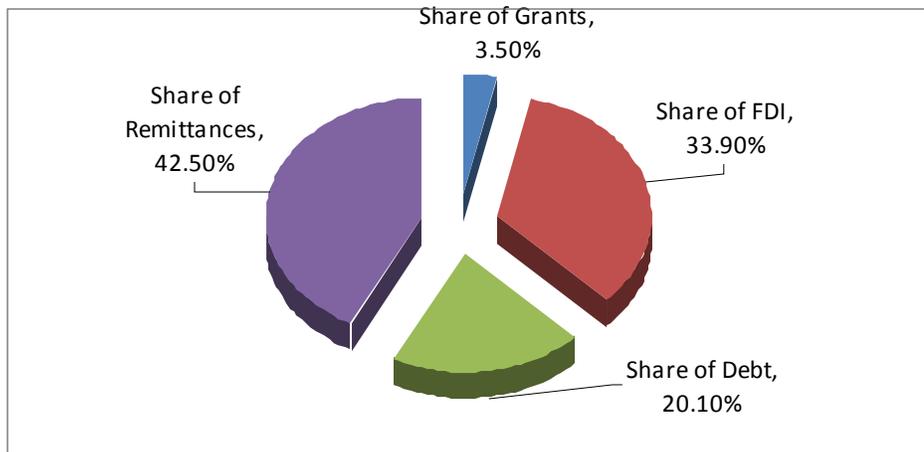
Muhammad Ali <alionline83@yahoo.com> is M.Phil Student, Applied Economics Research Centre, University of Karachi, Karachi. Muhammad Nishat <mnishat@iba.edu.pk> is Professor, Institute of Business Administration, Karachi.

*et al.* (2008) and Mohey-ud-din (2006). After thorough literature review and analysis, these authors have explained the relationship between foreign inflows and poverty but none of them have computed the extent of the impact between the two variables. This paper is therefore an attempt to fill this gap by numerically expressing the relationship between inflows and poverty. First, we would attempt to study the direct impact of foreign inflows on poverty reduction in Pakistan. Secondly, relationship between poverty and infant mortality in Pakistan would be derived to indirectly determine the relationship between inflows and infant mortality. Third, impact of inflows on total school enrolment in general and female enrolment in particular, would be examined to determine the impact on education sector. Fourth, impact of inflows on public expenditure on education and health would be examined.

## II. STRUCTURE OF FOREIGN INFLOWS IN PAKISTAN

The composition of inflows in Pakistan for the year 2008 is illustrated in Figure 1. Highest share in the inflows is of remittances (42.5 percent) followed by FDI (33.9 percent), foreign debt (20.1 percent) and Grants (3.5 percent). In terms of percentage of GDP, remittances have the highest ratio (4.1 percent) with FDI on second place with 3.3 percent as percentage to GDP.

**Fig. 1. Share of Each Component in Total Inflow Variable (2008)**



Source: Author's Estimates based on Hand Book of Statistics 2005, Economic Survey (Various Issues).

Table 1 compares the shares of each inflow in the total inflow variable and also their percentage to GDP. From the table we can see that the composition has changed over the years for Pakistan. Share of remittances in total inflows followed mixed trend over the years. From 1975 to 1985 it increased from 17.9 percent to 62.9 percent then fell to 37.3 percent in 1995 and followed similar trend till 2008 when the share of remittances in total foreign inflows was 42.5 percent. Similar uneven trend was observed in terms of percentage share of remittances to GDP. The share increased from 2.1 percent in 1975 to 3.4 percent in 1995 and following the mixed trend it reached 4.1 percent in 2008. On the contrary, share of FDI in total foreign inflows showed overall positive trend. It increased

Table 1

Composition and Shares of Foreign Inflows

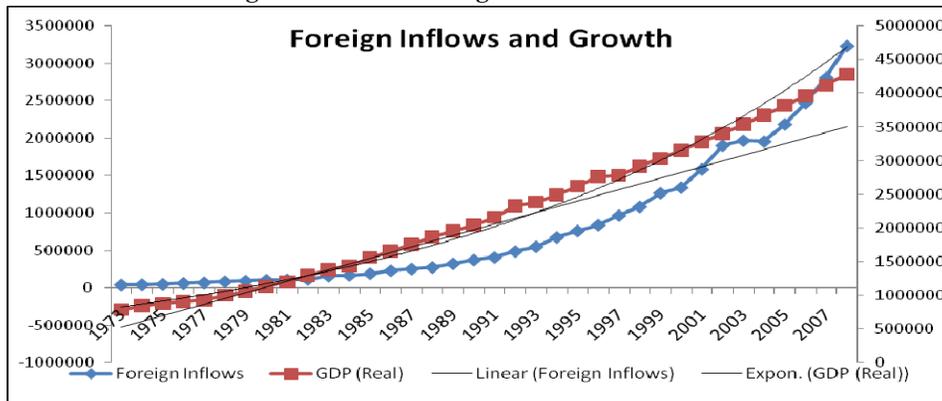
| Obs  | Share in Total Inflow |              |                |               | Percentage of GDP  |                    |                      |                     |
|------|-----------------------|--------------|----------------|---------------|--------------------|--------------------|----------------------|---------------------|
|      | Share of Remittances  | Share of FDI | Share of Grant | Share of Debt | Rem Percent of GDP | FDI Percent of GDP | Grant Percent of GDP | Debt Percent of GDP |
| 1975 | 17.9%                 | 1.2%         | 5.2%           | 75.7%         | 2.1%               | 0.1%               | 0.6%                 | 8.7%                |
| 1980 | 53.2%                 | 0.9%         | 7.7%           | 38.2%         | 8.2%               | 0.1%               | 1.2%                 | 5.9%                |
| 1985 | 62.9%                 | 1.8%         | 9.8%           | 25.5%         | 8.7%               | 0.3%               | 1.4%                 | 3.5%                |
| 1990 | 42.0%                 | 4.7%         | 11.6%          | 41.7%         | 5.5%               | 0.6%               | 1.5%                 | 5.4%                |
| 1995 | 37.3%                 | 8.8%         | 6.1%           | 47.8%         | 3.4%               | 0.8%               | 0.6%                 | 4.4%                |
| 2000 | 32.8%                 | 15.7%        | 4.2%           | 47.4%         | 1.4%               | 0.7%               | 0.2%                 | 2.1%                |
| 2005 | 50.8%                 | 18.6%        | 4.3%           | 26.3%         | 4.0%               | 1.5%               | 0.3%                 | 2.1%                |
| 2008 | 42.5%                 | 33.9%        | 3.5%           | 20.1%         | 4.1%               | 3.3%               | 0.3%                 | 1.9%                |

Source: Hand Book of Statistics 2005, Economic Survey (Various Issues).

from 1.2 percent in 1975 to 8.8 percent in 1995 and to 33.9 percent in 2008. Similar increasing trend was observed in FDI as a percent to GDP where it increased from 0.1 percent in 1975 to 0.8 percent in 1995 and further increased to 3.3 percent in 2008. The share of grants in total foreign inflows depicted U-shaped curve, from 5.2 percent in 1975, it increased to 11.6 percent in 1990 then it started falling and reached 3.5 percent in 2008. Grants as a percentage to GDP increased from 0.6 percent in 1975 to 1.5 percent in 1990 after that it started declining and reached 0.3 percent in 2008. As far as foreign debt is concerned, it followed mixed trend over the years. Its share in total foreign inflows decreased from 75.7 percent in 1975 to 47.8 percent in 1995 and to 20.1 percent in 2008. Similar trend was observed in foreign debt as percentage to GDP where it decreased from 8.7 percent in 1975 to 4.4 percent in 1995 and to 1.9 percent in 2008.

Figure 2 compares the trend of foreign inflows with real GDP. From the figure we can see that both series are increasing with time and real GDP is showing similar trend as of foreign inflows. The only irregularity in the inflow variable is in the year 2001 in which all the inflows experienced positive shocks following the attacks on World Trade Towers in USA.

Fig. 2. Trends in Foreign Inflows and Growth



### III. THEORETICAL FRAMEWORK AND ECONOMETRIC TECHNIQUES

#### Foreign Inflows

The linkage between Foreign Inflows and poverty seems to be quite general but studies have shown that there are country specific outcomes of the foreign inflows on poverty [Zaman, *et al.* (2008)]. Foreign Inflows can affect poverty directly or indirectly. The direct impact comes from the increase in household income while indirect affect comes from the spillovers of different income generating activities directly affected by foreign inflows [Carvalho, *et al.* (1996)]. Siddiqui, *et al.* (2006) found that foreign inflows significantly affect poverty in presence of trade liberalisation.

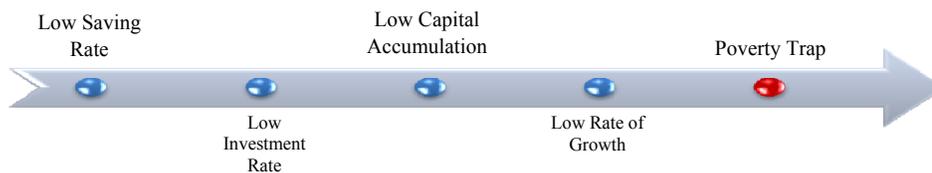
#### Foreign Assistance

Foreign assistance generally comprises of non-returnable grants (Aid) and returnable foreign loans (Debt) with interest. In this study, we have combined both Foreign Debt and Grant to form a foreign assistance variable and analysed its impact on different variables. It is argued that foreign assistance, particularly aid, has negative or insignificant impact on growth and poverty because it is not properly utilised. Masud, *et al.* (2005) portrayed three main arguments coming out of most of the aid effectiveness studies. (1) aid is often misallocated (given to wrong recipients), (2) aid is not properly used/utilised by the recipients and (3) GDP is not the correct measure for aid effectiveness Boone (1996). They further explained that the argument about the misallocation of foreign assistance is inappropriate most of the time because objectives of the donors are not always to assist the recipient countries in their development and poverty reduction but there is underlying agenda coupled with each assistance agreement which is more tilted in favour of donor's strategic interests. Keeping this situation in mind, one cannot expect the foreign assistance to help in poverty alleviation strategies and economic development. Gwin (2002) found that foreign assistance have decreased poverty in the host countries and increased their social development.

Kraay, *et al.* (2005) argued that the aid ineffectiveness is directly linked to the improper utilisation. A modest increase in aid can bring prominent results while huge amounts can end up giving zero net output from the agreement.

Figure 3 represents the channel through which countries fall in the poverty trap proposed by Kraay, *et al.* (2005). The authors proposed that, in order for the country to bring itself out of the poverty trap, it should direct the aid flows towards strategies that can increase the saving rate in the country, this will not only increase the investment rate but also with improve the capital accumulation in the country, resulting in better rate of growth and country would be able to come out of the poverty trap.

**Fig. 3 Channel of the Poverty Trap**



Source: Author's creation based on Kraay, *et al.* (2005).

### Infant Mortality

Boone (1996) attempted to find the relationship between aid and infant mortality but found no significant impact on lower levels of infant mortality. In countries with weak economic management, there is no relationship between aid and change in infant mortality. While in countries with good economic management there is evidence that aid reduces the infant mortality in the host country Burnside, *et al.* (1998).

### Pro-public Government Expenditures

Pro-public government expenditures are recognised in different categories in the literature. Verschoor (2002) identified the strongest candidates to be classified as pro-poor expenditures as the social sector expenditures (health, education and sanitation) while McGillivray (2004) included the expenditure on rural roads, micro-credit and agricultural extension and technology in the list of pro-public expenditures as they may also be beneficial to the poor.

Literature gives us evidence that incidence of pro-public expenditures is progressive i.e. marginal pro-public spending is progressive. Thus, it can be said that expenditures, particularly on health and education, increases human welfare [Gomanee, *et al.* (2003)]. In addition to the impact on the welfare of the individuals, it is also necessary to make sure that distribution of such impacts is desirable. There is a possibility that rich quintile of the population gets the maximum out of public expenditures. Castro-Leal, *et al.* (1999) proved the same by showing that there is a least possibility that poor will benefit from education and health expenditures.

In another research,<sup>1</sup> it is shown that there is a weak link between expenditures on health and education and poverty i.e., government social spending does not necessarily benefits the poor; hence such expenditures may not reduce poverty. On the other hand, this does not mean to reduce such expenditures as they may not benefit all the poor but the public as a whole do get the benefit [Gomanee, *et al.* (2005)]. More specifically, higher government spending on primary and secondary education has greater impact on measure of education attainment, higher spending on health results in reduction of infant mortality rates [Gupta, *et al.* (2002)].

### FDI, Growth and Poverty

Economic literature is rich with studies related to FDI as its importance has been recognised by the economists since 1990's. FDI is less volatile as compared to other sources of capital flows and does not depict a pro-cyclical behaviour. Hence it is the favourite source of capital inflows for developing countries [Ozturk and Kalyoncu (2007)].

FDI provides capital, productive facilities, technology and latest managerial knowledge to the recipient countries [Hassan (2003)]. In addition to this, FDI also brings foreign exchange, competition and enhances the access to foreign markets [Mottaleb (2007); World Bank (1999); Romer (1993); UNCTAD (1991)]. FDI also complements

<sup>1</sup>OECD Development Centre (2002), "Development Centre Studies: Education and Health Expenditure and Poverty Reduction in East Africa—Madagascar and Tanzania" Web address: [http://www.oecd.org/document/4/0,3343,en\\_2649\\_33731\\_1835908\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/4/0,3343,en_2649_33731_1835908_1_1_1_1,00.html).

domestic private investment which increases the employment; enhances the spillover and human capital, the enhancement boosts overall economic growth of recipient countries [Chowdhury and Mavrotas (2006)].

There are numerous studies on FDI and poverty separately but only few of them analysed the direct impact of FDI on poverty like White (1992), Carvalho and White (1996), and Siddiqui (1997). Other related studies have used the impact of FDI on GDP as a proxy to depict the impact of the same on poverty [Zaman, *et al.* (2008)]. For instance, Borensztein, *et al.* (1998) studied the impact of FDI on economic growth in framework of cross-country regression. They found FDI to be an important vehicle for technology transfer, and FDI contributes relatively more than domestic investment to growth. However, there is a complementary relationship between FDI and domestic investment as former causes the later to increase. De Mello (1999) used time series and panel data (1970–1990) for a sample of OECD and non-OECD countries, the results supported the findings of Borensztein, *et al.* (1998).

Bengoa, *et al.* (2003) used panel data for the period of 1970–1999 of 18 Latin American countries. Their findings suggest that there is a positive correlation between FDI and economic growth in the host countries. They noted that in order to benefit from long-term capital flows, the host country requires, adequate human capital, liberalised markets and economic stability. A panel data analysis of Li and Liu (2005) for the sample of 84 countries for the period 1970–1999 showed that through channel of human capital, FDI exerted a strong positive effect on economic growth.

Durham (2004) analysed data for 80 countries from 1979 to 1998 and found that foreign direct investment does not have direct positive effects on growth; effects are contingent on the ‘absorptive capacity’ of host countries. Herzer, *et al.* (2006) studied 28 developing countries and found that in majority of countries FDI has no statistically significant long-run effect on growth. In very few cases, both long run and short run relationship was found between FDI and growth. But for some countries, there is also evidence of growth-limiting effects of FDI in the short or long term.

Ozturk, *et al.* (2007) investigated the impact of FDI on economic growth of Turkey and Pakistan for the period of 1975–2004. The findings suggests that these two variables are co-integrated for both countries studied and GDP causes FDI in the case of Pakistan, while there is strong evidence of a bi-directional causality between the two variables for Turkey.

The overall inflows of FDI in Pakistan are increasing but their contribution to the growth is questionable. In Pakistan, FDI generally comes to the following sectors; energy, chemicals, foods and beverages, machinery, construction and textiles. From comparative point of view, despite of having increasing flows of FDI in the country, Pakistan is lacking far behind its potential to attract FDI in various sectors. The major reason behind the inability is perceptions of the investors and the law and order situation in the country which has significantly increased the risk associated with investment and hence increased the cost of doing business in the country [Zaman, *et al.* (2008)].

### **Remittances, Growth and Poverty**

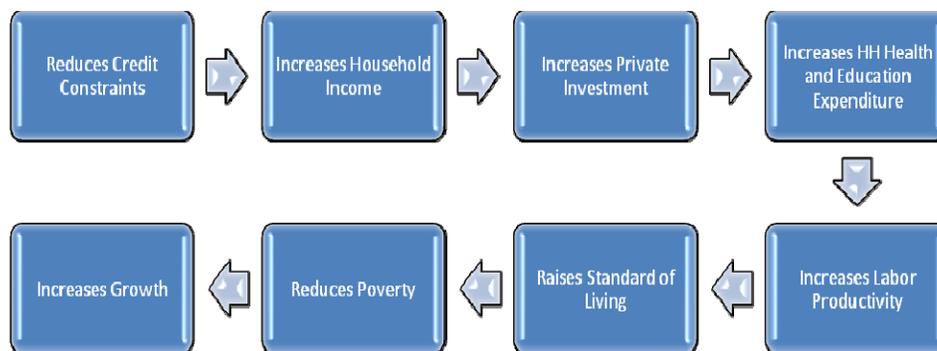
Research has shown that a very high proportion of remittances are spent on consumption instead of productive investments. Theoretically, however, the relationship

between remittances and growth can be positive or negative. Remittances may generate positive spillovers through efficient financial markets, easing the credit constraints of business as well as common men or on the contrary, it may increase consumption more than investment and negative chain of events can be triggered through low labour participation, low investments and so on [Goldberg, *et al.* (2008)].

One important feature of remittances is that it can indirectly affect labour supply. This could reduce economic growth through reduced labour supply. Moreover, large and consistent remittance inflows could make the exports less profitable through appreciated real exchange rate. However, remittances can reduce poverty through increase in income of the recipient households which finances their consumption and hence improves their standard of living [Jongwanish (2007)].

The positive impacts of remittances can emerge through a number of channels. Figure 4 shows that channel through which remittances affects poverty and economic growth. Remittances ease the credit constraints often faced by citizens of developing countries by increasing their household income. This does not only increase their consumption level but also increases their savings which ultimately translates themselves to private investments. The higher level of disposable income allows the households to spend more on health and education, through which the overall labour productivity increases, raises their standard of living and ultimately reduces poverty. Calderon, *et al.* (2008) found negative impact of remittances on poverty and inequality for their study on 10 Latin American Countries [Zaman, *et al.* (2008)]. Jongwanish, (2007) found that there is direct and significant impact of remittances on poverty reduction through higher per capita income and ease of credit constraints.

**Fig. 4. Channels of Remittances Impact on Poverty and Growth**



Source: Author's creation.

Some studies on the issue found positive relationship between remittances and growth [Stark and Lucas (1988); Taylor (1992); and Faini (2002)]. On the contrary, Chami, *et al.* (2003) found negative and IMF (2005) found no impact of remittances on economic growth. Brown (1994) found positive relationship between remittances and savings and investment in Tonga and Samoa basing on micro-level analysis. Yang (2004) found that remittances improves child enrolment in schools and increases education expenditure. Mesnard (2004) for Tunisia using a life-cycle model found that remittances ease the credit constraint of workers whose access to the

financial market is limited. In terms of poverty, Adams and Page (2005) studied the impact of remittances on poverty in 71 developing countries and found that remittances do help in poverty reduction. Stahl (1982) however argues that while remittances acts as a blessing to the household, there is a cost associated with it. The most obvious one is of migration itself. Since migration is not cheap, poor are least likely to be recipient of remittances from abroad hence the impact may be negligible on poverty or it may even increase the levels of poverty and inequality in the country [Jongwanish (2007)].

Adams (2002) found positive impact of remittances on the savings in Pakistan during the 1980s and early 1990s. The marginal propensity to save out of international remittances was found to be 0.71 compared to the marginal propensity to save out of rental income of just 0.085.

Nishat, *et al.* (1991) analysed the impact on remittances on economic growth in Pakistan for the period 1959-60 to 1987-88. The results indicated a strong positive impact of remittances on GNP, consumption, investment and imports. They argue that remittances increase the dependency on imports through increase in consumption of imported goods and worsen balance of payments problems.

#### IV. ECONOMETRIC MODELLING

Time series data usually suffer from the unit root problem thus involving a serious violation of assumptions of ordinary least square method of estimation. Keeping this in view, the data was first checked for stationarity before applying conventional Ordinary Least Square method of estimation.

Augmented Dicky-Fuller (ADF) test uses following equation to test whether there is unit root in the time series:

$$\Delta y_t = \beta_1 + \beta_2 t + \alpha y_{t-1} + \gamma \sum \Delta y_{t-1} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where  $\varepsilon_t$  is white noise error term and  $t$  represents time trend. The null hypothesis in ADF test is that variable has unit root.

In addition to ADF, the Phillips-Perron (PP) [1988] unit root test is also used in the study, which is a nonparametric system of controlling for serial correlation while testing for the stationarity of variables. The PP method estimates the following equation:

$$Y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 \left(t - \frac{n}{2}\right) + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where  $Y_t$  is the corresponding time series,  $n$  is the number of observations and  $\varepsilon_t$  is the error term. The null hypothesis of a unit root is  $H_0: \alpha_1 = 1$ .

After testing for stationarity our next step would be to investigate the long run and short run relationship between the variables. There are several econometric techniques available to study such relationship. Uni-variate co-integration includes Engle-Granger (1987) and Fully Modified Ordinary Least Squares (FMOLS) of Philips and Hansen (1990); and multivariate co-integration techniques includes Johansen (1988); Johansen and Juselius (1990); and Johansen's (1995). Although these tests are most commonly



**Female Enrolment Equation**

$$\begin{aligned}
\Delta \ln FENR_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POV_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\
& + \beta_5 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \beta_6 \sum_{i=1}^n \Delta \ln FENR_{t-i} + \gamma_1 \Delta \ln A_{t-1} + \gamma_2 \Delta \ln POV_{t-1} \\
& + \gamma_3 \Delta \ln Y_{t-1} + \gamma_4 \Delta \ln ER_{t-1} + \gamma_5 \Delta \ln EDEX_{t-1} \\
& + \varepsilon_t \quad \dots \quad (6)
\end{aligned}$$

**Health Expenditure Equation**

$$\begin{aligned}
\Delta \ln HEEX_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POV_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\
& + \beta_7 \sum_{i=1}^n \Delta \ln HEEX_{t-i} + \gamma_1 \Delta \ln A_{t-1} + \gamma_2 \Delta \ln POV_{t-1} + \gamma_3 \Delta \ln Y_{t-1} + \gamma_4 \Delta \ln ER_{t-1} \\
& + \varepsilon_t \quad \dots \quad (7)
\end{aligned}$$

**Education Expenditure Equation**

$$\begin{aligned}
\Delta \ln EDEX_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POV_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\
& + \beta_7 \sum_{i=1}^n \Delta \ln EDEX_{t-i} + \gamma_1 \Delta \ln A_{t-1} + \gamma_2 \Delta \ln POV_{t-1} + \gamma_3 \Delta \ln Y_{t-1} + \gamma_4 \Delta \ln ER_{t-1} \\
& + \varepsilon_t \quad \dots \quad (8)
\end{aligned}$$

Where  $\ln POV$  is the per capita poverty headcount in natural log,  $A$  is the set of Foreign Inflows, Foreign Assistance, Remittances and Foreign Direct Investment used separately which splits Equation 3 in four different equations.  $\ln EDEX$  is the federal education expenditure in natural log,  $\ln TENR$  is natural log of total enrollment in schools,  $\ln ER$  is natural log of exchange rate,  $\ln HEEX$  is natural log of federal health expenditure,  $\ln IM$  is natural log of Infant Mortality,  $\ln FENR$  is natural log of Female Enrollment,  $\ln Y$  is natural log of per capita GDP and  $\varepsilon_t$  is the white noise error term. The parameters  $\gamma_i$  where  $i = 1, 2, 3, 4$  are the corresponding long-run multipliers,  $\beta_i$  where  $i = 1, 2, 3, 4$  are the short dynamic coefficients of the underlying ARDL model. We test the null hypothesis of no co-integration i.e.,  $H_0 : \gamma_i = 0$  or  $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$  in Equation 3, against the alternative using the F-test with critical values tabulated by Pesaran and Pesaran (1997) and Pesaran, *et al.* (2001).

If there is evidence of long-run relationship in the model then in order to estimate the long run coefficients, the following long run model will be estimated:

**Poverty Equation**

$$\begin{aligned} \Delta \ln POVT_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln TENR_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln HEEX_{t-i} + \beta_6 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_7 \sum_{i=0}^n \Delta \ln POVT_{t-i} \\ & + \varepsilon_t \quad \dots \quad (9) \end{aligned}$$

**Infant Mortality Equation**

$$\begin{aligned} \Delta \ln IM_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln FENR_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln HEEX_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln POVT_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_6 \sum_{i=0}^n \Delta \ln IM_{t-i} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad (10) \end{aligned}$$

**Total Enrolment Equation**

$$\begin{aligned} \Delta \ln TENR_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln POVT_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln TENR_{t-i} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (11) \end{aligned}$$

**Female Enrolment Equation**

$$\begin{aligned} \Delta \ln FENR_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POVT_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \beta_6 \sum_{i=0}^n \Delta \ln FENR_{t-i} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad (12) \end{aligned}$$

**Health Expenditure Equation**

$$\begin{aligned} \Delta \ln HEEX_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POVT_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln HEEX_{t-i} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (13) \end{aligned}$$

**Education Expenditure Equation**

$$\begin{aligned} \Delta \ln EDEX_t = & \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POVT_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\ & + \beta_5 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (14) \end{aligned}$$



**Education Expenditure Equation**

$$\Delta \ln EDEX_t = \alpha_1 + \beta_1 \sum_{i=0}^n \Delta \ln A_{t-i} + \beta_2 \sum_{i=0}^n \Delta \ln POV_{t-i} + \beta_3 \sum_{i=0}^n \Delta \ln Y_{t-i} + \beta_4 \sum_{i=0}^n \Delta \ln ER_{t-i} \\ + \beta_7 \sum_{i=0}^n \Delta \ln EDEX_{t-i} + \phi_1 ECM_{t-1} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad (20)$$

Where  $\phi_1$  is the error correction term in the model which indicates the pace of adjustment towards long run equilibrium following a short run shock,  $ECM_{t-1}$  represents the error correction term derived from long-run con-integration equation through a newly developed technique of ARDL,  $\beta_i (i = 1, 2, 3, 4)$  are constant terms, and  $\delta_i$  is the serially uncorrelated random disturbance term with mean zero. Long-Run relationship can also be verified through the model specified in Equation (5), with the significance of the lagged ECM by *t*-test.

The ARDL approach involves two steps for estimating the long run relationship Pesaran, *et al.* (2001), first step is to investigate the long run relationship among the variables specified in the equation, and the second step is to estimate short run causality. The second step is only applied when existence of long run relationship is found in the first step [Narayan, *et al.* (2005)]. Two sets of asymptotic critical values are provided by Pesaran and Pesaran (1997) and Pesaran, *et al.* (2001). The first set assumes that all variables are I(0) while the second based on the assumption of I(1). The null hypothesis of the no co-integration will be rejected if the calculated F-statistic is greater than the upper bound critical value, implying that there exists long run relationship among the variables. If the computed statistics are less than the lower bound critical values, we cannot reject the null hypothesis. Lastly, if the computed F-statistics falls within the two bound critical values discussed above, the result will be inconclusive.

In addition to the ARDL approach for the investigation of a long run relationship between the variables in multivariate models, the Johansen co-integration technique will also be used in this study. Johansen (1988) and Johansen and Juselius (1990) presented the method to estimate the maximum likelihood estimators in multivariate models [Yuan, *et al.* (1994)]. They also present two likelihood ratio tests, one based on maximal eigenvalue with  $H_0$  that the number of co-integrating vectors is less than or equal to  $r$  against the  $H_1$  of  $r+1$  co-integrating vectors and other test based on trace test with the same null hypothesis and  $H_1$  that there are at least  $r+1$  co-integrating vectors. In order to apply Johansen co-integration technique, it is necessary that the variables should be stationary at I(1) [Ahlgren, *et al.* (2002)].

**V. DATA AND VARIABLE DESCRIPTION**

Data has been taken from various different sources for the period of 1973–2008. Ideally, literacy rate and Human Development Index would be the better indicators of wellbeing but due to unavailability of time series data, we used infant mortality and school enrolment as proxy variables. Brief information about the variables and their source is given in the following table.

---

|      |   |  |
|------|---|--|
| GDP  | Gross Domestic Product, at Constant Prices of 2000-01 in Million PKR. | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP.   |
| FI   | Foreign Inflows (FDI+FA+Rem) in Million PKR.                          | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP and Economic Survey of Pakistan various issues.  |
| FDI  | Foreign Direct Investment in Million PKR.                             | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP and Economic Survey of Pakistan various issues.  |
| FA   | Foreign Assistance (Foreign Grants + Foreign Debt) in Million PKR.    | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP and Economic Survey of Pakistan various issues.  |
| Rem  | Remittances in Million PKR.   | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP and Economic Survey of Pakistan various issues.  |
| IM   | Infant Mortality, Deaths per 1000 persons.                            | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP and Economic Survey of Pakistan various issues. Data for some years was filled in using Quadratic Interpolation. |
| TENR | Total School Enrolment in thousands.                                  | 50 Years of Pakistan Economy in Statistics. Pakistan Statistical Year Book 2008, Economic Survey of Pakistan 2008-09.  |
| FENR | Female School Enrolment in thousands.                                 | 50 Years of Pakistan Economy in Statistics. Pakistan Statistical Year Book 2008, Economic Survey of Pakistan 2008-09.  |
| POV  | Poverty headcount ratio.  | Jamal, H. (2006), Economic Survey of Pakistan 2008-09, ratio for 2008 was taken from an article of business recorder and for the year 2007 it was calculated using cubic-spline function.            |
| HEEX | Federal Expenditure on Health in Million PKR.                         | Annual Budget Statements (Various Issues).   |
| EDEX | Federal Expenditure on Education in Million PKR.                      | Annual Budget Statements (Various Issues).   |
| ER   | Exchange Rate of Pakistan in Term of US Dollars.                      | Handbook of Statistics on Pakistan Economy 2005, updated with Annual Reports of SBP.   |

---

## VI. EMPIRICAL RESULTS

### Unit Root Test

Table 2 presents the results of units root tests. As discussed before, we used Augmented Dickey Fuller test and Philip-Perron test to do the unit root analysis. The results suggest that most of the variables are not stationary at level therefore we cannot apply traditional OLS techniques for our estimation. The results of ARDL estimation are given in next section.

Table 2

#### Results of the Unit Root Tests

| Variable | Level       |         | 1st Difference |         | Level       |         | 1st Difference |         |
|----------|-------------|---------|----------------|---------|-------------|---------|----------------|---------|
|          | t-statistic | p-value | t-statistic    | p-value | t-statistic | p-value | t-statistic    | p-value |
| lnFI     | -2.45       | 0.35    | -7.18          | 0.00    | -2.35       | 0.40    | -8.41          | 0.00    |
| lnPOV    | -1.14       | 0.91    | -11.68         | 0.00    | -0.87       | 0.95    | -3.98          | 0.02    |
| lnFA     | -1.15       | 0.91    | -5.93          | 0.00    | -1.44       | 0.83    | -5.93          | 0.00    |
| lnREM    | -3.17       | 0.11    | -4.07          | 0.02    | -2.20       | 0.47    | -4.11          | 0.01    |
| lnFDI    | -3.42       | 0.07    | -7.65          | 0.00    | -3.41       | 0.07    | -8.07          | 0.00    |
| lnER     | -2.41       | 0.37    | -4.22          | 0.01    | -2.32       | 0.41    | -4.24          | 0.01    |
| lnY      | -4.06       | 0.02    | -5.43          | 0.00    | -4.07       | 0.02    | -5.55          | 0.00    |
| lnTENR   | -1.86       | 0.65    | -4.73          | 0.00    | -2.05       | 0.55    | -4.61          | 0.00    |
| lnFENR   | -1.83       | 0.67    | -5.80          | 0.00    | -1.84       | 0.67    | -5.80          | 0.00    |
| lnIM     | -1.30       | 0.87    | -4.29          | 0.01    | -1.37       | 0.85    | -4.13          | 0.01    |
| lnEDEX   | -4.92       | 0.00    | -3.65          | 0.04    | -4.31       | 0.01    | -3.65          | 0.04    |
| lnHEEX   | -1.77       | 0.70    | -6.64          | 0.00    | -1.67       | 0.74    | -7.61          | 0.00    |

### Estimated Coefficients

The long-run and short-run results of poverty equation are presented in Tables 3 and 4. For the FI variable as a whole, it was found that foreign inflows actually increase the poverty in Pakistan both in long-run and short-run. More specifically, in long-run one percent increase in foreign inflows bring about 0.6 percent increase in poverty while in short-run, 1 percent increase in foreign inflows brings about 0.4 percent increase in poverty. The other variables, education expenditure, total enrolment, exchange rate and per capita GDP found to be contributing to poverty alleviation policies in both long and short-run. The coefficient for health expenditure was however found to be having insignificant impact on poverty. Similar results were found for foreign assistance variable where FA positively affects poverty and rest of the variables significantly and negatively affects poverty except for the health expenditure variable. The reason for this could be the improper utilisation or underlying agenda of the donor country which played its role in restricting the impact of assistance on poverty [Masud, *et al.* (2005)]. We also found that remittances had insignificant impact on poverty reduction reason may be, as discussed by Jongwanish, (2007), the cost associated with migration due to which poor are not usually the beneficiaries if foreign remittances. Similarly for FDI, the coefficient was found to be insignificant suggesting that FDI has no direct relationship with poverty, neither in long-run nor in short-run.

Table 3

*Estimated Long-run Coefficients using the ARDL Approach*

| Dependent Variables | lnFI              | lnFA             | lnREM             | lnFDI            | lnEDEX            | lnTENR            | lnER              | lnHEEX            | lnY               |
|---------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>lnPOV</b>        | -0.623<br>(0.007) | -                | -                 | -                | -0.571<br>(0.00)  | -0.583<br>(0.005) | -0.712<br>(0.001) | -0.097<br>(0.443) | -0.882<br>(0.00)  |
|                     |                   | 0.566<br>(0.031) | -                 | -                | -0.543<br>(0.00)  | -0.635<br>(0.02)  | -0.874<br>(0.003) | -0.134<br>(0.361) | -1.084<br>(0.00)  |
|                     |                   |                  | -0.377<br>(0.195) | -                | -0.469<br>(0.02)  | -0.169<br>(0.907) | -0.377<br>(0.195) | -0.027<br>(0.904) | -0.874<br>(0.009) |
|                     |                   |                  |                   | 0.099<br>(0.365) | -0.389<br>(0.119) | 0.009<br>(0.962)  | -0.546<br>(0.088) | -0.181<br>(0.549) | -0.914<br>(0.017) |

Table 4

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables             | $\Delta$ lnFI    | $\Delta$ lnFA    | $\Delta$ lnREM  | $\Delta$ lnFDI    | $\Delta$ lnEDEX   | $\Delta$ lnTENR   | $\Delta$ lnER     | $\Delta$ lnHEEX   | $\Delta$ lnY      | Ecm(-1)           |
|---------------------------------|------------------|------------------|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b><math>\Delta</math>lnPOV</b> | 0.428<br>(0.022) | -                | -               | -                 | -0.393<br>(0.004) | -0.401<br>(0.018) | -0.489<br>(0.014) | -0.067<br>(0.454) | -0.606<br>(0.006) | -0.687<br>(0.00)  |
|                                 |                  | 0.344<br>(0.051) | -               | -                 | -0.329<br>(0.01)  | -0.385<br>(0.04)  | -0.53<br>(0.023)  | -0.081<br>(0.379) | -0.657<br>(0.006) | -0.606<br>(0.001) |
|                                 |                  |                  | 0.02<br>(0.674) | -                 | -0.214<br>(0.132) | -0.465<br>(0.053) | -0.172<br>(0.239) | -0.013<br>(0.904) | 0.399<br>(0.078)  | -0.457<br>(0.024) |
|                                 |                  |                  |                 | -0.027<br>(0.379) | -0.148<br>(0.238) | -0.497<br>(0.033) | -0.207<br>(0.173) | -0.069<br>(0.545) | 0.347<br>(0.161)  | -0.379<br>(0.027) |

In order to capture the forward linkages of poverty on different socio-economic variables like health and education, which are also the determinants of poverty, we estimated few more equations. For instance Tables 5 and 6 represents the results of infant mortality equations. We found that poverty has no relationship with infant mortality in short-run but in long-run, poverty increases infant mortality. We also found that, both in long-run and short-run, health expenditures have no impact on infant mortality, suggesting that the crucial component of public spending is either misallocated or being a victim of poor governance. Hence it not translating itself in improvement of important health sector indicator; infant mortality. The relationship between female enrolment and infant mortality was found to be negative, suggesting that an educated mother can take care of her child better than an uneducated mother.

Table 5

*Estimated Long-run Coefficients using the ARDL Approach*

| Dependent Variables | lnFENR            | lnHEEX            | lnEDEX           | lnPOV            | lnY               |
|---------------------|-------------------|-------------------|------------------|------------------|-------------------|
| <b>lnIM</b>         | -0.909<br>(0.019) | -0.688<br>(0.139) | 1.155<br>(0.000) | 1.754<br>(0.029) | -1.428<br>(0.024) |

Table 6

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables                      | $\Delta \ln \text{FENR}$ | $\Delta \ln \text{HEEX}$ | $\Delta \ln \text{EDEX}$ | $\Delta \ln \text{POV}$ | $\Delta \ln \text{Y}$ | $\text{Ecm}(-1)$  |
|--|--------------------------|--------------------------|--------------------------|-------------------------|-----------------------|-------------------|
| <b><math>\Delta \ln \text{IM}</math></b> | -0.148<br>(0.153)        | -0.112<br>(0.152)        | -0.069<br>(0.459)        | -0.002<br>(0.99)        | -0.233<br>(0.085)     | -0.163<br>(0.018) |

The long and short-run impacts of foreign inflows on public health expenditure are given in Tables 7 and 8 respectively. Results showed that both FI and FA had negative impact on health expenditure in long-run suggesting that with increased magnitude of inflows, priority of the government diverts to other areas. FI however had insignificant impact on health expenditure in the short-run. We have already seen that health expenditures had insignificant impact on infant mortality and poverty which gives us the implication that in addition to the fact that foreign assistance is negatively influencing the health expenditure, the expenditure itself is not correctly allocated. The other two components of the inflows, remittances and FDI, had positive relationship with health expenditure in both long-run and short-run. Poverty showed negative relationship with health expenditure in both time-scales, suggesting that with increase in poverty, the indicators with direct influence on poverty become government's priority expenditures and hence less is left to be allocated to health.

Table 7

*Estimated Long-run Coefficients using the ARDL Approach*

| Dependent Variables                 | $\ln \text{FI}$   | $\ln \text{FA}$   | $\ln \text{REM}$ | $\ln \text{FDI}$ | $\ln \text{POV}$  | $\ln \text{ER}$  | $\ln \text{Y}$   |
|-------------------------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|
| <b><math>\ln \text{HEEX}</math></b> | -1.224<br>(0.084) | -                 | -                | -                | -1.475<br>(0.00)  | 0.71<br>(0.007)  | 1.48<br>(0.029)  |
|                                     | -                 | -1.021<br>(0.014) | -                | -                | -1.367<br>(0.00)  | 0.912<br>(0.00)  | 1.204<br>(0.002) |
|                                     | -                 | -                 | 0.264<br>(0.071) | -                | -1.227<br>(0.00)  | 0.937<br>(0.002) | 0.014<br>(0.944) |
|                                     | -                 | -                 | -                | 0.236<br>(0.039) | -1.095<br>(0.002) | 0.277<br>(0.413) | 0.191<br>(0.155) |

Table 8

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables                        | $\Delta \ln \text{FI}$ | $\Delta \ln \text{FA}$ | $\Delta \ln \text{REM}$ | $\Delta \ln \text{FDI}$ | $\Delta \ln \text{POV}$ | $\Delta \ln \text{ER}$ | $\Delta \ln \text{Y}$ | $\text{Ecm}(-1)$  |
|--|------------------------|------------------------|-------------------------|-------------------------|-------------------------|------------------------|-----------------------|-------------------|
| <b><math>\Delta \ln \text{HEEX}</math></b> | -0.481<br>(0.114)      | -                      | -                       | -                       | -0.579<br>(0.008)       | 0.279<br>(0.095)       | 0.581<br>(0.053)      | -0.393<br>(0.006) |
|  | -                      | -0.462<br>(0.027)      | -                       | -                       | -0.619<br>(0.003)       | 0.413<br>(0.026)       | 0.544<br>(0.007)      | -0.453<br>(0.002) |
|  | -                      | -                      | 0.098<br>(0.068)        | -                       | -0.454<br>(0.022)       | 0.3456<br>(0.054)      | 0.005<br>(0.944)      | -0.37<br>(0.006)  |
|  | -                      | -                      | -                       | 0.095<br>(0.054)        | -0.444<br>(0.034)       | 0.112<br>(0.478)       | 0.077<br>(0.166)      | -0.406<br>(0.005) |

We attempted to capture the impact of poverty and inflows on education sector through total enrolment, female enrolment and government expenditure on education. Tables 9 and 10 presents the result of total enrolment equation. Results suggest that poverty has no influence on total enrolment in the long-run however it may negatively affect it in the short run. All inflow variables except for remittances showed positive and significant impact of total enrolment in the long-run while in the short run, only aggregated FI variable had positive and significant relationship with total enrolment.

Table 9

*Estimated Long-run Coefficients using the ARDL Approach*

| Dependent Variables | lnFI             | lnFA             | lnREM             | lnFDI           | lnEDEX            | lnY               | lnPOV             |
|---------------------|------------------|------------------|-------------------|-----------------|-------------------|-------------------|-------------------|
| <b>lnTENR</b>       | 0.595<br>(0.001) | –                | –                 | –               | –0.281<br>(0.083) | 0.55<br>(0.002)   | –0.822<br>(0.131) |
|                     | –                | 0.449<br>(0.003) | –                 | –               | –0.165<br>(0.262) | –0.622<br>(0.002) | –0.502<br>(0.306) |
|                     | –                | –                | –0.205<br>(0.698) | –               | 0.216<br>(0.774)  | 1.694<br>(0.286)  | –1.403<br>(0.728) |
|                     | –                | –                | –                 | 0.278<br>(0.00) | –0.226<br>(0.045) | 0.899<br>(0.000)  | –0.26<br>(0.264)  |

Table 10

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables              | $\Delta$ lnFI    | $\Delta$ lnFA    | $\Delta$ lnREM    | $\Delta$ lnFDI  | $\Delta$ lnEDEX   | $\Delta$ lnY      | $\Delta$ lnPOV     | Ecm (–1)          |
|----------------------------------|------------------|------------------|-------------------|-----------------|-------------------|-------------------|--------------------|-------------------|
| <b><math>\Delta</math>lnTENR</b> | 0.134<br>(0.077) | –                | –                 | –               | 0.058<br>(0.508)  | 0.125<br>(0.025)  | –0.186<br>(0.014)  | –0.226<br>(0.079) |
|                                  | –                | 0.092<br>(0.149) | –                 | –               | –0.034<br>(0.252) | 0.127<br>(0.044)  | –0.103<br>(0.0123) | –0.205<br>(0.128) |
|                                  | –                | –                | 0.0102<br>(0.769) | –               | 0.108<br>(0.838)  | 0.085<br>(0.267)  | –0.07<br>(0.45)    | –0.05<br>(0.563)  |
|                                  | –                | –                | –                 | 0.017<br>(0.45) | –0.068<br>(0.054) | –0.271<br>(0.002) | –0.314<br>(0.017)  | –0.302<br>(0.005) |

Similarly, the impact of poverty and inflows was analysed on female school enrolment. The results (Tables 11 and 12) suggest that both FI and FA have positive and significant relationship with total enrolment while poverty had negative relationship with female enrolment in both long and short-run. The impact of remittances and FDI on female school enrolment was also found to be positive and significant. We also found positive relationship between government expenditure and female enrolment.

Table 11

*Estimated Long Run Coefficients Using the ARDL Approach*

| Dependent Variables | lnFI            | lnFA            | lnREM            | lnFDI          | lnPOV             | lnY              | lnER              | lnEDEX           |
|---------------------|-----------------|-----------------|------------------|----------------|-------------------|------------------|-------------------|------------------|
| <b>lnFENR</b>       | 0.987<br>(0.03) | –               | –                | –              | –1.004<br>(0.011) | 0.12<br>(0.03)   | –0.123<br>(0.00)  | 0.981<br>(0.002) |
|                     | –               | 0.891<br>(0.07) | –                | –              | –0.451<br>(0.002) | 0.871<br>(0.00)  | –0.101<br>(0.031) | 0.876<br>(0.001) |
|                     | –               | –               | 1.064<br>(0.021) | –              | –2.032<br>(0.021) | 1.203<br>(0.006) | –0.004<br>(0.022) | 1.271<br>(0.034) |
|                     | –               | –               | –                | 1.02<br>(0.02) | –0.243<br>(0.03)  | 0.923<br>(0.031) | –2.03<br>(0.032)  | 0.35<br>(0.031)  |

Table 12

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables | $\Delta \ln FI$ | $\Delta \ln FA$ | $\Delta \ln REM$ | $\Delta \ln FDI$ | $\Delta \ln POV$  | $\Delta \ln Y$  | $\Delta \ln ER$   | $\Delta \ln EDEX$ | Ecm (-1)          |
|---------------------|-----------------|-----------------|------------------|------------------|-------------------|-----------------|-------------------|-------------------|-------------------|
| $\Delta \ln FENR$   | 0.211<br>(0.00) | -               | -                | -                | -0.432<br>(0.005) | 0.72<br>(0.004) | -0.94<br>(0.031)  | 0.022<br>(0.016)  | -0.333<br>(0.014) |
|                     | -               | 0.103<br>(0.05) | -                | -                | -0.219<br>(0.001) | 0.21<br>(0.014) | -0.439<br>(0.001) | 0.41<br>(0.001)   | -0.323<br>(0.026) |
|                     | -               | -               | 0.329<br>(0.03)  | -                | -0.482<br>(0.018) | 0.56<br>(0.02)  | -0.591<br>(0.591) | 0.34<br>(0.00)    | 0.012<br>(0.007)  |
|                     | -               | -               | -                | 0.045<br>(0.05)  | -0.018<br>(0.06)  | 0.09<br>(0.01)  | -0.21<br>(0.045)  | 0.69<br>(0.935)   | -0.016<br>(0.003) |

For the equation of education expenditure, we found that FI and FA had negative relationship with education expenditure in the long-run but in short-run the impact of aggregated FI variable had insignificant impact on education expenditure (Tables 13 and 14). Remittances had positive while FDI had insignificant impact on education expenditure both in long-run and short-run. Poverty negatively influenced education expenditure in long-run but in short-run the impact was relatively insignificant.

Table 13

*Estimated Long-run Coefficients using the ARDL Approach*

| Dependent Variables | $\ln FI$          | $\ln FA$          | $\ln REM$        | $\ln FDI$        | $\ln Y$           | $\ln POV$         | $\ln ER$          |
|---------------------|-------------------|-------------------|------------------|------------------|-------------------|-------------------|-------------------|
| $\ln EDEX$          | -1.052<br>(0.035) | -                 | -                | -                | 2.609<br>(0.001)  | -1.305<br>(0.005) | -0.77<br>(0.066)  |
|                     | -                 | -0.879<br>(0.007) | -                | -                | 2.184<br>(0.00)   | -1.196<br>(0.002) | -0.396<br>(0.155) |
|                     | -                 | -                 | 0.649<br>(0.013) | -                | -0.401<br>(0.525) | -1.053<br>(0.028) | 1.017<br>(0.103)  |
|                     | -                 | -                 | -                | 0.219<br>(0.353) | 0.628<br>(0.214)  | -0.756<br>(0.393) | -0.427<br>(0.45)  |

Table 14

*Estimated Short-run Coefficients using the ARDL Approach*

| Dependent Variables | $\Delta \ln FI$  | $\Delta \ln FA$   | $\Delta \ln REM$ | $\Delta \ln FDI$ | $\Delta \ln Y$   | $\Delta \ln POV$  | $\Delta \ln ER$   | Ecm (-1)          |
|---------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|
| $\Delta \ln EDEX$   | 0.328<br>(0.377) | -                 | -                | -                | 0.640<br>(0.014) | -0.32<br>(0.114)  | -1.126<br>(0.012) | -0.246<br>(0.008) |
|                     | -                | -0.259<br>(0.015) | -                | -                | 0.642<br>(0.005) | -0.352<br>(0.076) | -0.576<br>(0.08)  | -0.294<br>(0.001) |
|                     | -                | -                 | 0.162<br>(0.009) | -                | 0.809<br>(0.031) | -0.263<br>(0.177) | 0.265<br>(0.456)  | -0.249<br>(0.005) |
|                     | -                | -                 | -                | 0.043<br>(0.328) | 0.122<br>(0.355) | 0.147<br>(0.512)  | -0.696<br>(0.064) | -0.195<br>(0.037) |

## VII. CONCLUSION

In this study we tried to find out the direct and indirect impacts of foreign inflows and poverty in economy. Foreign Inflows generally supplement resources of the recipient countries to promote economic growth and eliminate poverty. We attempted to test this

argument in this study and found that foreign inflows, specifically foreign assistance, have actually increased poverty in Pakistan both in long-run and short-run through direct and indirect channels. We used infant mortality rate and enrolment rates as a proxy to capture welfare impacts. We found that poverty increases infant mortality in Pakistan. Earlier in this study, the relationship of foreign assistance is already shown to be positive with poverty, hence an increase in foreign assistance would not only increase poverty but also infant mortality therefore we need concrete policy measures that can make sure of the positive feedback of foreign assistance on infant mortality in Pakistan. We also found that all the foreign inflow variables in disaggregated forms had positive impact on both female and total enrolment in Pakistan suggesting beneficial impact of foreign inflows in education.

Another interesting finding of this paper was the insignificant impact of government health expenditure on poverty and infant mortality. The impact could be because of improper allocation of resources or inability of these finances to reach the critical geographic areas. As far as the policy recommendations are concerned, in light of this analysis we can see that there is a need of proper allocation of resources in the country. The inflows are somewhat continuous and increasing with time but their results are not as significant as they should be. Proper allocation of resources would not only reduce poverty but also improve other indicators such as infant mortality and female school enrolment.

#### REFERENCES

- Adam, R. H. (2002) Precautionary Saving from Different Sources of Income: Evidence from Rural Pakistan. Washington, DC: World Bank. (Policy Research Working Paper 2761).
- Adams, R. and J. Page (2005) Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Development* 33:10, 1645–69.
- Ahlgren, N. and J. Antell (2002) Testing for Cointegration between International Stock Prices. *Applied Financial Economics* 12, 851–861.
- Baharumshah, A. Z. and M. A. M. Thanoon (2005) Domestic Savings, Foreign Capital and Economic Growth: The Case of Vietnam and 15 Neighbouring Countries. *Modernisation and Social Transformation in Vietnam: Social Capital Formation and Institution Building*. Mitteilungen Des Instituts Fur Asienkunde Hamburg, Germany. pp. 290–305.
- Bengoa, M. and S. R. Blanca (2003) Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America. *European Journal of Political Economy* 19, 529–545.
- Boone, P. (1996) Politics and the Effectiveness of Foreign Aid. *European Economic Review* 40: (February), 289–329.
- Borensztein, E. J., J. De Gregorio and L. W. (1998) How Does Foreign Direct Investment Affect Economic Growth? *Journal of International Economics* 45, 115–135.
- Burnside, C. and D. Dollar (1998) Aid, the Incentive Regime and Poverty Reduction. (World Bank Policy Research Working Paper 1937).
- Calderon, C. Pablo Fajnzylber, and Humberto Lopez (2008) What is the Impact of International Remittances on Poverty and Inequality in Latin America? *World Development* 36:1, 89–114.

- Carvalho, S. and H. White (1996) *Implementing Projects for the Poor: What has been Learned?* Washington, DC: World Bank.
- Chami, R., C. Fullenkamp and S. Jahjah (2003) *Are Immigrant Remittance Flows a Source of Capital for Development?* Washington, DC: International Monetary Fund. (IMF Working Paper 01/189).
- Chowdhury, A. and G. Mavrotas (2006) *FDI and Growth: What Causes What?* United Nations University.
- De Mello, L. R. (1997) FDI in Developing Countries and Growth: A Selective Survey. *Journal of Development Studies* 34 : 2 , 1–34.
- Durham, J. B. (2004) Absorptive Capacity and the Effects of Foreign Direct Investment and Equity Foreign Portfolio Investment on Economic Growth. *European Economic Review* 48, 285–306.
- Engle, Robert F. and Clive W. J. Granger (1987) Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica* 55: 2, 251–76.
- Faini, R. (2002) *Development, Trade, and Migration*. ABCDE Europe Conference 1-2.
- Goldberg, M. A. and M. D. Levi (2008) *The Impact of Remittances of Economic Growth*. Mastercard Worldwide Insights.
- Gomanee, K., S. Girma, and O. Morrissey (2005) Aid, Public Spending and Human Welfare: Evidence from Quantile Regressions. *Journal of International Development* 117: 3, 299–309.
- Gupta, S., M. Verhoeven, and E. R. Tiongson (2002) The Effectiveness of Government Spending on Education and Health Care in Developing and Transition Economies. *European Journal of Political Economy* 18: 4, 717–738.
- Gwin, C. (2002) *IDA's Partnership for Poverty Reduction: An Independent Evaluation of Fiscal Years 1994–2000*. Washington, DC: World Bank.
- Hassan, M. K. (2003) FDI, Information Technology and Economic Growth in the MENA Region. Retrieved 2009, from ERF: [www.erf.org.eg/CMS/getFile.php?id=602](http://www.erf.org.eg/CMS/getFile.php?id=602)
- Herzer, D., S. Klasen, and D. F. Nowak-Lehman (2006) *In Search of FDI-led Growth in Developing Countries*. Goettingen, Germany: Georg-August-Universität Göttingen.
- Hong, K. (1997) Foreign Capital and Economic Growth in Korea: 1970-1990. *Journal of Economic Development* 22: 1, 79–89
- IMF (2005) *The Work of the IMF Committee on Balance of Payments Statistics*. Retrieved 2009 from *Balance of Payment Statistics* 12:1. <http://www.imf.org/external/pubs/ft/bop/news/pdf/1205.pdf>
- Johansen S. and K. Juselius (1990) Maximum Likelihood Estimation and Inference on Cointegration—With Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics* 52: 2, 169–210
- Johansen, S. (1988) *Statistical Analysis of Cointegration Vectors*. *Journal of Economic Dynamics and Control* 12, 231–54.
- Jongwanish, J. (2007) *Worker's Remittances, Economic Growth and Poverty in Developing Asia and the Pacific Countries*. Economic and Social Commission for Asia and Pacific: UNESCAP (Working Paper, WP/07/01).
- Kraay, A. and C. Raddatz (2005) *Poverty Traps, Aid, and Growth*. World Bank (WPS 3631).

- Li, X. and L. Xiaming (2005) Foreign Direct Investment and Economic Growth: An Increasingly Endogenously Relationship. *World Development* 33 :3, 393–407.
- Lucas, R. (1988) On Mechanics of Economic Growth. *Journal of Monetary Economics* 22, 3–42.
- Masud, N. and B. Yontcheva (2005) Does Foreign Aid Reduce Poverty? Empirical Evidence from Non-governmental and Bilateral Aid. IMF Institute (IMF Working Paper WP/05/100).
- McGillivray, M. and O. Morrissey (2004) Fiscal Effects of Aid. In T. Addison and A. Roe (eds.) *Fiscal Policy for Development: Poverty, Reconstruction and Growth*. Basingstoke: Palgrave Macmillan in Association with UNU-WIDER.
- Mesnard, A. (2004) Temporary Migration and Capital Market Imperfections. *Oxford Economic Papers* 56 :2, 242–62.
- Mohey-ud-din, G. (2006) Impact of Foreign Capital Inflows on Economic Growth in Pakistan. Retrieved 2009, from MPRA Archive: <http://mpra.ub.uni-muenchen.de/1233/>
- Mottaleb, K. A. (2007) Determinants of Foreign Direct Investment and Its Impact on Economic Growth in Developing Countries. Retrieved 2009, from MPRA Archive: <http://mpra.ub.uni-muenchen.de/9457/>
- Narayan, K. P. (2005) The Saving and Investment Nexus for China: Evidence from Cointegration Tests. *Applied Economics* 37, 1979–90.
- Nishat, M. and N. Bilgrami (1991) The Impact of Migrant Worker's Remittances on Pakistan Economy. *Pakistan Economic and Social Review* 29: 1, . 21–41.
- Ozturk, I. and H. Kalyoncu (2007) Foreign Direct Investment and Growth: An Empirical Investigation Based on Cross-country Comparison. *Economia Internazionale* 60:1, 75–82.
- Pakistan, Government of (Various Issues) *Economic Survey of Pakistan*. Ministry of Finance.
- Pesaran, M. H. and Y. Shin (1995, 1998) An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. (DAE Working Paper No. 9514).
- Pesaran, M. H. and B. Pesaran (1997) *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford: Oxford University Press.
- Pesaran, M. H., Y. Shin, and R. J. Smith (2001) Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics* 16, 289–326
- Phillips, P. C. and P. Perron (1988) Testing for a Unit Root in a Time Series Regression. *Biometrika* 75, 335–346.
- Prasad, E. S., R. G. Rajan and A. Subramanian (2007) Foreign Capital and Economic Growth. Available at SSRN: <http://ssrn.com/abstract=1033745> (NBER Working Paper Series, Vol. w13619).
- PSLM (2007) Pakistan Social and Living Standard Measurement Survey. Federal Bureau of Statistics: Government of Pakistan. Web address: [www.statpak.gov.pk](http://www.statpak.gov.pk)
- Rana, P. B. and J. M. Jr. Dowling (1988) The Impact of Foreign Capital on Growth: Evidences from Asian Developing Countries. *The Developing Economies* 26:1, Tokyo, Japan.
- Romer, P. (1993) Idea Gaps and Object Gaps in Economic Development. *Journal of Monetary Economics* 32:3.

- Siddiqui, R. and A. R. Kemal (2006) Remittances, Trade Liberalisation, and Poverty in Pakistan: The Role of Excluded Variables in Poverty Change Analysis. *The Pakistan Development Review* 45:3, 383–415.
- Siddiqui, R. and A. R. Kemal (2006) Poverty-reducing or Poverty-inducing? A CGE-Based Analysis of Foreign Capital Inflows in Pakistan. Pakistan Institute of Development Economics Online at <http://mpira.ub.uni-muenchen.de/2283/>
- Siddiqui, Rehana (1997) The Impact of Foreign Resource Inflow, Technology Transfer, and Trade on Poverty. (Research Report.)
- Stahl, C. (1982) Labour Emigration and Economic Development. *International Migration Review* 16, 868–99.
- State Bank of Pakistan (2005) *Handbook of Statistics on Pakistan*. [www.sbp.org.pk](http://www.sbp.org.pk)
- Taylor, J. (1992) Remittances and Inequality Reconsidered: Direct, Indirect and Intertemporal Effects. *Journal of Policy Modelling* 14:2, 187–209.
- UNCTAD (1991) The Triad in Foreign Direct Investment. New York: United Nations Center for Transnational Corporations. (World Investment Report 1991).
- Verschoor, A. (2002) Aid and the Poverty-sensitivity of the Public Sector Budget. Department of Economics, University of Sheffield, Research Programme on Risk, Labour Markets and Pro-poor Growth. (Occasional Paper 3).
- White, Howard (1992) The Macro Economic Impact of Development Aid: A Critical Survey. *The Journal of Development Studies* 28: 2.
- World, Bank (1999) *Foreign Direct Investment in Bangladesh: Issues of Long-run Sustainability*. World Bank.
- Yang, D. (2004) International Migration, Human Capital, and Entrepreneurship: Evidence from Philippine Migrants Exchange Rate Shocks. Ford School of Public Policy University of Michigan, Ann Arbor. (Working Paper No. 02-011).
- Yuan, M. and K. Kochhar (1994) China's Imports: An Empirical Analysis Using Johansen's Cointegration Approach. (IMF Working Paper No. WP/94/145).
- Zaman, K. and W. Ikram (2008) The Study of Foreign Direct Investment—Poverty Nexus in Pakistan. Under Investigation of Pro-poor Investment Index (PPII) Online at <http://mpira.ub.uni-muenchen.de/9332/>

## Comments

The author has made a good attempt to determine the impact of foreign inflows on poverty in Pakistan through the channel of health, education and other indicators related to human development. This is a good paper with an excellent review of literature as the author has tried to establish a coherent story.

The author has also examined the composition of inflows in Pakistan and suggests the highest share of foreign debt in the total inflow variable at 76.5 percent followed by remittances at 12.5 percent, FDI at 9.96 percent and grants at 1.02 percent. I think there appears to be some confusion as according to my knowledge inflows of foreign loans plus grant were US\$2.5 billion in FY05 while inflows of FDI and workers remittances were US\$1.5 billion and US\$ 4.1 billion. Probably, the author has included stock of foreign debt rather than flows in this variable which seems to be incorrect. A *stock* variable is measured at one specific time which may have been accumulated in the past while a *flow* variable is measured over an interval of time. Thus, it is important to revise it as it can alter the conclusion.

While the results are not consistent with the perception and other studies, I have doubt on poverty variable in terms of consistency of poverty estimates over time as author has used poverty variable which was computed till 2001 using Malik (1988) poverty line. This is not consistent with the official poverty estimates based on official poverty line announced by Planning Commission in 2002 and onward.

The authors' results that exchange rate found to be contributing to poverty alleviation policies in both long and short-run are surprising. But exchange rate depreciation leads to increase in inflation and there is no doubt that inflation increases poverty. I agree on insignificant coefficient for health expenditure which has no impact on poverty. It is worrying that the country spends too little on health and even this meager government spending at 0.5 percent of GDP seems to be poorly targeted which is not beneficial for the poor. However, this result may have been due to only taking federal expenditure on health and education and ignoring the provincial expenditure. Health and education areas are provincial subject and thus author should include provincial expenditure.

In addition, I would like to comment that running expenditure merely on nominal expenditure does not capture the policy shift or emphasis. Therefore, the right approach to capture the weight of the policy is to take expenditure as percent of GDP over time and then run regression. Furthermore, the author should explain that why remittances have not shown positive and significant impact of total enrolment in the long-run while it has an impact in the short run. Finally, some of the references are missing which I am pointing out.

**Talat Anwar**

Canadian International Development Agency (CIDA),  
Programme Support Unit, Islamabad.

## Poverty Elimination Through Potential Zakat Collection in the OIC-member Countries: Revisited

NASIM SHAH SHIRAZI and MD. FOUAD BIN AMIN

### 1. INTRODUCTION

The World Bank has been reporting poverty estimates for a number of years which are helpful in assessing the progress towards poverty alleviation across the countries. The World Bank (2009) estimates show that poverty level has been decreasing over last two and half decades. The number of absolute poor (in terms of \$1.25 a day) has decreased from about 1.9 billion in 1981 to about 1.8 billion in 1990, and it further dropped to about 1.4 billion in 2005. The share of people living on less than \$ 1.25 a day decreased by 10 percentage points from 52.2 to 42.0 percent during 1981 to 1990 and it further went down by about 17 percentage point ( from 42.0 percent to 25.3 percent) during 1990 and 2005. Similarly, we can find variations on the poverty alleviation front across the regions. East Asia and Pacific, Middle East and North Africa witnessed a decline in poverty both in terms of number of absolute poor and the share of people in poverty during 1981 to 2005. Although the share of South Asia's poor people in Global poverty declined from 59.4 percent to 40.3 percent during 1981 to 2005, yet absolute number of poor people increased from 548 million to 596 million during the same period. Sub-Saharan Africa witnessed a slight decrease (53.4 percent to 50.9 percent) in its share of poor people, while the number of poor people increased from 211 million to 388 million during 1981 to 2005. This shows that poverty has been the serious problem and a great challenge for Developing Countries. In Europe and central Asia, both the number of poor people and the share of people in poverty increased during the same period. [See World Bank (2009), Table 2.8]. The World Bank believe that about 46 million more people will come under the income level of \$1.25 a day due to the recent global economic meltdown and the slow economic growth rates.

Different policies and strategies, both at the micro and macro level including safety-nets programmes, have been adopted in different countries in the past to reduce the poverty, but the fact remains that poverty still persists especially in developing countries. The Muslim countries have a very strong institution—*Zakat and Sadaqat*—which has never been practiced in its true spirit. We firmly believe that if this institution is revived and fully implemented then absolute poverty can be eliminated from these countries.

Nasim Shah Shirazi <nasimss@yahoo.com> is Professor, and Md. Fouad Bin Amin is PhD Student, Department of Economics, Faculty of Economics and Management Sciences, International Islamic University Malaysia (IIUM).

This paper is written in the said spirit. The paper attempts to estimate resource shortfall and potential *Zakat* collection for poverty elimination in 38 OIC-member countries.<sup>1</sup> The rest of the paper is organised as follows. Section 2 gives a brief summary of the literature review and Section 3 discusses the data and methodology employed for the estimation of results. Section 4 highlights the poverty incidence in the OIC member countries from which data are available, Section 5 provides the estimates of resource required for poverty elimination, the estimates of potential *Zakat* collection and compares both the resource required and resource needed that can be made available through potential *Zakat* collection. Section 6 sets forth the summary and conclusion.

## 2. LITERATURE REVIEW

An extensive review of literature has been covered by [Shirazi (2004, 2006)]. However, this section focuses on a few studies only, which discuss the subject matter of the paper. Ahmed (2004) estimates the potential of Zakat collection and resource required for poverty alleviation for a sample of 24 IDB member countries by using a \$1/day (group1) and \$2/day (group 2) international poverty lines. To determine the amount needed per annum for poverty alleviation, the author multiplied the number of poor of each country under his study by 365 and converted the amount into percentage of GDP of the respective country. Similarly he estimated the resource required under \$2.00 a day. He found that , at one extreme, Tunisia required only 0.3 percent (for group 1) and 1.4 percent (for group 2) of its GDP for the alleviation of extreme poverty while at other extreme, Nigeria required huge amount that is 107.7 percent (for group1) and 149.6 percent (for group 2) of GDP respectively for poverty alleviation. The author employed Kahf (1989) estimates to measure the potential of Zakat in the respective countries. Author compares the percentages of GDP required under \$1 and \$2 for poverty alleviation with potential Zakat collection under three different opinions for Zakatable items. With the Zakat rate of 1.8 percent, only eight countries namely Tunisia, Turkey, Kazakhstan, Jordan, Algeria, Morocco, Egypt and Azerbaijan are capable of lifting the poor from poverty line in a year (group 1), but other 16 countries are failing to do so. At 4.3 percent Zakat rate half of the sample countries are able to move their hard core poor people (Group 1) out of poverty [for further detail see Ahmad (2004)].

In our view, study has two shortcomings. Firstly, study multiplies the total number of poor of the respective country by 365 to estimates total funds needed per annum for poverty alleviation. Thus the study assumes that every poor has zero income. This may not be true. Some may be having zero income while other more than zero but less than \$1 a day. Therefore, precise estimates for obtaining absolute resource required can be obtained by using the poverty gap index. Secondly, the author has not adjusted the Muslim and non-Muslim population for the estimation of potential Zakat.

Yaumidin (2009) estimates the resource needed for poverty alleviation and potential Zakat collection for Malaysia and Indonesia. She concludes that Malaysia performs better than Indonesia. She replicates the methodology employed by Ahmad (2004) which suffers the same shortcoming as discussed above.

<sup>1</sup> Data are available for 38 OIC-member countries only.

Although macroeconomic policies play pivotal role in alleviating poverty, yet it cannot be eliminated without the use of Zakat in an effective way [Ahmad (2008)]. Ahmad is of the view that Zakat can make an impact on poverty if (i) it is complemented by robust macroeconomic policies that increase growth and redistribute income, and (ii) when larger portion of Zakat is used for productive purposes.

Hassan and Khan (2007) find that Zakat fund can largely facilitate the government budgetary expenditure and support the poor through transfer of payment in Bangladesh. By allocating funds into eight groups of Zakat recipient, it is possible to increase the income and employment with the improvement of safety net programmes. Zakat funds can increase the tax potential of the government through the improvement of productivity, employment and output. They conclude that Zakat funds can replace the government budgetary expenditures ranging from 21 percent of ADP (annual development me) in 1983-84 to 43 percent of ADP in 2004-2005. These funds can be used for other developmental and social expenditures. They suggested that Zakat should be included, for Bangladesh and rest of the Muslim countries, as a poverty alleviation instrument in their PRSP.

Sadeq (1996) finds that RM 293 million (which is about 73 percent of estimated potential Zakat collection) will be needed annually to change the status of hard-core households to a status of non-poor households in Malaysia. The rest of the amount (23 percent), as the study suggests, could be used for uplifting their economic condition.

While discussing the distributive effect of Zakat, Awad (1989) estimates that in Sudan about 3 to 4 percent of GNP is collected as Zakat revenue which implies that one third of GNP can be redistributed from the rich to the poor in a decade. However, some studies find that the proceeds of Zakat will not exceed 1 to 2 percent of GNP, when all the existing Fische rules are followed, especially in Sudan and Saudi Arabia [Khan (1989) and Salama (1990)].

The studies made, so far, are either limited in scope or lack the proper methodology for estimation of the resource needed and potential Zakat collection. Therefore the present study is devoted for the purpose.

### 3. METHODOLOGY AND DATA SET

As we have noted earlier that this paper is the updated and extended version of Shirazi (2004, 2006), so we have followed the same estimation method for the current paper. However, we have corrected the error which we made in our earlier paper, which resulted under estimation of the resource required for poverty elimination.

#### 3.1. Estimation of Resource Shortfall

The resource gap has been estimated by using the poverty gap index, which is defined as the mean shortfall below the poverty line, expressed as a percentage of the poverty line. The World Bank has used the recent updated poverty lines of US \$1.25 a day in 2005 PPP terms for hard core poor and US \$2.0 a day for the poor respectively which represents the mean of poverty lines found in the poorest countries ranked by per capita consumption.<sup>2</sup> This reflects the depth of poverty as well as its incidence. The

<sup>2</sup>For precise estimates, national poverty lines and micro data of each country are required, which are not available to us. Therefore we have to rely on the International poverty line and the poverty gap index measured in terms of international poverty line. The World Bank has updated the previous international poverty line which was in terms of \$ 1 a day for the extreme poor and \$ 2 a day for the relative poor. However, this poverty line remained controversial among the researchers [see Pogge and Reddy (2003)]. The recent updated poverty lines in terms of \$1.25 a day and \$2.0 a day is also questioned by the same author [see Reddy (2009)].

poverty gap index does not provide the total income (consumption) shortfall explicitly. For this purpose we will use the estimated poverty gap based on international poverty line, and convert it into absolute figures for each country under study.

$$P_1 = 1/N \sum_{i=1}^q (Z - \frac{Y_i}{z}), \text{ Where, } N \text{ is total population, } Z \text{ is poverty line and } Y_i \text{ is}$$

the income (consumption) of the  $i$ th household. The poverty gap index has been rearranged to get the absolute resource shortfall of the country concerned.

$$\sum_{i=1}^q (Z - Y_i) = P_1 NZ$$

Similarly average resource shortfall under \$2 a day is calculated. This will give us, on average, the total amount required for poverty elimination for each country under study.

### 3.2. Estimation of Potential Zakat Collection

Different studies have been made for the estimation of potential Zakat collection in the past. All such studies have used different methodology and employed diverse opinions of scholars regarding the coverage of Zakat and consequently their results are not comparable [see Salama (1982); Chowdhry (1991); Kahf (1989, 1999); Hussain and Shirazi (1994); al-Tahir (1997)].<sup>3</sup> Since there is no agreement among the scholars on the new wealth that may be brought under Zakat net, hence there is urgent need for the general agreement on the definition of the items, which may be taken as Zakatable items. This requires *Ijmah* of the *ullama* and other contemporary scholars on the issue.

Kahf (1989) estimated Zakat potential for eight Muslim countries by using National Income Accounts. His estimates of potential Zakat were based on three different opinions of jurists regarding Zakatable items. Those three definitions were named as Z1, Z2 and Z3. Z1 was estimated in accordance with the majority traditional view according to which Zakat was levied on agriculture, livestock, stock in trade, gold, silver and money. Z2 was based in accordance with the views of contemporary Muslim scholars where Zakat can be deducted from net returns of manufacturing concerns and building rents and from net savings out of salaries. Z3 was based on Malikite views, where Zakat base includes buildings and other fixed assets except those assigned for personal and family use. According to these definitions, under Z1, Zakat can be collected in the range of 1.0 percent to 2.0 percent, under Z2 from 3.1 percent to 4.9 percent and under Z3 from 3.2 percent to 7.5 percent of the GDP for the eight Muslim countries (for detail see Table 1).

Table 1

#### *Percentage of Estimated Zakat Proceeds to GDP in Selected Muslim Countries*

| Countries    | Z1   | Z2   | Z3   |
|--------------|------|------|------|
| Egypt        | 2.0  | 3.9  | 4.9  |
| Indonesia    | 1.0  | 1.7  | 2.0  |
| Pakistan     | 1.6  | 3.5  | 4.4  |
| Qatar        | 0.9  | 3.7  | 3.2  |
| Saudi Arabia | 1.2  | 3.7  | 3.4  |
| Sudan        | 4.3  | 6.3  | 6.2  |
| Syria        | 1.5  | 3.1  | 3.1  |
| Turkey       | 1.9  | 4.9  | 7.5  |
| Average      | 1.80 | 3.85 | 4.34 |

Source: Kahf (1989).

<sup>3</sup> For detail see Shirazi (2006).

The different potential Zakat collection is due to different economic structure of the countries. Kahf's (1989) estimates covered eight Muslim countries having different economic structure, therefore, we have opted his definitions for potential Zakat estimation with some changes.

It may be noted that Zakat is collected from the rich Muslims only and non-Muslims<sup>4</sup> citizens are exempt from the payment of Zakat. Kahf's study for the above-mentioned eight countries, perhaps, did not take into account this factor while estimating Zakat potential under different definitions of Zakatable items. Consequently, we have adjusted GDP of each Muslim country by taking into account the proportion of Muslim Population in each of the Muslim country. We have used the per capita concept of GDP for the adjustment of GDP. For example, GDP of Bangladesh was US\$ 163,728 million (at PPP) in 2005, and the Muslim population was 88 percent, therefore, adjusted GDP for the purpose of Zakat estimation will be  $[(163,728) * (0.88)]$  US\$ 144081million. Similarly, we have adjusted the GDP of all other countries with respect to their proportion of Muslim population. After adjusting GDP, we have used the Kahf's definition of potential Zakat collection for Egypt, Pakistan and Turkey as reported in the above Table 1. On the other hand, for the rest of the Islamic countries, where such estimates are not available, we have taken the average of Zs of the above eight countries (see Table 1) and used this average to estimate the potential Zakat collection.

### 3.3. Data Sets

We have used Poverty gap index under US \$ 1.25 a day and US \$ 2.0 a day as reported in World Bank (2009). Total Number of Population is taken from World Development Indicators (2007), while GDP (at PPP) from 2005-2007 are taken from the CIA World Fact books<sup>5</sup> and Development Data Group, the World Bank. 2008. 2008 World Development Indicators Online.<sup>6</sup>

## 4. POVERTY INCIDENCE IN MUSLIM COUNTRIES

This section gives an overview of poverty condition in OIC-member states. The poverty in the majority of the OIC-member countries are sever and housing more than 50 percent of their population as extremely poor. Among these countries are Burkina Faso (56.5 percent), Chad (61.9 percent), Guinea (70.1 percent), Mali (51.4 percent), Mozambique (74.7 percent), Niger (65.9 percent), Nigeria (64.4 percent), Sierra Leone (53.4 percent), and Uganda (51.5 percent). The incidence of poverty in Bangladesh (49.6

<sup>4</sup>Although non-Muslims are exempt from the payment of zakat but controversy still exists regarding the payment of zakat to the poor non-Muslims. Maududi (1988, pp. 63-64), wrote that non-Muslims should be helped from other social welfare funds as they are not eligible for taking zakat. His views were based on Hadith "...To be taken from your rich people (Muslims) and to be distributed to your poor people". Shaikh (1980) was of the view that zakat money may be paid to non-Muslims after meeting the need of the Muslims. He said that there is nothing-pertinent indication in the Qur'an or Hadith that zakat is to be used for Muslims only. Abu Saud (1988) expressed the same view. He further reported that zakat could be paid to non-Muslims as long they do not fight against Islam and Muslims. However, non-Muslims are not excluded from the poor people of the countries under study.

<sup>5</sup>Available at ([http://www.nationmaster.com/graph/eco\\_gdp\\_pur\\_pow\\_par-economy-gdp-purchasing-power-parity](http://www.nationmaster.com/graph/eco_gdp_pur_pow_par-economy-gdp-purchasing-power-parity)) Economy Statistics > GDP (purchasing power parity) (most recent) by country.

<sup>6</sup>GDP, PPP, current international dollars, : <http://earthtrends.wri.org/text/economics-business/variable-222.html>

percent), Benin (47.3 percent), Comoros (46.1 percent), guinea-Bissau (48.8 percent) and Uzbekistan (46.3 percent) is also very high.

The World Bank (2009) report overestimates the percentage of poor population (under \$1.25 a day) in case of Benin, Burkina Faso, Guinea-Bissau and Uganda compared to their national poverty lines. In contrast, countries like Albania, Azerbaijan, Egypt, Iran, Jordan, and Malaysia have the lowest rate of poverty (less than 2 percent of their total population ) while Kazakhstan, Morocco, Tunisia, Turkey and Gabon also having less than 5 percent of their total population as poor. Interestingly, the report underestimates the percentage of poverty in case of all these countries compared with their national poverty line, which indicates the real picture of poverty in the respective countries. However incidence of poverty reported in the countries like Bangladesh, Mozambique, Niger, Nigeria and Togo is approximately comparable under both the national and international poverty lines. Under international poverty line of US \$ 2 a day the incidence of poverty, in most of the countries, is found to be more than 70 percent of their total population (for detail see Appendix Table 1).

Since the international poverty measurements provide a uniform standard for comparing poverty rates and the number of people in poverty across countries, therefore results based on national and international poverty lines cannot be compared. However, as we have noted elsewhere, for precise measure micro data of each country is required.

## 5. RESULTS

In this section we have reported the estimates of resource required and potential Zakat collection for poverty elimination in the OIC member countries.

### 5.1. Resource Shortfall for Poverty Elimination

The column 7 and column 8 of the Table 2 depicts the resource required for poverty elimination under US \$1.25 a day and US \$ 2.0 a day respectively. Fifteen countries of the sample including Albania (0.03 percent), Algeria (0.16 percent), Azerbaijan (0.04 percent), Gabon (0.03 percent), Egypt (0.04 percent), Guyana (0.66 percent), Iran (0.02 percent), Jordan (0.04 percent), Kazakhstan (0.03 percent) Malaysia (0.02 percent), Morocco (0.06 percent), Suriname (0.54 percent), Tunisia (0.04 percent), Turkey (0.05 percent) and Yemen (0.88 percent) require small amount of resources for poverty elimination. These countries constitute about 37 percent of a total of 38 OIC-member countries that need less than 1 percent of their GDP per annum for reducing poverty. For some countries the resource requirement for poverty elimination ranges from 1 percent to about 3 percent of their GDP. This group of countries consists of Cameroon (2.69 percent), Cote d'Ivoire (2.01 percent), Djibouti (1.48 percent), Mauritania (1.84 percent), Pakistan (1 percent), Senegal (3.20 percent), and Tajikistan (1.55 percent). Resources shortfall for some countries is quite high. These countries are Mozambique (29.81 percent), Niger (21.29 percent), Sierra Leone (19.03 percent), and Guinea-Bissau (17.26 percent).

Column 8 of the Table 2 presents the resource shortfall under US \$2. The resource short fall as a percentage of GDP is very high in the case of Guinea-Bissau (58.24 percent), Mozambique (72.09 percent), Niger (56.49 percent), Sierra Leone (56.26 percent), Chad (35.06 percent), Guinea (36.46 percent) and Uganda (31.35 percent). The total resource shortfall for all the sample countries under US \$ 1.25 a day and US \$ 2.0 a day is estimated to be 1.53 percent and 5.20 percent respectively of their total GDP.

Table 2

*Resource Shortfall for Poverty Elimination under US \$1.25 & US \$ 2 Poverty Lines*

| 1                     | 2           | 3                | 4                  | 5  | 6   | 7  | 8   |
|-----------------------|-------------|------------------|--------------------|--|---|--|---|
| OIC- Member Countries | Survey Year | Total Population | GDP (PPP) Millions | Resource Shortfall under \$ 1.25 per Annum (Million) | Resource Shortfall under \$ 2 per Annum (Million) | Resource Shortfall under \$ 1.25 per Annum as % of GDP | Resource Shortfall under \$ 2 per Annum as % of GDP |
| Albania               | 2005        | 3153731          | 17,234             | 5.76   | 32.23   | 0.03   | 0.19  |
| Algeria               | 1995        | 28265291         | 109,616            | 180.54   | 1320.55   | 0.16   | 1.20  |
| Azerbaijan            | 2005        | 8391850          | 38,389             | 15.32  | 30.63   | 0.04   | 0.08  |
| Bangladesh            | 2005        | 153281120        | 163,728            | 9161.42  | 37820.58  | 5.60   | 23.10   |
| Benin                 | 2003        | 7961594          | 9,163              | 570.30   | 1947.01   | 6.22   | 21.25   |
| Burkina Faso          | 2003        | 13081911         | 12,450             | 1211.63  | 3743.52   | 9.73   | 30.07   |
| Cameroon              | 2001        | 16240110         | 28,129             | 755.77   | 2797.85   | 2.69   | 9.95  |
| Chad                  | 2002        | 9118887          | 8,335              | 1065.09  | 2922.33   | 12.78  | 35.06   |
| Comoros               | 2004        | 587944           | 630                | 55.80  | 146.79  | 8.86   | 23.30   |
| Cote d'Ivoire         | 2002        | 17691452         | 27,333             | 548.88   | 2273.00   | 2.01   | 8.32  |
| Djibouti              | 2002        | 762775           | 1,244              | 18.44  | 81.30   | 1.48   | 6.54  |
| Egypt                 | 2004        | 71550018         | 309,733            | 130.58   | 1828.10   | 0.04   | 0.59  |
| Gabon                 | 2005        | 1290693          | 17,839             | 5.30   | 47.11   | 0.03   | 0.26  |
| Gambia                | 2003        | 1524061          | 1,491              | 84.14  | 277.03  | 5.64   | 18.58   |
| Guinea                | 2002        | 8513599          | 8,556              | 1250.75  | 3119.89   | 14.62  | 36.46   |
| Guinea-Bissau         | 2002        | 1455881          | 635                | 109.60   | 369.85  | 17.26  | 58.24   |
| Guyana                | 1998        | 736291           | 1,977              | 13.10  | 37.09   | 0.66   | 1.88  |
| Iran                  | 2005        | 69087070         | 643,503            | 126.08   | 907.80  | 0.02   | 0.14  |
| Jordan                | 2006        | 5537600          | 25,628             | 10.11  | 24.25   | 0.04   | 0.09  |
| Kazakhstan            | 2003        | 14909000         | 103,441            | 27.21  | 424.46  | 0.03   | 0.41  |
| Malaysia              | 2004        | 25191441         | 276,939            | 45.97  | 257.46  | 0.02   | 0.09  |
| Mali                  | 2006        | 11968376         | 12,664             | 1026.59  | 3188.97   | 8.11   | 25.18   |
| Mauritania            | 2000        | 2566152          | 3,634              | 66.74  | 297.85  | 1.84   | 8.20  |
| Morocco               | 2007        | 30860595         | 125,392            | 70.40  | 698.38  | 0.06   | 0.56  |
| Mozambique            | 2002        | 19134153         | 10,366             | 3090.40  | 7472.84   | 29.81  | 72.09   |
| Niger                 | 2005        | 13264190         | 7,988              | 1700.55  | 4512.21   | 21.29  | 56.49   |
| Nigeria               | 2003        | 134659379        | 178,435            | 18185.75   | 46103.33  | 10.19  | 25.84   |
| Pakistan              | 2004        | 152061263        | 306,752            | 3052.63  | 20757.88  | 1.00   | 6.77  |
| Senegal               | 2005        | 11770340         | 18,133             | 579.98   | 2113.72   | 3.20   | 11.66   |
| Sierra Leone          | 2002        | 4924199          | 2,396              | 456.07   | 1348.00   | 19.03  | 56.26   |
| Suriname              | 1999        | 432413           | 2,159              | 11.64  | 36.93   | 0.54   | 1.71  |
| Tajikistan            | 2004        | 6467377          | 9,682              | 150.49   | 793.16  | 1.55   | 8.19  |
| Togo                  | 2006        | 6410428          | 4,971              | 333.42   | 1305.61   | 6.71   | 26.26   |
| Tunisia               | 2000        | 9563500          | 45,617             | 17.45  | 209.44  | 0.04   | 0.46  |
| Turkey                | 2005        | 72065000         | 561,075            | 295.92   | 1367.79   | 0.05   | 0.24  |
| Uganda                | 2005        | 28947181         | 24,534             | 2522.57  | 7691.84   | 10.28  | 31.35   |
| Uzbekistan            | 2003        | 25567700         | 43,028             | 1749.79  | 6196.59   | 4.07   | 14.40   |
| Yemen                 | 2005        | 21095679         | 46,150             | 404.25   | 2279.18   | 0.88   | 4.94  |
| For all Countries     |             | 101009024        | 3208969            | 49106.43   | 166782.55   | 1.53   | 5.20  |

*Source:*

1. Total Number of Population is taken from WDI, 2007, Online Database, 2007 The World Bank Group,
2. GDP (at PPP) from 2005-2007 are taken from the web.  
([http://www.nationmaster.com/graph/eco\\_gdp\\_pur\\_pow\\_par-economy-gdp-purchasing-power-parity](http://www.nationmaster.com/graph/eco_gdp_pur_pow_par-economy-gdp-purchasing-power-parity))  
Economy Statistics > GDP (purchasing power parity) (most recent) by country.
3. GDP, PPP, current international dollars, Web: <http://earthtrends.wri.org/text/economics-business/variable-222.html>.
4. All the web pages accessed on 20-08-09 to 29-09-2009.

## 5.2. Potential Zakat Collection

The Table 3 presents the potential amount of Zakat that can be collected under three different opinions of scholars regarding the items and assets that can be brought under Zakat net. Column 4 of the Table shows Muslim population in the respective country, which is used for the calculation of column 5 of the Table. Potential Zakat collection in absolute terms is reported in columns 6 through 8, while columns 9 through 11 depict potential Zakat collection as percentage of GDP for the respective country. On

Table 3

### Potential Zakat Collection

| 1                     | 2           | 3                  | 4                            | 5                                 | 6                | 7                | 8                | 9             | 10            | 11            |
|-----------------------|-------------|--------------------|------------------------------|-----------------------------------|------------------|------------------|------------------|---------------|---------------|---------------|
| OIC- Member Countries | Survey Year | GDP (PPP) Millions | Muslim Popu <sup>n</sup> (%) | Adjusted GDP (PPP) in Million USD | Z1 (Million USD) | Z2 (Million USD) | Z3 (Million USD) | Z1 (% of GDP) | Z2 (% of GDP) | Z3 (% of GDP) |
| Albania               | 2005        | 17,234             | 58                           | 9995.72                           | 179.92           | 384.84           | 433.81           | 1.04          | 2.23          | 2.52          |
| Algeria               | 1995        | 109,616            | 99                           | 108519.84                         | 1953.36          | 4178.01          | 4709.76          | 1.78          | 3.81          | 4.30          |
| Azerbaijan            | 2005        | 38,389             | 93.4                         | 35855.33                          | 645.40           | 1380.43          | 1556.12          | 1.68          | 3.60          | 4.05          |
| Bangladesh            | 2005        | 163,728            | 88                           | 144080.64                         | 2593.45          | 5547.10          | 6253.10          | 1.58          | 3.39          | 3.82          |
| Benin                 | 2003        | 9,163              | 20                           | 1832.60                           | 32.99            | 70.56            | 79.53            | 0.36          | 0.77          | 0.87          |
| Burkina Faso          | 2003        | 12,450             | 52                           | 6474.00                           | 116.53           | 249.25           | 280.97           | 0.94          | 2.00          | 2.26          |
| Cameroon              | 2001        | 28,129             | 20                           | 5625.80                           | 101.26           | 216.59           | 244.16           | 0.36          | 0.77          | 0.87          |
| Chad                  | 2002        | 8,335              | 54                           | 4500.90                           | 81.02            | 173.28           | 195.34           | 0.97          | 2.08          | 2.34          |
| Comoros               | 2004        | 630                | 99                           | 623.70                            | 11.23            | 24.01            | 27.07            | 1.78          | 3.81          | 4.30          |
| Cote d'Ivoire         | 2002        | 27,333             | 38.6                         | 10550.54                          | 189.91           | 406.20           | 457.89           | 0.69          | 1.49          | 1.68          |
| Djibouti              | 2002        | 1,244              | 99                           | 1231.56                           | 22.17            | 47.42            | 53.45            | 1.78          | 3.81          | 4.30          |
| Egypt                 | 2004        | 309,733            | 90                           | 278759.70                         | 5575.19          | 10871.63         | 13659.23         | 1.80          | 3.51          | 4.41          |
| Gabon                 | 2005        | 17,839             | 1                            | 178.39                            | 3.21             | 6.87             | 7.74             | 0.02          | 0.04          | 0.04          |
| Gambia                | 2003        | 1,491              | 95                           | 1416.45                           | 25.50            | 54.53            | 61.47            | 1.71          | 3.66          | 4.12          |
| Guinea                | 2002        | 8,556              | 85                           | 7272.60                           | 130.91           | 280.00           | 315.63           | 1.53          | 3.27          | 3.69          |
| Guinea-Bissau         | 2002        | 635                | 38                           | 241.30                            | 4.34             | 9.29             | 10.47            | 0.68          | 1.46          | 1.65          |
| Guyana                | 1998        | 1,977              | 10                           | 197.70                            | 3.56             | 7.61             | 8.58             | 0.18          | 0.39          | 0.43          |
| Iran                  | 2005        | 643,503            | 98                           | 630632.94                         | 11351.39         | 24279.37         | 27369.47         | 1.76          | 3.77          | 4.25          |
| Jordan                | 2006        | 25,628             | 95                           | 24346.60                          | 438.24           | 937.34           | 1056.64          | 1.71          | 3.66          | 4.12          |
| Kazakhstan            | 2003        | 103,441            | 47                           | 48617.27                          | 875.11           | 1871.76          | 2109.99          | 0.85          | 1.81          | 2.04          |
| Malaysia              | 2004        | 276,939            | 60.4                         | 167271.16                         | 3010.88          | 6439.94          | 7259.57          | 1.09          | 2.33          | 2.62          |
| Mali                  | 2006        | 12,664             | 90                           | 11397.60                          | 205.16           | 438.81           | 494.66           | 1.62          | 3.47          | 3.91          |
| Mauritania            | 2000        | 3,634              | 99                           | 3597.66                           | 64.76            | 138.51           | 156.14           | 1.78          | 3.81          | 4.30          |
| Morocco               | 2007        | 125,392            | 99                           | 124138.08                         | 2234.49          | 4779.32          | 5387.59          | 1.78          | 3.81          | 4.30          |
| Mozambique            | 2002        | 10,366             | 20                           | 2073.20                           | 37.32            | 79.82            | 89.98            | 0.36          | 0.77          | 0.87          |
| Niger                 | 2005        | 7,988              | 90                           | 7189.20                           | 129.41           | 276.78           | 312.01           | 1.62          | 3.47          | 3.91          |
| Nigeria               | 2003        | 178,435            | 50                           | 89217.50                          | 1605.92          | 3434.87          | 3872.04          | 0.90          | 1.93          | 2.17          |
| Pakistan              | 2004        | 306,752            | 98                           | 300616.96                         | 4809.87          | 10521.59         | 13227.15         | 1.57          | 3.43          | 4.31          |
| Senegal               | 2005        | 18,133             | 94                           | 17045.02                          | 306.81           | 656.23           | 739.75           | 1.69          | 3.62          | 4.08          |
| Sierra Leone          | 2002        | 2,396              | 60                           | 1437.60                           | 25.88            | 55.35            | 62.39            | 1.08          | 2.31          | 2.60          |
| Suriname              | 1999        | 2,159              | 22                           | 474.98                            | 8.55             | 18.29            | 20.61            | 0.40          | 0.85          | 0.95          |
| Tajikistan            | 2004        | 9,682              | 95                           | 9197.90                           | 165.56           | 354.12           | 399.19           | 1.71          | 3.66          | 4.12          |
| Togo                  | 2006        | 4,971              | 13.7                         | 681.03                            | 12.26            | 26.22            | 29.56            | 0.25          | 0.53          | 0.59          |
| Tunisia               | 2000        | 45,617             | 99                           | 45160.83                          | 812.89           | 1738.69          | 1959.98          | 1.78          | 3.81          | 4.30          |
| Turkey                | 2005        | 561,075            | 99                           | 555464.25                         | 10553.82         | 27217.75         | 41659.82         | 1.88          | 4.85          | 7.43          |
| Uganda                | 2005        | 24,534             | 15                           | 3680.10                           | 66.24            | 141.68           | 159.72           | 0.27          | 0.58          | 0.65          |
| Uzbekistan            | 2003        | 43,028             | 89                           | 38294.92                          | 689.31           | 1474.35          | 1662.00          | 1.60          | 3.43          | 3.86          |
| Yemen                 | 2005        | 46,150             | 99                           | 45688.50                          | 822.39           | 1759.01          | 1982.88          | 1.78          | 3.81          | 4.30          |
| For all Countries     |             | 3208969            |                              |                                   | 49896.21         | 110547.42        | 138365.46        | 1.55          | 3.44          | 4.31          |

Source: Percentage of Muslim Population is taken from: [http://en.wikipedia.org/wiki/Islam\\_by\\_country](http://en.wikipedia.org/wiki/Islam_by_country).

average Z1<sup>7</sup> for 8 OIC members' countries ranges from 0.02 percent to 0.40 percent of their GDP. This is due to very low share of Muslim population in these countries. Similarly, for these countries, Z2 and Z3 vary from 0.04 percent to 0.85 percent and 0.04 percent to 0.85 percent of their GDP respectively. For rest of the 30 OIC member countries, Z1 ranges from 0.68 percent to 1.88 percent, Z2 varies from 1.46 to 4.85 percent, while Z3 varies from 1.65 percent to 7.43 percent of the GDP of the respective country. The potential Zakat collection from Z1, Z2 and Z3, for all the countries under study, comes out to be 1.55 percent, 3.44 percent and 4.31 percent of their total GDP respectively. Although we have used 1.8 percent as Z1 for all other countries except Egypt, Pakistan and Turkey (for which we have used 2.0 percent, 1.6 percent and 1.9 percent respectively) still we get different potential Zakat collection as a share of GDP due to adjustment of GDP with Muslim population share.

### 5.3. Resource Shortfall and Potential Zakat Collection

Resource shortfall and potential Zakat collection have been put together in Table 4. Columns 3 and 4 shows the resources shortfall under US \$ 1.25 and 2 respectively whereas columns 5 through 7 represents the potential Zakat collection under three definitions of Zakatable items. The resource requirement, under US \$1.25 a day, of some of the countries for poverty elimination is too high, which cannot be met by their potential Zakat collection. For example, the resource shortfall of Burkina Faso (9.73 percent), Chad (12.78 percent), Guinea (14.62 percent), Guinea-Bissau (17.26 percent), Mozambique (29.81 percent), Niger (21.29 percent), Nigeria (10.19 percent), Sierra Leone (19.03 percent) and Uganda (10.28 percent) are very high and corresponding Zakat collection even under Z3 is very low. However, resource shortfall of the countries like Albania, Algeria, Azerbaijan, Djibouti, Egypt, Iran, Jordan, Kazakhstan, Malaysia, Morocco, Pakistan, Tajikistan, Tunisia, Turkey, Yemen can be covered from collection of Z1 (see Table). If we take into account the administrative cost of Zakat collection (assuming 10 to 20 percent of the potential Zakat collection), even then Z2 and Z3 collection is enough for fulfilling both the amount of resource shortfall and administrative cost. The countries, like Gabon (0.03 percent) Mauritania (1.84), Senegal (3.20 percent) and Suriname (0.54 percent) cannot meet their resource shortfall by Z1 but these can meet it by utilising Z2. The nineteen OIC member countries can easily eliminate poverty form generating their own Zakat resources, whereas the rest of the sample countries cannot meet their resource shortfall from their own resources.

Resource shortfall, under US \$1.25 a day and US \$ 2.0 a day, on average, is 1.53 percent and 5.20 percent of the GDP for all the countries under study. The corresponding amount, which can be collected under Z1, Z2 and Z3, estimated to be 1.55 percent, 3.44 percent and 4.31 percent of their total GDP, respectively. These resources are not only sufficient to provide for the shortfall and eliminate the extreme poverty but also can generate surplus.

<sup>7</sup>Z1 = [(0.018) (Adjusted GDP/ GDP)]\* 100]. Similarly Z2 and Z3 are calculated by using average of eight Muslim countries, which is 3.85 percent and 4.34 percent of the GDP respectively. For Egypt, Pakistan and Turkey Z2 is 3.9 percent, 3.5 percent and 4.9 percent and Z3 is 4.9 percent, 4.4 percent and 7.5 percent respectively.

Resource shortfall under US \$ 2.0 a day is high. Countries, which could meet their resource shortfall under US \$ 1.25 a day from Zakat proceeds, are not able to meet their resource shortfall under US \$ 2.0 a day. The countries which added to such list are Djibouti, Pakistan, Tajikistan and Yemen (see Table 4). As noted above that resource shortfall under US \$ 2.0 a day cannot be met by resources raised through potential Zakat collection. The maximum that can be collected is estimated to be 4.31 percent of the GDP of all countries under study, whereas corresponding resource required are estimated to be 5.20 percent of the GDP of these countries. However, some resource rich countries are not included in the sample due to non-availability of the data. If these countries also

Table 4

| <i>Resource Shortfall and Potential Zakat Collection</i> |             |  |                                       |               |               |               |
|--|-------------|--|---------------------------------------|---------------|---------------|---------------|
| 1  | 2           | 3  | 4                                     | 5             | 6             | 7             |
| OIC- Member Countries                                    | Survey Year | Resource Shortfall % of GDP (US \$ 1.25) | Resource Shortfall % of GDP (US \$ 2) | Z1 (% of GDP) | Z2 (% of GDP) | Z3 (% of GDP) |
| Albania  | 2005        | 0.03                                     | 0.19                                  | 1.04          | 2.23          | 2.52          |
| Algeria  | 1995        | 0.16                                     | 1.20                                  | 1.78          | 3.81          | 4.30          |
| Azerbaijan   | 2005        | 0.04                                     | 0.08                                  | 1.68          | 3.60          | 4.05          |
| Bangladesh   | 2005        | 5.60                                     | 23.10                                 | 1.58          | 3.39          | 3.82          |
| Benin  | 2003        | 6.22                                     | 21.25                                 | 0.36          | 0.77          | 0.87          |
| Burkina Faso   | 2003        | 9.73                                     | 30.07                                 | 0.94          | 2.00          | 2.26          |
| Cameroon   | 2001        | 2.69                                     | 9.95                                  | 0.36          | 0.77          | 0.87          |
| Chad   | 2002        | 12.78                                    | 35.06                                 | 0.97          | 2.08          | 2.34          |
| Comoros  | 2004        | 8.86                                     | 23.30                                 | 1.78          | 3.81          | 4.30          |
| Cote d'Ivoire  | 2002        | 2.01                                     | 8.32                                  | 0.69          | 1.49          | 1.68          |
| Djibouti   | 2002        | 1.48                                     | 6.54                                  | 1.78          | 3.81          | 4.30          |
| Egypt  | 2004        | 0.04                                     | 0.59                                  | 1.80          | 3.51          | 4.41          |
| Gabon  | 2005        | 0.03                                     | 0.26                                  | 0.02          | 0.04          | 0.04          |
| Gambia   | 2003        | 5.64                                     | 18.58                                 | 1.71          | 3.66          | 4.12          |
| Guinea   | 2002        | 14.62                                    | 36.46                                 | 1.53          | 3.27          | 3.69          |
| Guinea-Bissau  | 2002        | 17.26                                    | 58.24                                 | 0.68          | 1.46          | 1.65          |
| Guyana   | 1998        | 0.66                                     | 1.88                                  | 0.18          | 0.39          | 0.43          |
| Iran   | 2005        | 0.02                                     | 0.14                                  | 1.76          | 3.77          | 4.25          |
| Jordan   | 2006        | 0.04                                     | 0.09                                  | 1.71          | 3.66          | 4.12          |
| Kazakhstan   | 2003        | 0.03                                     | 0.41                                  | 0.85          | 1.81          | 2.04          |
| Malaysia   | 2004        | 0.02                                     | 0.09                                  | 1.09          | 2.33          | 2.62          |
| Mali   | 2006        | 8.11                                     | 25.18                                 | 1.62          | 3.47          | 3.91          |
| Mauritania   | 2000        | 1.84                                     | 8.20                                  | 1.78          | 3.81          | 4.30          |
| Morocco  | 2007        | 0.06                                     | 0.56                                  | 1.78          | 3.81          | 4.30          |
| Mozambique   | 2002        | 29.81                                    | 72.09                                 | 0.36          | 0.77          | 0.87          |
| Niger  | 2005        | 21.29                                    | 56.49                                 | 1.62          | 3.47          | 3.91          |
| Nigeria  | 2003        | 10.19                                    | 25.84                                 | 0.90          | 1.93          | 2.17          |
| Pakistan   | 2004        | 1.00                                     | 6.77                                  | 1.57          | 3.43          | 4.31          |
| Senegal  | 2005        | 3.20                                     | 11.66                                 | 1.69          | 3.62          | 4.08          |
| Sierra Leone   | 2002        | 19.03                                    | 56.26                                 | 1.08          | 2.31          | 2.60          |
| Suriname   | 1999        | 0.54                                     | 1.71                                  | 0.40          | 0.85          | 0.95          |
| Tajikistan   | 2004        | 1.55                                     | 8.19                                  | 1.71          | 3.66          | 4.12          |
| Togo   | 2006        | 6.71                                     | 26.26                                 | 0.25          | 0.53          | 0.59          |
| Tunisia  | 2000        | 0.04                                     | 0.46                                  | 1.78          | 3.81          | 4.30          |
| Turkey   | 2005        | 0.05                                     | 0.24                                  | 1.88          | 4.85          | 7.43          |
| Uganda   | 2005        | 10.28                                    | 31.35                                 | 0.27          | 0.58          | 0.65          |
| Uzbekistan   | 2003        | 4.07                                     | 14.40                                 | 1.60          | 3.43          | 3.86          |
| Yemen  | 2005        | 0.88                                     | 4.94                                  | 1.78          | 3.81          | 4.30          |
| On Average   |             | 1.53                                     | 5.20                                  | 1.55          | 3.44          | 4.31          |

Source: Based on Tables 2 and 3.

collect Zakat to its potential and transfer their surplus to the common pool and if these funds could be provided for the resource deficit countries then we hope that the deficit in resource can be met and poverty under US \$ 2 a day can easily be eliminated.

## 6. SUMMARY AND CONCLUSION

The poverty has been the serious problem and challenge for the Developing countries. Since majority of the OIC countries fall in the same category, therefore, these countries also face the same problems and challenges. Different policies and strategies, in addition to safety-nets programme have been adopted in the past to alleviate poverty, but poverty still persists. Some of the Muslim countries have implemented the system of Zakat officially and while in other it is unofficial matter and they have ignored the collection and distribution. But the fact is that none of the Muslim country has enforced Zakat in letter and spirit. It is believed that if the system is enforced in letter and spirit then extreme poverty can be eliminated. The paper has been written in this spirit.

The paper has estimated the resource required by 38 OIC member countries and potential Zakat collection for poverty elimination. We have employed the poverty gap index based on US \$ 1.25 and US \$ 2.0 as reported in World Bank Indicators (2009) for measuring resource shortfall. Our results show that fifteen countries of the sample including Albania (0.03 percent), Algeria (0.16 percent), Azerbaijan (0.04 percent), Gabon (0.03 percent), Egypt (0.04 percent), Guyana (0.66 percent), Iran (0.02 percent), Jordan (0.04 percent), Kazakhstan (0.03 percent) Malaysia (0.02 percent), Morocco (0.06 percent), Suriname (0.54 percent), Tunisia (0.04 percent), Turkey (0.05 percent) and Yemen (0.88 percent) require small amount of resources for poverty elimination. Some countries, like Cameroon, Cote d'Ivoire, Djibouti, Mauritania, Pakistan, Senegal and Tajikistan resource requirement for poverty elimination ranges from 1 percent to about 3 percent of their GDP. Resources shortfall for some countries is quite high. These countries are Mozambique (29.81 percent), Niger (21.29 percent), Sierra Leone (19.03 percent), and Guinea-Bissau (17.26 percent). Similarly resource shortfall, under US \$2 a day, for countries like Guinea-Bissau (58.24 percent), Mozambique (72.09 percent), Niger (56.49 percent), Sierra Leone (56.26 percent), Chad (35.06 percent), Guinea (36.46 percent) and Uganda (31.35 percent) is quite high. The total resource shortfall for all the sample countries under US \$ 1.25 a day and US \$ 2.0 a day is estimated to be 1.53 percent and 5.20 percent of their total GDP respectively.

We have used Kahf (1989) for the estimation of potential Zakat collection with some modifications. On average, Z1 for 8 OIC member countries ranges from 0.02 percent to 0.40 percent of their GDP. This is due to very low share of Muslim Population. Similarly, for these countries, Z2 and Z3 vary from 0.04 percent to 0.85 percent and 0.04 percent to 0.85 percent of their GDP respectively. For rest of the 30 OIC member countries, Z1 ranges from 0.68 percent to 1.88 percent, Z2 varies from 1.46 to 4.85 percent, while Z3 varies from 1.65 percent to 7.43 percent of the GDP of the respective country. The potential Zakat collection from Z1, Z2 and Z3, for all the countries under study, comes out to be 1.55 percent, 3.44 percent and 4.31 percent of their total GDP respectively.

Keeping in view the resource required and resource available through potential Zakat collection, the general picture that emerges is as follow. Most of the African OIC

member countries cannot meet their resource requirement by their own potential Zakat collection. However, countries like Albania, Algeria, Azerbaijan, Djibouti, Egypt, Iran, Jordan, Kazakhstan, Malaysia, Morocco, Pakistan, Tajikistan, Tunisia, Turkey, Yemen resource shortfall can be covered from collection of Z1. If we take into account the administrative cost of Zakat collection (assuming 10 to 20 percent of the potential Zakat collection), even then Z2 and Z3 collection is enough for fulfilling both the amount of resource shortfall and administrative cost. The countries, like Gabon (0.03 percent) Mauritania (1.84), Senegal (3.20 percent) and Suriname (0.54 percent) cannot meet their resource shortfall by Z1 but these can meet it by utilising Z2. The nineteen OIC member countries can easily eliminate poverty form generating their own Zakat resources, whereas the rest of the sample countries cannot meet their resource shortfall from their own resources.

Resource shortfall, under US \$1.25 a day and US \$ 2.0 a day, on average, is 1.53 percent and 5.20 percent of the GDP for all the countries under study. The corresponding amount, which can be collected under Z1, Z2 and Z3, estimated to be 1.55 percent, 3.44 percent and 4.31 percent of the total GDP, respectively. These resources are not only sufficient to provide for the shortfall and eliminate the extreme poverty but also can generate surplus.

Resource shortfall under US \$ 2.0 a day is high. Countries, which could meet their resource shortfall under US \$ 1.25 a day from Zakat proceeds, are not able to meet their resource shortfall under US \$ 2.0 a day. The countries which added to such list are Djibouti, Pakistan, Tajikistan and Yemen. The maximum Zakat that can be collected is estimated to be 4.31 percent of the GDP of all countries under study, whereas corresponding resource required are estimated to be 5.20 percent of the GDP of these countries. However, some resource rich countries are not included in the sample due to non-availability of the data. If these countries also collect Zakat to its potential and transfer their surplus to the common pool which could be provided for the resource deficit countries, then we hope that the deficit in resource can be met and poverty under US \$ 2 a day can easily be eliminated. However, this requires globalisation of Zakat and serious efforts on the part of the OIC-member countries.

Appendix Table 1

*Poverty in the Selected Muslim Countries*

| 1                    | 2  | 3           | 4                                  | 5                                | 6                               | 7                             |
|----------------------|--|-------------|------------------------------------|----------------------------------|---------------------------------|-------------------------------|
| OIC-Member Countries | Population Below National Poverty Line (%) | Survey Year | Population Below \$ 1.25 a Day (%) | Poverty gap at \$ 1.25 a day (%) | Population Below \$ 2 a Day (%) | Poverty Gap at \$ 2 a Day (%) |
| Albania              | 25   | 2005        | <2                                 | <0.5                             | 7.8                             | 1.4                           |
| Algeria              | NA   | 1995        | 6.8                                | 1.4                              | 23.6                            | 6.4                           |
| Azerbaijan           | 49   | 2005        | <2                                 | <0.5                             | <2                              | <0.5                          |
| Bangladesh           | 45   | 2005        | 49.6                               | 13.1                             | 81.3                            | 33.8                          |
| Benin                | 37   | 2003        | 47.3                               | 15.7                             | 75.3                            | 33.5                          |
| Burkina Faso         | 45   | 2003        | 56.5                               | 20.3                             | 81.2                            | 39.2                          |
| Cameroon             | 48   | 2001        | 32.8                               | 10.2                             | 57.7                            | 23.6                          |
| Chad                 | 80   | 2002        | 61.9                               | 25.6                             | 83.3                            | 43.9                          |
| Comoros              | 60   | 2004        | 46.1                               | 20.8                             | 65                              | 34.2                          |
| Cote d'Ivoire        | NA   | 2002        | 23.3                               | 6.8                              | 46.8                            | 17.6                          |
| Djibouti             | 50   | 2002        | 18.8                               | 5.3                              | 41.2                            | 14.6                          |
| Egypt                | 16.7                                       | 2004        | <2                                 | <0.5                             | 18.4                            | 3.5                           |
| Gabon                | NA   | 2005        | 4.8                                | 0.9                              | 19.6                            | 5                             |
| Gambia               | NA   | 2003        | 34.3                               | 12.1                             | 56.7                            | 24.9                          |
| Guinea               | 40   | 2002        | 70.1                               | 32.2                             | 87.2                            | 50.2                          |
| Guinea-Bissau        | NA   | 2002        | 48.8                               | 16.5                             | 77.9                            | 34.8                          |
| Guyana               | NA   | 1998        | 7.7                                | 3.9                              | 16.8                            | 6.9                           |
| Iran                 | 40   | 2005        | <2                                 | <0.5                             | 8                               | 1.8                           |
| Jordan               | 30   | 2006        | <2                                 | <0.5                             | 3.5                             | 0.6                           |
| Kazakhstan           | 26   | 2003        | 3.1                                | <0.5                             | 17.2                            | 3.9                           |
| Malaysia             | 8  | 2004        | <2                                 | <0.5                             | 7.8                             | 1.4                           |
| Mali                 | 64   | 2006        | 51.4                               | 18.8                             | 77.1                            | 36.5                          |
| Mauritania           | 57   | 2000        | 21.2                               | 5.7                              | 44.1                            | 15.9                          |
| Morocco              | 17   | 2007        | 2.5                                | 0.5                              | 14                              | 3.1                           |
| Mozambique           | 70   | 2002        | 74.7                               | 35.4                             | 90                              | 53.5                          |
| Niger                | 63   | 2005        | 65.9                               | 28.1                             | 85.6                            | 46.6                          |
| Nigeria              | 60   | 2003        | 64.4                               | 29.6                             | 83.9                            | 46.9                          |
| Pakistan             | 35   | 2004        | 22.6                               | 4.4                              | 60.3                            | 18.7                          |
| Senegal              | 54   | 2005        | 33.5                               | 10.8                             | 60.3                            | 24.6                          |
| Sierra Leone         | 68   | 2002        | 53.4                               | 20.3                             | 76.1                            | 37.5                          |
| Suriname             | NA   | 1999        | 15.5                               | 5.9                              | 27.2                            | 11.7                          |
| Tajikistan           | 60   | 2004        | 21.5                               | 5.1                              | 50.8                            | 16.8                          |
| Togo                 | 32   | 2006        | 38.7                               | 11.4                             | 69.3                            | 27.9                          |
| Tunisia              | 14.1                                       | 2000        | 2.6                                | <0.5                             | 12.8                            | 3                             |
| Turkey               | 20   | 2005        | 2.7                                | 0.9                              | 9                               | 2.6                           |
| Uganda               | 35   | 2005        | 51.5                               | 19.1                             | 75.6                            | 36.4                          |
| Uzbekistan           | NA   | 2003        | 46.3                               | 15                               | 76.7                            | 33.2                          |
| Yemen                | 45.2                                       | 2005        | 17.5                               | 4.2                              | 46.6                            | 14.8                          |

Source: World Bank (2009).

## REFERENCES

- Abu-Saud, Mahmoud (1988) *Contemporary Zakat*. Zakat and Research Foundation, Ohio.
- Abu 'Ubad Al Qasim Ibn Sallam (Circa 945), (1934) *Kitab Al Amwal* (the book of wealth), Al Maktabah Al Tijariyyah Al Kubra, Cairo, Egypt.
- Al Tahir, Abdallah (1997) *Zakat Proceeds and Developments of Society*. In Monzer Kahf (editor) *Economics of Zakat*. Book of Reading No. 2, Islamic Research and Training Institute, Islamic Development Bank Group, Jeddah. 507–64.

- Ahmed, Habib (2008) Zakat, Macroeconomic Policies, and Poverty Alleviation: Lessons from Simulations on Bangladesh. *Journal of Islamic Economics, Banking and Finance* 4:2.
- Ahmed, Habib (2004) Role of Zakat and Awqaf in Poverty Alleviation. Islamic Research and Training Institute, Islamic Development Bank Group, Jeddah. (Occasional Paper No. 8).
- Ahmed, Habib (2002) Financing Microenterprises: An Analytical Study of Islamic Microfinance Institutions. *Islamic Economic Studies* 9, 27–64.
- Awad, Mohammad H. (1989) Adjusting Tax Structure to Accommodate Zakat. In I. M. Imtiaz, *et al.* (eds.) *Management of Zakat in Modern Society*. IRTI, IDB. 77–96.
- Chowdhry, A. R. (1991) Ushr and Pakistani Society. *The Daily Muslim*. 27 December.
- Hassan, M. Kabir, and Jauanyed Masrur Khan (2007) Zakat, External Debt and Poverty Reduction Strategy in Bangladesh. *Journal of Economic Cooperation* 28:4,1–38.
- Hussain, M. and Nasim Shah Shirazi (1994) Role of Zakat and Ushr in Rural Development. Paper Presented at the Seminar on Rural Development in Islamic Perspective, Islamabad, International Institute of Islamic Economics, June 4–8.
- Khan, M. Fahim (1985) Macro Consumption Function in an Islamic Framework. *Journal of Research in Islamic Economics* 1:2, 1–24.
- Kahf, Monzer (1989) Zakat: Unresolved Issues in the Contemporary Fiqh. *Journal of Islamic Economics* 2:1, 1–22.
- Kahf, Monzer (1993) Zakat Management in Some Muslim Societies. Islamic Research and Training Institute, Islamic Development Bank, Jeddah. (Background Paper No. 11).
- Kahf, Monzer (1999) Zakat: Performance in Theory and Practice. Paper presented at the International Conference on Islamic Economics Towards the 21st Century. Kuala Lumpur, August.
- Kahf, Monzer (2004) Shari'ah and Historical Aspects of Zakat and Awqaf. Background paper prepared for Islamic Research and Training Institute, Islamic Development Bank.
- Mannan, M. A. (1983) Zakat, its Disbursement and Inter-poor Distributional Equity. *Thoughts on Economics* 4: 8. 2–14.
- Maududi, Abul'Ala (1988) *Ma'ashiat-i-Islam*. Islamic Publication, Lahore.
- Mohammad Rawwas Qal'aji (1984) *Mausu'at Fiqh, 'Umar Ibn Al Khattab* (Jurisprudence Encyclopedia of Umar Ibn Al Khattab), Maktabah Al Falah, Kuwait.
- Obaidullah and Tariqullah (2008) Islamic Microfinance Development—Challenges and Initiatives. Islamic Development Bank, Jeddah. (Policy Dialogue Paper No. 2).
- Pogge, T. and T. Reddy (2003) How not to Count the Poor. Columbia University, New York. (Mimeographed). Retrieved August 15, 2004 from <http://www.columbia.edu/~sr793/count.pdf>.
- Rahman, Saha Muhammed Habibur (1980) Zakat—A Case for Equitable Distribution of Income and Wealth. In K.T. Hosain, *et al.* (eds.) *Thoughts on Islamic Economics*. Islamic Economics Research Bureau, Dhaka, 94–101.
- Ravallion and Chen (2008) The Developing World is Poorer than We Thought, But No Less Successful in the Fight against Poverty. These estimates are for 1990 and 2005, calculated using the \$1.25 international poverty line.

- Reddy, S. (2009) The Emperor's New Suit: Global Poverty Estimates Reappraised. (SCEPA Working Paper, 2009-11).
- Sadeq, A. H. M. (1996) Ethico-Economic Institution of Zakat: An Instrument of Self-reliance and Sustainable Grassroots Development. *IJUM Journal of Economics and Management* 12:2.
- Sadeq, Abul Hasan M. (1989) Distribution of Wealth through Transfer Payments. *Hamdard Islamicus* 1:13, 33-45.
- Salama, Abdin Ahmed (1990) Voluntary and Compulsory Applications of Zakat: A Case Study of Sudan 1405-1410. Paper presented at the Third International Conference on Zakat, Kuala Lumpur, Malaysia, May 14-17.
- Salama, Abdin Ahmed (1982) Fiscal Analysis of Zakat with Special Reference to Saudi Arabia's Experience in Zakat. In Mohammad Arif (editor) *Monetary and Fiscal Policy of Islam*. International Centre for Research in Islamic Economics, King Abdul Aziz University, Jeddah.341-64.
- Sheikh, Abdul Aziz (1980) Concept of Zakat: A Survey of Qur'anic Texts and Their Explanation in Shari'ah and Contemporary Economics. In M. Raquibuzzaman (ed.) *Some Aspects of Economic of Zakat*. pp. 3-68.
- Shirazi, Nasim Shah (2004) Prospects of Poverty Elimination through the Institution of Zakat: A Case of OIC Member Countries. International Conference on Poverty in the Muslim World and Communities, IIUM, 14-1 December.
- Shirazi, Nasim Shah (2006) Providing for the Resource Shortfall for Poverty Elimination through the Institution of Zakat in Low-Income Muslim Countries. *IJUM Journal of Economics and Management* 14:1.
- World Bank (2009) PovcalNet, PovcalNet Online Poverty Analysis Tool. The World Bank, Washington, DC.
- World Bank (2008) Development Data Group, 2008 World Development Indicators Online. Washington, DC: The World Bank. Available at: <http://go.worldbank.org/U0FSM7AQ40>
- Yaumidin, Karomah U. (2009) Islamic Alternative: Comparative Study between Indonesia and Malaysia. Paper presented in The International Conference on Islamic Economics and Economics of the OIC Countries, Kuala Lumpur, 28-29 April.

## Comments

As the title suggest, this is an important area in poverty alleviation through potential Zakat Collection in OIC-member Countries. First of all, apart from the technical comments, I would like to say that it is difficult to comment on the text as a through editing of the paper is needed for the benefit of the reader.

Secondly, authors claims at page 5 that earlier studies were either limited in scope or lack the proper methodology for estimation of the resources needed and potential zakat collection. But what constitutes a proper methodology is not explained in the paper clearly. Thirdly, the authors have used poverty gap index based on \$ 1 a day poverty or \$ 2 a day estimated by the World Bank to compute the resource shortfall for poverty alleviation but have not mentioned with clarity that how they have converted into absolute number.

Thirdly, authors reviewed that Kahf (1989) using National Income Accounts estimated zakat potential for eight Muslim countries which is based on three different opinions of jurists regarding zakatable items namely Z1, Z2 and Z3.

- Z1 was estimated in accordance with the majority traditional view according to which Zakat was levied on agriculture, livestock, stock in trade, gold, silver and money.
- Z2 was based in accordance with the views of contemporary Muslim scholars where Zakat can be deducted from net returns of manufacturing concerns and building rents and from net savings out of salaries.
- Z3 was based on Malikite views, where Zakat base includes buildings and other fixed assets except those assigned for personal and family use. According to these definitions, under Z1, Zakat can be collected in the range of 1-2 percent of GDP, under Z2 from 3.1- 4.95 and under Z3 from 3.25 to 7.5 percent of the GDP for the eight Muslim countries.

The authors claim that Kahf (1989 ) estimates has a shortcoming of not taking into account of non-Muslims population and claim that their estimates are better than Khaf (1989). While authors have not applied the above method using national accounts as done by Kahf, the authors should not claim that these are their estimates and are better than Kahf. In my opinion, authors have simply adjusted Kahf estimates by multiplying it to non-Muslim population ratios with Kahf's estimates. The authors' estimates can be regarded as Kahf's non-Muslim population adjusted estimates.

Finally, it is also important to discuss the existing extent of Zakat collection in Pakistan and in other Muslims countries and how Zakat collection can be enhanced to fill the gap in order to reduce poverty. Currently, few hundred billion of rupees have been collected in Pakistan as people are not willing to pay Zakat through government system due to lack of creditability of the government. Similar is the case with other Muslim countries. Hence, its scope for poverty alleviation will remain limited.

**Talat Anwar**

Canadian International Development Agency,  
Programme Support Unit, Islamabad.

## **Inequality and Welfare by Food Expenditure Components**

RASHIDA HAQ and NABEELA ARSHID

### **1. INTRODUCTION**

The effect of rising global food crises had a potential impact on food consumption in Pakistan and also its implications for inequality and welfare in urban and rural areas. In Pakistan agriculture is the predominant sector of the economy accounting 46.2 percent of the gross domestic product in 2008-09 which provides livelihood for 60.94 percent of its rural population where its 27 percent poor reside [Pakistan (2009)]. Due to food inflation of 26.61 percent in 2008-09, food expenditure are increasingly dominating household budget, the poor are consuming even less than before and the quality of their diet has deteriorated further indicating a 30 percent undernourished population [UNDP (2003)]. The *Household Integrated Economic Survey* (HIES), 2005-06 demonstrates that, out of total expenditure on average 43.05 percent goes for food mainly for essential food, i.e., cereals, pluses, milk, oil, vegetables and sugar where it constitutes 81 percent of food budget share for bottom 20 percent poor population. This food purchase decisions is also based on a budget that also must cover expenses for clothing, housing, and other goods and services. The overall budget available for food depends on the amount of total household budget spent on other goods and services. This phenomenon indicates that low-income countries spend a greater portion of their budget on necessities such as food than wealthier countries do. Therefore, an in-depth study on food components distribution requires an understanding of the complete welfare function of consumers.

Effective evaluation of food policy issues requires accurate information on distribution of food consumption patterns. This distribution of household food expenditure also represents a very important aspect of the distribution of economic welfare. Its role becomes even more important when the distribution of economic welfare is observed using micro data. In this case income data is considered the best proxy to the level of the household's economic welfare is usually not reliable and total consumption is taken as the second best solution. However, micro level data do not present consumption statistics and expenditure is used instead as a proxy. One important problem associated with the use of total expenditure is that many households account zero expenditure for various goods while

Rashida Haq <rashida\_haq@hotmail.com> and Nabeela Arshid <nabeela@pide.org.pk> are Senior Research Economist and Senior Systems Analyst at the Pakistan Institute of Development Economics, Islamabad.

*Authors' Note:* We would like to thank Dr Attiya Javid, Dr Najam us Saqib and Mr Masood Ishfaq Ahmed for their useful comments and suggestions on an earlier draft of the paper.

their consumption is not zero, simply because they do not purchase those goods during the survey period. This becomes more important in the case of long-life durable goods or goods purchased only occasionally [Lazaridis (2000)]. Second, measures of consumption inequality are a useful complement or even alternative to income or earnings inequality because households do take some steps to smooth consumption. Therefore, consumption inequality is probably the better measure of inequality in welfare. For all these reasons, the distribution of total expenditure on food, despite its limitations, is considered a good indicator of the distribution of economic welfare.

However, food expenditure consists of several food components with different shares and distributions which can be classified in essential and non-essential or luxury items. In terms of foods, each society determines which foods are social necessities and which are luxuries, and this distinction reflects the 'social grammar' of a society. Luxury usually denotes foods that are desirable or hard to obtain but not essential to human nutrition. If the number of people who have access to a luxury increases, the status of these goods changes; they turn into commonplace goods and may ultimately become necessities [Veen (2003)]. In Pakistan meat, fruits, soft drinks and other readymade food products have little access to majority of the masses, thus categorised as luxury food for the present analysis of inequality and welfare. The principal purpose of this paper is to examine the contribution of each food item to overall food expenditure inequality and welfare. This analysis enables the policy-maker to reduce inequality through taxes or subsidies in the most efficient way.

This paper examines the impact of eleven food components including essential and luxury on the inequality of total food expenditures in Pakistan. It also evaluates the effect of price changes on the aggregate welfare. The study is also concerned with such questions as: what is the extent of the inequality in food expenditure components? How do the various expenditure components affect total welfare? The paper is organised as follows: Section 2 discusses briefly, some evidence in distribution of food consumption patterns in Pakistan. Section 3 develops techniques intended to analyse inequality and welfare in terms of per capita expenditure components while Section 4 deals with results. Finally, Section 5 is devoted to some concluding remarks.

## **2. SOME EVIDENCE ON FOOD CONSUMPTION PATTERNS**

Recent shifts in food trade reveal dramatic changes in consumption patterns for food around the globe. These changes are likely to continue well into the future. A number of driving forces are working behind these changing consumption patterns, but growth in income is perhaps the most important of them. Growth of income during the past few decades has resulted in increased purchasing power of the consumers around the world that in turn has caused a shift of consumption to more expensive food items. The overall budget available for food depends on the amount of total household budget spent on other goods and services. Although the food budget may grow at a relatively slow rate among high-income consumers, global food consumption patterns are rapidly changing with growing demands for quality, variety, and convenience. Globalisation, improved transportation, and increased purchasing power have generally increased the demand for higher value food products such as fruit and vegetables, meats, and processed food products across all countries [Seale, Anita, and Jason (2003)].

Despite considerable progress in recent decades, the goal of adequate food and nutrition for all is still elusive. Eradicating hunger and malnutrition is a high priority of aid agencies and governments throughout the world. Several policies have been enacted to fight malnutrition. One of them has focused on raising the incomes of the poorest people [Grimard (1996)]. The distribution of budget shares for the eight food sub-categories across three income groups countries are presented in Table 1 which demonstrates that cereals, fats and oils, and fruits and vegetables account for a larger share of the total food budget in low-income countries compared with high-income countries. Low-value staples, such as cereals, account for a larger share of the food budget in poorer countries, while higher-valued food items or luxury foods, such as dairy and meat, and beverages and tobacco are a larger share of the food budget in richer countries. In terms of food, luxury usually denotes foods that are desirable or hard to obtain but not essential to human nutrition. For a good to be a luxury it needs to be desired by many but attained by few. As the true arena of luxury goods, by definition, outside the reach of mass consumption; using Berry's (1994) words, it is not possible to 'democratise' luxuries. The conclusion that can be drawn from this is that luxury goods will occur only in societies with strong social stratification, where elites require goods in order to display and maintain their status.

Table 1

*Percentage Distribution of Budget Shares for Food Sub-categories Across Countries*

| Food Sub-categories                                 | Low<br>Income<br>Countries | Middle<br>Income<br>Countries | High<br>Income<br>Countries |
|---|----------------------------|-------------------------------|-----------------------------|
| Cereals/breads                                      | 26.97                      | 17.98                         | 11.83                       |
| Meat and Fish                                       | 19.65                      | 22.48                         | 23.41                       |
| Dairy   | 7.89                       | 10.78                         | 10.03                       |
| Fruits and Vegetables                               | 20.34                      | 18.24                         | 14.62                       |
| Beverages and Tobacco                               | 9.25                       | 14.22                         | 25.92                       |
| Fats and Oils                                       | 5.90                       | 4.36                          | 2.78                        |
| Other Foods   | 10.0                       | 11.94                         | 11.41                       |
| Food Expenditure Share as % of Total<br>Expenditure | 52.58                      | 34.69                         | 16.97                       |

Source: [www.ers.usda.gov](http://www.ers.usda.gov).

Table 2 shows inequality in budget shares for food sub-categories for poorest quintile and richest quintile over time in Pakistan which is largely a reflection of poverty: people do not have income for food. There are some distinct differences in the expenditure patterns of poor and rich households. Poor households spend on average 55 percent of their budgets on food, whereas rich household's average per capita food expenditure is 33 percent in 2005-06. The consumption pattern of poor and rich households also shows that the richest 20 percent allocate a large share of expenditure on high valued food items such as meat and fruits. Given the slow income growth that is likely for the poorest people in the foreseeable future, large numbers will remain malnourished for decades to come.

Table 2

*Inequality in Monthly Budget Shares for Essential and Luxury Food Items: Pakistan*

| Food Categories                               | 2000-01        |                | 2004-05        |                | 2005-06        |                |
|---|----------------|----------------|----------------|----------------|----------------|----------------|
|   | Poorest<br>20% | Richest<br>20% | Poorest<br>20% | Richest<br>20% | Poorest<br>20% | Richest<br>20% |
| Cereals/Pulses                                | 32.72          | 16.03          | 31.54          | 15.06          | 31.14          | 15.18          |
| Dairy   | 15.02          | 24.50          | 18.51          | 25.03          | 17.44          | 26.19          |
| Vegetables                                    | 9.50           | 8.16           | 10.02          | 7.61           | 10.33          | 7.36           |
| Fats and Oils                                 | 8.44           | 6.69           | 10.47          | 8.11           | 9.49           | 7.72           |
| Condiments and Spices                         | 3.56           | 2.97           | 3.51           | 3.04           | 3.41           | 3.04           |
| Gur and Sugar                                 | 8.94           | 6.99           | 7.14           | 5.30           | 9.79           | 7.12           |
| Tea   | 3.38           | 2.56           | 2.77           | 2.08           | 3.04           | 2.04           |
| Meat, Poultry and Fish                        | 4.84           | 12.87          | 7.18           | 15.68          | 6.77           | 14.70          |
| Fruits  | 1.67           | 5.12           | 2.28           | 5.58           | 1.90           | 5.55           |
| Tobacco                                       | 4.36           | 3.13           | 2.69           | 2.79           | 3.72           | 2.46           |
| Readymade Food                                | 7.57           | 10.99          | 3.87           | 9.70           | 2.98           | 8.62           |
| Food Expenditure as % of Total<br>Expenditure | 63.44          | 49.33          | 59.22          | 40.57          | 55.61          | 33.1           |

Source: 'Household Integrated Economic Survey' for respective years.

In this scenario, Pakistan ranks at 61st position in Global Hunger Index-2008 with 21.7 points out of 88 countries surveyed indicating alarming level of hunger. The Index ranks countries on a 100-point scale with zero being the best score (no hunger) and 100 being the worst in three indicators which include child malnutrition, rates of child mortality and the number of people who are calorie deficient [IFPRI (2008)].

The food consumption patterns of households have been analysed in a number of studies<sup>1</sup> in Pakistan. These studies differ not only in their scope but also by the period of the data which are discussed here.

Rise in food prices have a big impact on the poorest households in rural and urban areas in Pakistan which is explored by Naqvi and Akbar (2000). They revealed that Pakistani households they have shifted expenditures toward basic needs and away from non-essential items over the 1987-88 to 1996-97, a period associated with rapidly increase in price levels and with very slowly rising real incomes. High own-price elasticity of demand for food combined with high expenditure allocations on food indicates that the poorest households in Pakistan are facing a distressful situation due to food price hikes. Currently, the nominal prices of many staple food commodities are at their highest levels in nearly 50 years leading to food riots in some developing countries. Haq, Hina, and Meilke (2008) had estimated the impacts of rising world prices on poverty in rural and urban areas of Pakistan. As compared to 2004-2005 the unexpected food price changes resulting from the food crisis increased poverty by 8.2 percentage points (34.8 percent), severely affecting the urban areas where poverty doubled. The effect of inflation are highly non-egalitarian and in fact, contributed more to increase the existing inequalities in food expenditure than in non-food expenditure especially in lower income brackets [Afridi, *et al.* (1984)]. The rise in inequality was more pronounced in urban areas than in rural areas where both the poorest and middle income groups lost their consumption share while the richest top two deciles gained in their consumption

<sup>1</sup>See, for example Burney and Khan (1991), Haq, Nazli and Meilke (2008), Naqvi and Akbar (2000), Grimard (1996), Haq (1998), Anwar, (2009) and Zakir and Idrees (2009).

share implying that inequality in Pakistan increased at the expense of the poor and the middle income groups [Anwar (2009)].

The conventional wisdom proposed that income increases should allow individuals to increase their food intake and nutrient consumption, which in turn should improve their nutritional status.

Taking calories as a proxy for all nutrients Grimard (1996) revealed that rural households in Pakistan spend 69 percent of their food budget on cereals, dairy, edible oils and sugar thus translated into 77 percent of daily calories consumption share per household. As households get richer, they would substitute away from the lower quality toward the better quality food items of a given category. Cheema and Malik (1985) also showed that redistribution of income from rich to the poor households will raise the consumption demand for basic necessities like, wheat, pulses, edible oils, clothing and footwear, etc; while the demand for personal effects: meat, fish and poultry, furniture would decreased.

Sen’s welfare index that determined the level of disparities in different section of the society is used by Haq (1998) and Zakir and Idrees (2009). The result confirmed that disparity in food consumption is not high as compared to non-food consumption. As far as economic welfare is concerned its level increased over time and its magnitude is greater in the urban sector. It is also evaluated that ‘food’ and ‘housing’ components of expenditure are the major contributors in total welfare. The price elasticity of welfare has shown that ‘food’ expenditure is more responsive in price changes in all areas [Haq (1998)]. Trends in inequality and welfare during 1963-64 to 2004-05 revealed that income and consumption inequalities were more severe in urban areas than in rural areas [Zakir and Idrees (2009)].

Since the consumption patterns are likely to change considerably since the last two decades, there is a need to analyse the per capita households’ consumption patterns on the basis of more recent micro data.

### 3. THEORETICAL FRAMEWORK AND THE DATA

It is important to employ a single measure of welfare to acquire a complete welfare ranking of distribution. This type of measure can be derived by giving different weights to individuals with different income levels. It can be assumed that in a country there are  $n$  persons who are arranged in ascending order of their income as:  $\chi_1 \leq \chi_2 \dots \dots \dots \leq \chi_n$ , then a welfare measure may be described as a unique function of  $\chi_1, \chi_2 \dots \dots \dots, \chi_n$ . Sen (1974) illustrated a welfare function as follow:

$$W = \sum_{i=1}^n x_i v_i \quad \dots \quad (1)$$

Where  $v_i$  is the weight given to the person with income  $x_i$ . It is evident that if  $v_i = \frac{1}{n}$  for all  $i$ , then  $W$  is equal to average income of individuals. To make  $W$  sensitive to inequality in the distribution, a higher (lower) weight should be assigned to the individual with lower (higher) incomes. Sen (1974) proposed that  $v_i$  should be proportional to the number of persons who are at least as well off as  $i$ . This proposition leads Sen to write the welfare function as:

$$W = x(1 - G) \quad \dots \quad (2)$$

Where  $x$  the mean income of the society and  $G$  is the Gini index which is a widely used measure of the dispersion in welfare, with values closer to unity associated with higher inequality. When  $G=1$ , all income is received by one individual (perfect inequality) and  $G=0$  indicates absolute equality. The method of estimating Gini coefficient is due to Lorenz's (1905) defined as:

$$G = 1 - \sum_{i=1}^n (Z_i - Z_{i-1})(x_i + x_{i-1}) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Where  $Z$  is the cumulative proportion of income receivers and  $x_i$  is the corresponding cumulative proportion of income received. Although there are several alternative welfare measures such as Atkinson (1970), this paper uses  $W$  as a basis for analysing welfare in Pakistan because it can be considered as an appropriate welfare measure which takes into account both size and distribution of income.

#### (a) Inequality and Welfare by Food Expenditure Components

In measuring inequality, consumption expenditure is used as an appropriate indicator of economic welfare because utility is derived from the consumption of goods and services. It is also a better indicator measure of long term standard of living than income. Since the individual expenditure is the sum of several expenditure components, it will be useful to analyse total inequality and welfare in terms of individual total food expenditure components as proposed by Sen (1974).

Suppose there are  $k$  expenditure components whose prices are  $p_1, p_2, \dots, p_k$  and  $q_1, q_2, \dots, q_k$  are the quantities consumed of the  $k$  food expenditure components then  $u_j$  is taken the mean of  $j$ th expenditure component. Then it is obvious that:

$$W = \sum_{j=1}^k \mu_j (1 - C_j) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

Here the disaggregation of Gini index in terms of expenditure components can be written as [Kakwani (1980)]:

$$G = 1 / \mu \sum_{j=1}^k \mu_j C_j \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Where  $C_j$  is considered as the concentration index of the  $j$ th expenditure component. The concentration index  $C_j$  is similar to the Gini index except that the ranking of individual is by the total expenditure and not the  $j$ th expenditure component. The concentration index of expenditure component measures how evenly or unevenly that expenditure component is distributed over the aggregate per capita expenditure. If  $C_j$  is greater (smaller) than  $G$ , it implies that the  $j$ th expenditure component is distributed over the aggregate expenditure in favour of rich (poor) individuals. Thus combining Sen welfare index (2) with (4) and (5) gives:

$$W = \sum_{j=1}^k \mu_j (1 - C_j) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Which shows how the total welfare can be decomposed in terms of individual expenditure components;  $\mu_j(1-C_j)$  being the contribution of the  $j$ th expenditure component to total welfare.

**(b) The Price Elasticity of Aggregate Welfare**

To evaluate the effect of price change on the total welfare, then following equation expresses the price elasticity of aggregate welfare as Kakwani (1980):

$$n_j = -\frac{\mu_j(1-C_j)}{\mu(1-G)} \quad \dots \quad (7)$$

Which implies that if the price of  $j$ th commodity increases by 1 percent, then the aggregate welfare changes by  $n_j$  percent.  $n_j$  will always be negative. Thus the magnitude of  $n_j$  can be used to evaluate the effects of price changes on the aggregate welfare.

**(c) Progressivity Index**

This progressivity index is expressed as the ratio of the inequality component to aggregate expenditure:

$$P_j = \frac{(G-C_j)}{(1-G)} \quad \dots \quad (8)$$

A positive value of  $P_j$  implies the  $j$ th expenditure component to be progressive and the negative value implies the  $j$ th component to be regressive. Thus, the magnitude of  $P_j$  indicates whether the increase in the  $j$ th component favours the poor or the rich. If the  $j$ th component is distributed in proportion to total expenditure,  $C_j$  will be equal to  $G$  which gives  $P_j$  to be equal to zero. In this case, the effect of an increase in the  $j$ th component favours neither the poor nor the rich.  $P_j$  provides a quantitative basis for maximising the country's total welfare with minimum cost.

The above measure should be interpreted with care since it is based on the assumption that per capita total expenditure on food is considered a good indicator of the distribution of welfare. This is an approximate measure of individual welfare because it assumes that the basic needs of every household member are the same.

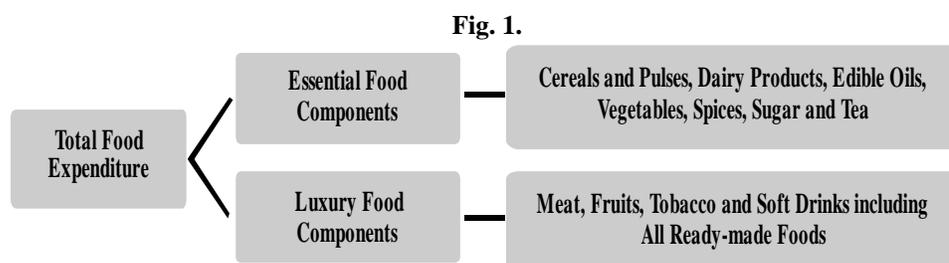
**(d) The Data**

All computations are performed on the complete set of data collected in Household Integrated Economic Survey (HIES), 2005-06 conducted by Federal Bureau of Statistics (FBS). The universe of HIES consists of all urban and rural areas of all four provinces as defined by the Provincial Governments. Military restricted areas have been excluded from the scope of the survey. Separate sampling frames have been used in the survey for urban areas and rural areas. FBS has developed its own urban area frame. All urban areas known as cities/towns of the urban domain of the sampling frame have been divided into small compact areas known as enumeration blocks. Each enumeration block comprises about 200-250 households. Each enumeration block has been divided into low, middle and high income group, keeping in view the status of the living of majority of

households. With regard to the rural areas, the lists of villages/*mouzas/dehs* according to population census, 1998 have been used as sampling frame.

A sample size of 15,453 households was considered appropriate to provide reliable estimates of key characteristics at the National/provincial level with urban/rural breakdown. The entire sample of households has been drawn from 1109 Primary Sampling Units (PSUs) out of which 531 are urban and 578 are rural. Households within each Primary Sampling Units have been considered as secondary sampling units. 16 and 12 households have been selected from each sample village and enumeration block respectively by random systematic sampling technique with a random start [Pakistan (2005-06)]. It collects data on household characters, consumption patterns, households' income by sources/occupation/sectors and social indicators that make it possible to estimate inequality and welfare across various sections of the society. In this paper weights are assigned to each household in order to insure the representativeness of the sample, and to obtain unbiased sample population parameter estimates.

For the analysis of inequality and welfare, total food expenditure is decomposed into essential and non essential food groups which are further disaggregated into its food components as presented by Naqvi and Akbar (2000).



#### 4. ANALYSIS

In this section per capita food expenditure inequality and welfare is analysed for Pakistan. The basic sample weights for sampled households are used that reduces biases due to imperfections in the sample related to non-coverage and non-response households. Inequality measures such as quintile shares, Gini index and decile dispersion ratio (DDR) in Table 3 are based on per capita household food consumption expenditure across region in Pakistan. The DDR is defined as the share of the bottom 20 percent in relation to the share of the top 20 percent. For an in depth analysis of inequality, total food expenditure is decomposed in essential and non essential food components. It is observed that disparity in essential food expenditure is less as compare to non essential food components; approximately fifty percent of non essential food expenditure is incurred by top fifth quintile of the population. Inequality parameters indicate that distribution in expenditure is more pronounced in urban area as compare to rural area. The decile dispersion ratio also indicates disparity in non essential food expenditure is quite high within urban households.

Table 3

*Inequality of Per capita Household Food Consumption Expenditure: 2005-06*

| Quintiles       | Share of Total Food Expenditure (%) |       |       | Share of Essential Food Expenditure (%) |       |       | Share of Non-essential Food Expenditure (%) |       |       |
|-----------------|-------------------------------------|-------|-------|---|-------|-------|---|-------|-------|
|                 | Pakistan                            | Urban | Rural | Pakistan                                | Urban | Rural | Pakistan                                    | Urban | Rural |
| Ist             | 9.7                                 | 7.3   | 11.4  | 11.1                                    | 8.6   | 12.4  | 5.7   | 3.7   | 7.4   |
| 2 <sup>nd</sup> | 13.1                                | 10.6  | 14.7  | 14.4                                    | 12.0  | 15.7  | 9.0   | 6.8   | 10.9  |
| 3 <sup>rd</sup> | 16.8                                | 14.9  | 17.9  | 17.8                                    | 16.4  | 18.6  | 13.1  | 10.8  | 15.1  |
| 4 <sup>th</sup> | 22.5                                | 21.6  | 23.0  | 23.1                                    | 22.7  | 23.3  | 20.4  | 18.8  | 21.9  |
| 5 <sup>th</sup> | 37.8                                | 45.8  | 32.9  | 33.7                                    | 40.3  | 30.0  | 51.9  | 60.0  | 45.7  |
| Gini Index      | 26.27                               | 27.10 | 25.34 | 21.0                                    | 20.52 | 21.80 | 43.0  | 44.37 | 39.9  |
| DDR             | 25.66                               | 15.94 | 34.65 | 32.93                                   | 21.34 | 41.33 | 10.98                                       | 8.33  | 16.19 |

Source: Computations are based on 'Household Integrated Economic Survey (HIES), 2005-06'.

Total per capita food expenditures inequality by its components is presented in Table 4. Food consumption patterns show that a typical household spends a larger share of food budget on essential food item, i.e. on average cereals and pluses 22.1 percent, dairy products 23.34 percent, edible oils 9.26 percent, vegetables 8.6 percent, spice 3.28 percent and sugar 8.13 percent constituting 77.37 percent of total food budget. Cereals and pluses, a basic foodstuff, sees its relative importance in food budget share in urban and rural areas. In Pakistan it is a major source of daily calories intake which constitute approximately 62 percent of total calories intake [Grimard (1996)]. All other essential food items represent a consistent consumption pattern in urban and rural areas.

The concentration index of food expenditure component measures how evenly or unevenly that component is distributed over the per capita total expenditure. It can be seen that the concentration index of dairy products, meat, poultry and fish, fruits (fresh and dried) and all readymade food products are higher than overall Gini coefficient which implies that expenditures on these commodities are unevenly distributed over the total expenditure in favour of rich families. Wheat and rice which is included in cereals and pluses category had high inequality in rural area as compare to urban area. Concentration of all essential food items is less as compare to total food expenditure in all regions. Overall non essential food expenditure is more unevenly distributed as compare to total food inequality. The last column shows the contribution of food components inequality in total inequality. Dairy products and meat, poultry and fish had major share in total inequality in all regions. All essential food items which had 77.37 percent budget share contribute 62.77 percent in total inequality.

To make statements about the magnitude of welfare, it will be necessary to compute single measures of welfare. Statistics given in Table 5 is based on Sen Welfare function (1974) given by Equation (1) which takes into account both size and distribution of expenditure. It is evident that cereals and pulses and dairy products are the major source of welfare in urban, rural and overall Pakistan. Tea and tobacco contribute least magnitude of welfare in Pakistan indicating that these items cannot be categorised as social necessities.

Table 4

*Food Expenditure Inequality by It's Components: 2005-06*

| Food Expenditure Components          | % Share of Food Expenditure |               |               | Concentration Index (%) |              |              | % Contribution to total Inequality |            |            |
|--------------------------------------|-----------------------------|---------------|---------------|-------------------------|--------------|--------------|------------------------------------|------------|------------|
|                                      | Pakistan                    | Urban         | Rural         | Pakistan                | Urban        | Rural        | Pakistan                           | Urban      | Rural      |
| <b>Essential Food Components</b>     |                             |               |               |                         |              |              |                                    |            |            |
| Cereals and Pluses                   | 22.15                       | 18.54         | 24.36         | 11.2                    | 9.60         | 12.73        | 9.44                               | 6.64       | 12.25      |
| Dairy Products                       | 23.34                       | 23.92         | 22.98         | 33.0                    | 30.30        | 34.03        | 29.32                              | 26.57      | 30.83      |
| Edible Oils and Fats                 | 9.26                        | 8.60          | 9.66          | 21.0                    | 18.80        | 22.26        | 7.40                               | 5.90       | 8.30       |
| Vegetables                           | 8.60                        | 8.15          | 8.88          | 18.66                   | 18.91        | 18.49        | 6.11                               | 5.54       | 6.32       |
| Condiments and Spices                | 3.28                        | 3.51          | 3.13          | 21.6                    | 21.0         | 20.84        | 2.70                               | 2.58       | 2.77       |
| Gur and Sugar                        | 8.13                        | 6.97          | 8.84          | 19.47                   | 20.19        | 19.81        | 6.03                               | 5.17       | 7.11       |
| Tea                                  | 2.61                        | 2.60          | 2.61          | 17.67                   | 19.25        | 16.19        | 1.76                               | 1.85       | 1.58       |
| <b>Non Essential Food Components</b> |                             |               |               |                         |              |              |                                    |            |            |
| Meat, Poultry and Fish               | 11.26                       | 14.49         | 9.29          | 40.46                   | 41.45        | 36.61        | 17.34                              | 22.14      | 13.44      |
| Fruits (Fresh and Dried)             | 4.03                        | 5.25          | 3.28          | 41.69                   | 41.87        | 38.34        | 6.40                               | 8.12       | 5.14       |
| Tobacco                              | 3.29                        | 3.00          | 3.47          | 23.8                    | 26.18        | 22.78        | 2.99                               | 2.95       | 3.16       |
| Readymade Food Products              | 4.05                        | 4.96          | 3.50          | 67.9                    | 66.54        | 67.50        | 10.48                              | 12.18      | 9.49       |
| <b>Total Food Expenditure</b>        | <b>100.00</b>               | <b>100.00</b> | <b>100.00</b> | <b>26.27</b>            | <b>27.10</b> | <b>25.34</b> | <b>100</b>                         | <b>100</b> | <b>100</b> |
| All Essential Food Expenditure       | 77.37                       | 72.30         | 80.47         | 21.0                    | 20.52        | 21.8         | 62.77                              | 54.61      | 69.17      |
| Non Essential Food Expenditure       | 22.63                       | 27.70         | 19.53         | 43.0                    | 44.37        | 39.97        | 37.23                              | 45.39      | 30.83      |

Computations are based on 'Household Integrated Economic Survey (HIES), 2005-06'.

While prices play an important role in our lives, inflation undeniably affects the welfare of the poorest in society. Rise in food prices have a big impact on the poorest households in rural and urban areas. If the prices of essential food items increases faster than those of luxuries, the poorest in first quintile will be hurt more than the top 20 percent. If the prime concern is to protect the poor, it is important to know how changes in prices affect their welfare. To evaluate the effect of price changes on the aggregate welfare, price elasticity of welfare is computed which indicates that if the price of the  $j$ th commodity increases by 1 percent, then the aggregate welfare changes by  $n_j$  percent as in Equation (5). The price elasticity welfare for cereals and pulses is 0.269 in Pakistan; it means if the price of cereals and pulses increases by 1 percent aggregate welfare decreases by 0.269 percent. It can also be analysed that essential food item such as cereals and pulses, dairy products and edible oils have 55 percent budget share; if the price increases by one percent the aggregate welfare will decrease by 0.58 percent. This phenomenon is observed in recent food inflation in Pakistan where bottom 20 percent population hurt proportionately more than the rich as they have greater share of these essential items in the food budget. A welfare comparison of the two components cannot be made without taking into account the cost involved in increasing welfare. A progressivity index is also computed to make this cost adjustment in the last column of Table 5. It is the ratio of the  $j$ th inequality component to the aggregate expenditure inequality implies that if its value is positive the  $j$ th component is to be progressive and the negative value implies the  $j$ th component to be regressive. It is observed that essential food components except dairy products are the most progressive expenditure as the poor spend a greater proportion of their income on food. If the government decides to give subsidy on cereals and pluses the poor will advantaged more than the rich. The magnitude of progressivity index indicates whether the tax/subsidy on the  $j$ th commodity have an adverse impact on the poor or the non poor or how prices changes affect aggregate inequality in a society.

Table 5

*Welfare by Food Expenditure Components: 2005-06*

| Food Expenditure Components    | % Contribution to Total Welfare |       |       | Price Elasticity of Welfare by Components |       |       | Progressivity Index by Components |        |        |
|--------------------------------|---------------------------------|-------|-------|---|-------|-------|-----------------------------------|--------|--------|
|                                | Pakistan                        | Urban | Rural | Pakistan                                  | Urban | Rural | Pakistan                          | Urban  | Rural  |
| Cereals and Pulses             | 26.90                           | 23.00 | 28.48 | 0.269                                     | 0.23  | 0.28  | 0.214                             | 0.240  | 0.169  |
| Dairy Products                 | 21.33                           | 22.88 | 20.31 | 0.213                                     | 0.23  | 0.20  | -0.086                            | -0.044 | -0.116 |
| Edible Oils and Fats           | 9.98                            | 9.59  | 10.06 | 0.100                                     | 0.10  | 0.10  | 0.078                             | 0.114  | 0.041  |
| Vegetables                     | 9.55                            | 9.07  | 9.69  | 0.095                                     | 0.09  | 0.10  | 0.110                             | 0.112  | 0.092  |
| Condiments and Spices          | 3.50                            | 3.80  | 3.32  | 0.035                                     | 0.04  | 0.03  | 0.070                             | 0.084  | 0.060  |
| Gur and Sugar                  | 8.94                            | 7.63  | 9.50  | 0.089                                     | 0.08  | 0.10  | 0.099                             | 0.095  | 0.074  |
| Tea                            | 2.93                            | 2.88  | 2.93  | 0.029                                     | 0.03  | 0.03  | 0.124                             | 0.108  | 0.123  |
| Meat, Poultry and Fish         | 9.15                            | 11.64 | 7.89  | 0.091                                     | 0.12  | 0.08  | -0.188                            | -0.197 | -0.151 |
| Fruits (Fresh and Dried)       | 3.20                            | 4.19  | 2.71  | 0.032                                     | 0.04  | 0.03  | -0.205                            | -0.203 | -0.174 |
| Tobacco                        | 1.44                            | 3.03  | 3.59  | 0.014                                     | 0.03  | 0.04  | 0.040                             | 0.013  | 0.034  |
| Readymade Food Products        | 4.21                            | 2.28  | 1.52  | 0.042                                     | 0.02  | 0.02  | -0.562                            | -0.541 | -0.565 |
| Food Expenditure               | 100                             | 100   | 100   | 1   | 1     | 1     | 0                                 | 0      | 0      |
| All Essential Food Expenditure | 83.39                           | 78.35 | 84.28 | 0.834                                     | 0.783 | 0.843 | 0.078                             | 0.090  | 0.047  |
| Non Essential Food Expenditure | 17.60                           | 21.65 | 15.72 | 0.177                                     | 0.216 | 0.157 | -0.222                            | -0.237 | -0.196 |

Source: Computations are based on "Household Integrated Economic Survey (HIES), 2005-06".

## 5. CONCLUSIONS

A central area of inquiry in stratification research concerns income or expenditure inequality. Per capita inequality and welfare in the distribution of food consumption expenditures across consumer units has been focus of this research. Using the Kakwani (1980) disaggregation of Gini index and Sen (1974) welfare function, inequality and welfare in food expenditure components have been examined by employing full sample of 'Household Integrated Economic Survey' 2005-06.

The total food expenditure is decomposed in essential and non essential food components, having budget share of 77.37 percent and 22.63 percent respectively. Cereals and dairy products; the basic foodstuff, find its relative importance in food budget share in urban and rural areas. Inequality parameters indicate that distribution in food expenditure is more pronounced in urban area as compare to rural area. The decile dispersion ratio indicates that disparity in non essential food expenditure is quite high within urban households. It can be seen that the concentration index of dairy products, meat, fruits and all readymade food products are higher than overall Gini coefficient which implies that expenditures on these commodities are unevenly distributed over the total expenditure in favour of rich families. It is evident that cereals and dairy products are the major source of welfare in urban, rural and overall Pakistan. The study also present results on price elasticity of welfare and the progressivity index for each component. The price elasticity welfare for cereals is 0.269 in Pakistan which indicates that aggregate welfare is very responsive to price changes. It can also be analysed that essential food items such as, dairy products and edible oils having 32 percent food budget share are fairly sensitive to price changes. This phenomenon is observed in recent food inflation in Pakistan where bottom 20 percent population hurt proportionately more than the rich as they have greater share of these essential items in the food budget. It is also observed that essential food components except dairy products are the most progressive expenditure as the poor spend a greater proportion of their income on food. If the government decides to give subsidy on cereals and pluses the poor will advantaged more than the rich.

The present analysis provides a basis for determining the magnitude of inequality and welfare that can be helped in designing appropriate policies. As the changes in prices have generally affected the welfare of the poor more adversely than the non-poor, safety nets will be required for the most vulnerable population as they will not be able to sustain their livelihoods.

#### REFERENCES

- Afridi, U., A. Qadir, and J. Zaki (1984) Effect of Dual Sector Inflation across income Levels in Pakistan. *The Pakistan Development Review* 23:2, 381–390.
- Anwar, T. (2009) Measuring Inequality of Consumption and Opportunities in Pakistan, 2001-02 and 2004-05. *Pakistan Economic and Social Review* 47:2, 157–181.
- Atkinson, A. B. (1970) On the Measurement of Inequality. *Journal of Economic Theory* 2, 244–263.
- Berry, C. J. (1994) *The Idea of Luxury: A Conceptual and Historical Investigation*. Cambridg: Cambridge University Press.
- Burney, N. A. and A. H. Khan (1991) Household Consumption Patterns in Pakistan: An Urban-Rural Comparison Using Micro Data. *The Pakistan Development Review* 30:2, 145–172.
- Cheema, A. A. and M. H. Malik (1985) Changes in Consumption Patterns and Employment under Alternative Income Distribution in Pakistan. *The Pakistan Development Review* 24:1, 1–22.
- Grimard, F. (1996) Does the Poor's Consumption of Calories Respond to Changes in Income? Evidence from Pakistan. *The Pakistan Development Review* 35:3, 257–283.
- Haq, R. (1998) Trends in Inequality and Welfare in Consumption Expenditure: The Case of Pakistan. *The Pakistan Development Review* 37:4, 257–283.
- Haq, Z., H. Nazli, and K. Meilke (2008) Implications of High Food Prices for Poverty in Pakistan. *Agricultural Economics* (39) Supplement 477–484. Department of Food, Agricultural and Resource Economics, University of Guelph, Ontario, Canada.
- Idrees, M. (2006) An Analysis of Income and Consumption Inequalities in Pakistan. Unpublished PhD Dissertation, Department of Economics, Quaid-i-Azam University, Islamabad.
- International Food Policy Research Institute (2008) Global Hunger Index. Retrieve: <http://www.ifpri.org/pressrelease/new-global-hunger-index>
- Kakwani, N. (1980) *Income Inequality and Poverty: Methods of Estimation and Policy Applications*. New York: Oxford University Press.
- Kakwani, N. (1980) On the Class of Poverty Measures. *Econometrica* 48, 437–446.
- Lazaridis, P. (2000) Decomposition of Food Expenditure Inequality: An Application of the Extended Gini Coefficient to Greek Micro-data. *Social Indicators Research* 52, 179–193.
- Lorenz, M. O. (1905) Methods of Measuring Concentration of Wealth. *Journal of the American Statistical Association* 9.
- Naqvi, Z. F. and M. Akmal (2000) How Do the Poor Respond to Rising Prices? *The Pakistan Development Review* 39:4, 827–842.

- Pakistan, Government of (2002) *Household Integrated Economic Survey*. Islamabad: Federal Bureau of Statistics.
- Pakistan, Government of (2005) *Household Integrated Economic Survey*. Islamabad: Federal Bureau of Statistics.
- Pakistan, Government of (2006) *Household Integrated Economic Survey*. Islamabad: Federal Bureau of Statistics.
- Pakistan, Government of (2009) *Pakistan Economic Survey 2008–09*. Islamabad: Finance Division, Economic Adviser's Wing.
- Seale, J., R. Anita, and B. Jason (2003) International Evidence on Food Consumption Patterns. United States Department of Agriculture. Retrieved from [www.ers.usda.gov](http://www.ers.usda.gov).
- Sen, A. K. (1974) Information Base of Alternative Welfare Approach: Aggregation and Income Distribution. *Journal of Public Economics* 44:1, 219–31.
- UNDP (2003) *Human Development Report 2000*. New York: Oxford University Press.
- Veen, M. (2003) When Is Food a Luxury? *World Archaeology* 34:3, Luxury Foods. pp. 405-427. Taylor & Francis, Ltd. Stable URL: <http://www.jstor.org/stable/3560194>
- Zakir, N. and M. Idrees (2009) Trends in Inequality, Welfare and Growth in Pakistan, 1963-64 and 2004-2005. Pakistan Institute of Development Economics, Islamabad. (PIDE Working Paper 2009:53).

## Comments

This is an important paper in the areas of distribution and welfare. Indeed, effective evaluation of food policy issues will be possible through analysing distribution of food consumption patterns which is the objective of this paper. First of all, I would like to comment on page 5 where authors says that inequality in budget shares for food sub-categories for poorest quintile and richest quintile over time in Pakistan is largely a reflection of poverty as people do not have income for food. But I would comment that most of the poor do have income for food as their food share is higher compared with the non-poor. Therefore, most of the poverty is mainly due to insufficient income to spend on the non-food need.

Secondly, I would like to point out that authors say at page 11 that consumption is also a better indicator measure of long term standard of living than income. While current consumption expenditure may be a good indicator on different account, one of the drawbacks of consumption is that it gives a short run status of household resources. It may be possible for the poor to finance their consumption payments by dissaving or by borrowing—a process which cannot be sustained in the long run. It is, therefore, recommended to examine welfare using both income and consumption and draw inference from the comparison.

Thirdly, I would like to say that authors have used the per capita consumption that ignored the differences needs and economies of scale in household consumption. Different individuals of different age and sex in a household have different requirement for food and non-food. For example adult calorie needs are higher than children and similarly male adult needs more calories than female adult. Since the paper focuses on inequality on consumption in particular food, it is therefore, important to use adult equivalent household consumption rather than per capita household. While analysis is mostly focused on presenting the statistical results, more discussion is required on policy implications in the concluding section.

**Talat Anwar**

Canadian International Development Agency (CIDA),  
Programme Support Unit, Islamabad.

## **Trade Liberalisation Could Improve Producers Profitability in Agriculture: A Case of Basmati Rice**

MUHAMMAD ZULFIQAR, DILAWAR KHAN, ANWAR F. CHISHTI, MUNIR KHAN,  
WASIULLAH, AJMAL WAHEED, MUHAMMAD ZAKIR and ROBINA KARIM

### **1. INTRODUCTION**

Rice is one of the most important crops of Pakistan having second position as staple food after wheat [Akhtar (1999)] while Basmati rice is an important export commodity [Pakistan (2008)]. Basmati rice is the third largest crop in terms of occupying area under cultivation [Zulfiqar (2008)]. Due to the importance of Basmati rice to the economy of Pakistan, this piece of research has been conducted with the objectives to; (i) identify various protection policies and interventions made to Basmati rice economy in Pakistan (ii) estimate welfare effects associated with existing protection policies and interventions and (iii) to estimate implications of WTO's trade liberalisation in domestic economy and abroad.

Production of various crops including Basmati rice has been a private job. However, marketing and trade of most of the commodities have mainly been regulated or managed by government in one or the other way. The major policy intervention of Government of Pakistan has been in the form of 'support prices', currently abandoned to comply with World Trade Organisation (WTO) agreements. The announcement of 'support or procurement prices' and size of stocks procured thereof have affected production and trade of the commodities involved. Secondly, State Trading Enterprises (STEs) had been playing major role in trading of some major agricultural commodities including Basmati rice. Although lately Pakistan has taken certain measures to liberalise trade but still according to Trading Corporation of Pakistan (2006) it is, inter alia, involved in inspection of export purpose rice. Thirdly, import tariffs and export duty has been important interventions. According to Scott, *et al.* (1990), imposition of export duties on Basmati rice has been a common feature. Some clues of such policies in Basmati rice economy are also found in studies like Cornelisse and Kuijpers (1987), Ahmad, *et al.* (1987), Hamid, *et al.* (1987), Chishti (1994), Ackerman and Dixit (1999), Ashfaq, Griffith, and Parton (2001) and Arifullah (2007).

Muhammad Zulfiqar <zulfi64@yahoo.com> is Director Planning, Kohat University of Science and Technology, Kohat. Dilawar Khan <dilawarmkd@yahoo.com> is Assistant Professor, Kohat University of Science and Technology, Kohat. Anwar F. Chishti <chishti\_anwar@yahoo.com> is Incharge Graduate Programme, Muhammad Ali Jinnah University, Islamabad. Munir Khan <munirkhan4@hotmail.com> is Professor, NWFP Agricultural University, Peshawar. Wasiullah <wasiullahmalik\_63@yahoo.com> is Project Director, Kohat University of Science and Technology, Kohat. Ajmal Waheed <awkhan2@yahoo.com> is Assistant Professor, Quaid-i-Azam University, Islamabad. Muhammad Zakir <mzakirs@yahoo.com> is Director QEC, Kohat University of Science and Technology, Kohat. Robina Karim <robikarim@yahoo.com> is PhD Fellow, NWFP Agricultural University, Peshawar.

For the instant article, types of interventions that Government of Pakistan has adopted to regulate its Basmati rice economy from 1985 to 2005, our study period, have been determined through reviewing Pakistan's Basmati rice domestic wholesale price, export price and world trade price. An examination of the data on prices (Table 1) reflects that Pakistan's domestic wholesale price ( $P_d$ ) has remained, on average, at US\$374.89 (Pak Rs 13777.29) per M. ton while average world trade price ( $P_w$ ) remained US\$332.97 (Rs 12236.59) per M. ton. However, Pakistan's average export price ( $P_e$ ) was US\$514.23 (Rs 18897.74), signifying export tax amounting US\$139.34 (Rs 5120.71) per M. ton during the 1985–2005 study period. Basmati is especial quality rice and its export can not be evaluated on the basis of world average rice price given in Table 1. Therefore free trade export price has been estimated using domestic price of Basmati rice and establish whether Pakistan has supported its Basmati rice in the domestic market. For this purpose export supply ( $E_s$ ) and export demand ( $E_d$ ) functions adopted from Zulfiqar (2008) and solved for Basmati rice free trade export price ( $P_{ef}$ ). So realised free trade export price along with Pakistan's domestic Basmati rice price is reflected in Table 2. A comparison of the two prices ( $P_d$  &  $P_{ef}$ ) indicates Basmati Rice remained under 'price tax-cum-export tax' regime.

## 2. METHODOLOGICAL/ANALYTIC FRAMEWORK

The objective set for this research required to engage three methodologies, namely: (a) analysis of prices using time series data from 1985 to 2005 and identification of government interventions which was done through calculating mean values of prices for the study period. (b) computation of associated welfare effects in terms of changes in producer and consumer surpluses ( $\Delta PS$  &  $\Delta CS$ ) using following approach.

$$\Delta PS = + / - \int_{P_d / P_f}^{P_d / P_f} S(P) dp$$

or

$$\Delta CS = + / - \int_{P_d / P_f}^{P_d / P_f} D(P) dp$$

and (c) analysing implications of implementation of WTO's Agreements particularly agreement on Agriculture from the difference of domestic and world prices. As WTO in general aims at introducing and implementing free trade. For estimating welfare effects of existing policy regimes, we compared those with free trade situation. In case no government interventions were existed, free trade price  $P_{df}$  would have prevailed instead of existing domestic price  $P_d$ . Hence, the effects of implementation of free trade at domestic level have been estimated using free trade scenario. However, at international level, these estimates have been developed using an increase in the prices at international market, based on empirical results of a number of studies such as FAO (2005), Anderson, Martin, and Mensbrugghe (2006) and Akhtar (1999). The functional detail of these methodologies are given in their respective sections in succeeding sections.

### Identification of Government Interventions

To achieve our objectives, the study period (1985–2005) was divided into two sub-periods: pre-WTO (1985-1995) and post-WTO (1995-2005). The mean values of prices for the two sub-periods were computed, as follows, using Tables 1 and 2.

Table 1

|                                      | Pre-WTO Period<br>(1985-1995) | Post-WTO Period<br>(1995-2005) |
|--------------------------------------|-------------------------------|--------------------------------|
| Pakistan's Wholesale Price ( $P_d$ ) | US\$368.18 (Rs 8262.30)       | US\$381.61 (Rs 19292.28)       |
| Estimated Free Trade Price ( $P_e$ ) | US\$398.63 (Rs 8945.57)       | US\$387.79 (Rs 19604.86)       |
| Pakistan's Trade Price ( $P_c$ )     | US\$551.94 (Rs 12385.92)      | US\$476.52 (Rs 24090.51)       |

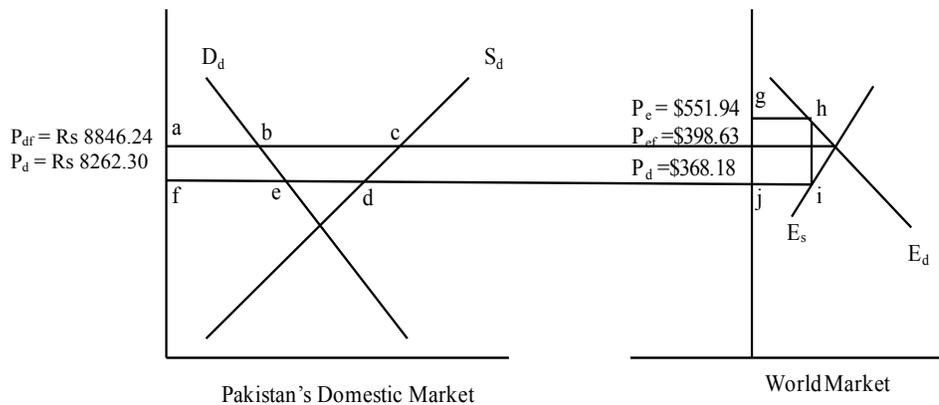
Average  $P_d$  lingered at US\$368.18 per M. ton against average  $P_c$  at US\$551.94 and average  $P_{ef}$  at US\$398.63 during the pre-WTO period, reflecting 'price tax-cum-export tax' regime (Figure 1). Post-WTO study period witnessed average  $P_d$  (US\$381.61),  $P_c$  (US\$476.52) and  $P_{ef}$  (US\$387.79), again reflecting 'price tax-cum-export tax' regime (Figure 2).

**Computation of Welfare Effects**

Welfare effects of (pre- and post-WTO) scenarios, were estimated using simple welfare analysis. To conduct welfare analysis, producer and consumer surpluses ( $\Delta PS$  and  $\Delta CS$ ) were determined along with computed export tax (ET) based on demand, supply and price linkage equations. To estimate producer and consumer surplus and to estimate these equations, time series data from 1985 to 2005 was used.

**Pre-WTO Situation:** The welfare effects of 'price tax-cum-export tax' regime of pre-WTO period are represented in Figure 1, as follows.

**Fig. 1. Price Tax-cum-export Tax Regime during Pre-WTO 10 Years**



The associated welfare effects were captured using the following model.

$$\Delta PS = -(abef) = - \int_{P_d}^{P_{df}} S(P) dp \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

$$\Delta PS = +(acdf) = + \int_{P_d}^{P_{df}} S(P) dp \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

$$ET = (ghij) = (P_e - P_d)E_s \text{ (export supplies)} \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

$$NWG/C \text{ (net welfare gain or cost)} = \Delta PS + \Delta CS + ET \quad \dots \quad \dots \quad (4)$$

The model adopted following Basmati rice supply and demand functions from Zulfiqar (2008).

$$S_d = 676.9517 + 0.052582P_d \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

$$D_d = 840.7971 - 0.008451P_d \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

$$E_s = -163.845 + 0.061033P_d \quad \dots \quad \dots \quad \dots \quad \dots \quad (7)$$

$$E_d = 468.7365 - 0.23247P_e \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

$$= 1.360216 + 1.1063P_w \quad \dots \quad \dots \quad \dots \quad \dots \quad (9)$$

For arriving at free market price ( $P_{ef}$ ), export supply ( $E_s$ ) and export demand ( $E_d$ ) were equalised, as follows.

$$E_s = E_d \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (10a)$$

Since  $P_d/EXR = P_e$  or  $P_d = P_e * EXR$ , replacing  $P_d$  in above equation we obtained:

$$P_{ef} = \text{US\$}398.63 \text{ per M. ton} \quad \dots \quad \dots \quad \dots \quad \dots \quad (10b)$$

Putting values of  $P_{ef} = 398.63$  given in (10b) in  $E_d$  in Equation (8)

$$E_{df} = 468.7365 - 0.23247(P_e = 398.63) \quad \dots \quad \dots \quad \dots \quad \dots \quad (11a)$$

$$E_{df} = 575.85 \text{ M. tons} \quad \dots \quad \dots \quad \dots \quad \dots \quad (11b)$$

$$\text{Equating } E_{df} = E_{sf} \quad \dots \quad \dots \quad \dots \quad \dots \quad (12a)$$

$$P_{df} = \text{Pak Rs } 8846.24 \text{ per M. ton} \quad \dots \quad \dots \quad \dots \quad \dots \quad (12b)$$

After computing  $P_{ef}$  and  $P_{df}$  in Equations (10b) and (12b), the pre-WTO scenario's welfare effects specified in model (1) to (4) were estimated, as follows.

$$\Delta PS = - \left\{ \int_{P_d=8262}^{P_{df}=8846.24} (676.9517 + 0.052582P_d) dp \right\} \quad \dots \quad \dots \quad \dots \quad (13a)$$

$$= - \left\{ 676.9517P_d + \left( \frac{0.052582}{2} \right) P_d^2 \right\} \Bigg|_{8262}^{8846.24}$$

$$= - \left\{ \left[ 676.9517(8846.24) + \left( \frac{0.052582}{2} \right) (8846.24)^2 \right] - \right.$$

$$\left. \left[ 676.9517(8262.30) + \left( \frac{0.052582}{2} \right) (8262.30)^2 \right] \right\}$$

$$= - \text{Rs } 657953 \text{ thousand}$$

$$= - \text{Rs } 657.95 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad (13b)$$

$$\Delta CS = +(acdf) = \int_{P_d=8262.30}^{P_{df}=8846.24} (840.7971 - 0.008451P_d) dp \quad \dots \quad \dots \quad (14a)$$

= Rs 448759.20 thousand  
 = Rs 448.76 million ... .. (14b)

$ET = (ghij) = (P_e - P_d)E_s$  ... .. (15a)

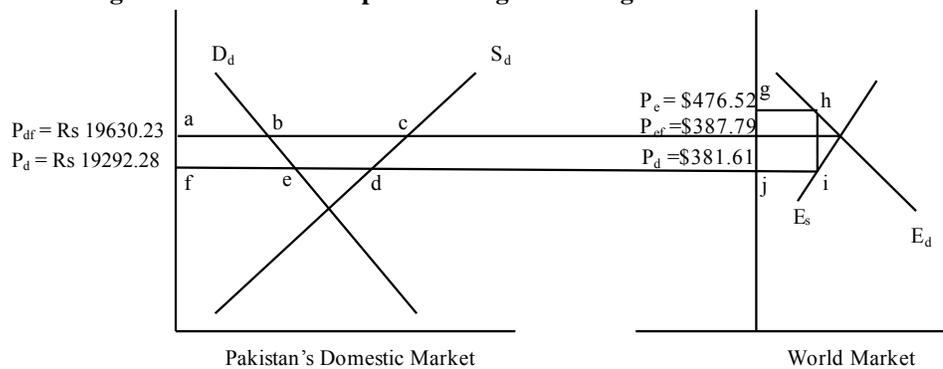
= US\$ 62555.42  
 = Rs 1403792 thousand  
 = Rs 1403.79 million ... .. (15b)

$NWG/C = \Delta PS + \Delta CS + ET$  ... .. (16a)

= Rs 1194598.00 thousand  
 = Rs 1194.60 million ... .. (16b)

**Post-WTO Situation:** Figure 2 given below best reflects the interventions made in Basmati rice economy during second part of the study period.

**Fig. 2. Price Tax-cum-export Tax Regime during Post-WTO 10 Years**



The following supply and demand functions adopted from Zulfiqar (2008) was used for the post-WTO period (1995-2005).

$S_d = 898.4736 + 0.052582P_d$  ... .. (17)

$D_d = 1437.392 - 0.008451P_d$  ... .. (18)

$E_s = -538.919 + 0.061033P_d$  ... .. (19)

$E_d = 749.3228 - 0.23247P_e$  ... .. (20)

=  $298.5887 + 1.1063P_w$  ... .. (21)

For estimation of free market price ( $P_{ef}$ )

$E_s = E_d$  ... .. (22a)

Since  $P_d/EXR = P_e$  or  $P_d = P_e * EXR$ , replacing  $P_d$  in above equation we get:

$P_{ef} = US\$387.79$  per M. ton ... .. (22b)

Putting values of  $P_{ef} = 387.79$  given in (22b) in  $E_d$  (20)

$E_{df} = 749.3228 - 0.23247(P_{ef} = 387.79)$  ... .. (23a)

$$E_{df} = 659.17 \text{ M. tons} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (23b)$$

$$\text{Equating } E_{df} = E_{sf} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (24a)$$

$$P_{df} = \text{Rs } 19630.23 \text{ per M. ton} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (24b)$$

For estimation of *NSWG/C* specified in model (1) to (4), we estimate various components of *NWG/C*, as follows.

$$\Delta PS = - \left\{ \int_{P_d=19292.28}^{P_{df}=19630.23} (898.4736 + 0.052582Pd) dp \right\} \quad \dots \quad \dots \quad \dots \quad (25a)$$

$$= - \text{Rs } 649480.00 \text{ thousand}$$

$$= - \text{Rs } 649.48 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (25b)$$

$$\Delta PS = - \left\{ \int_{P_d=19292.28}^{P_{df}=19630.23} (1437.392 - 0.008451Pd) dp \right\} \quad \dots \quad \dots \quad \dots \quad (26a)$$

$$= \text{Rs } 430193.50 \text{ thousand}$$

$$= \text{Rs } 430.19 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (26b)$$

$$ET = (ghij) = (P_e - P_d)E_s \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (27a)$$

$$= \text{US\$}60604.84$$

$$= \text{Rs } 3063899.00 \text{ thousand}$$

$$= \text{Rs } 3063.90 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (27b)$$

$$NWG/C = \Delta PS + \Delta CS + T \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (28a)$$

$$= \text{Rs } 2844612 \text{ thousand}$$

$$= \text{Rs } 2844.61 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (28b)$$

**Implications of WTO's Trade Liberalisation in Domestic Economy:** WTO's Agreements particularly agreement on Agriculture aims at steadily reducing 'domestic support', 'import tariffs' and 'export subsidies' and eliminate/abolish all such protection/support policies over a specified period ([www.wto.org](http://www.wto.org)). This means that WTO in general aims at introducing and implementing free trade. So, if no government interventions were existed, free trade price  $P_{df} = \text{Rs } 8846.24$  would have prevailed instead of existing domestic price  $P_d = \text{Rs } 8262.30$  per metric ton during the pre-WTO period (Figure 1). The effects of implementation of free trade would have been as follows.

$$\Delta PS = \text{Rs } 657.95 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (29)$$

$$\Delta CS = - \text{Rs } 448.76 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (30)$$

$$ET (\text{export tax}) = - \text{Rs } 1403.79 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (31)$$

$$NWG/C = - \text{Rs } 1194.60 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (32)$$

Similarly, welfare effects of free-trade scenario for post-WTO period would have been, as follows.

$$\Delta PS = \text{Rs } 649.48 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (33)$$

$$\Delta CS = - \text{Rs } 430.19 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (34)$$

$$ET = -\text{Rs } 3063.90 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (35)$$

$$NSWG/C = -\text{Rs } 2844.61 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (36)$$

### Implementation of WTO Trade Liberalisation in International Markets:

Certain empirical studies have suggested that implementation of Agreement on Agriculture and other WTO agreements would raise world prices. FAO (2005) and Akhtar (1999) have found that impacts of trade liberalisation on world commodity prices would be positive. Another study by Anderson, Martin and Mensbrugghe (2006) found that a move to free trade would increase farm employment, the real value of agricultural output and exports, real returns to farm land and unskilled labour, and real net farm incomes in developing countries. In want of exact estimates, an assumption a 5 percent rise in world prices ( $P_w$ ) was made and examined its effects on Pakistan's domestic economy.

### Pre-WTO Scenario

Using Equation (9) and putting 5 percent-enhanced value of  $P_w$ , that is,  $1.05P_w$

$$E_d = 1.360216 + 1.1063(P_w = 355.6407) \quad \dots \quad \dots \quad \dots \quad \dots \quad (37a)$$

$$= 394.805 \text{ thousand M. tons} \quad \dots \quad \dots \quad \dots \quad \dots \quad (37b)$$

Equating  $E_d = 394.805$  with  $E_s$  given in (7) and solving for  $P_d$

$$E_d = E_s \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (38a)$$

$$394.81 = -163.845 + 0.061033P_d$$

$$P_d = 9153.253 \text{ Rs per M. ton} \quad \dots \quad \dots \quad \dots \quad \dots \quad (38b)$$

Substituting  $P_d = 9153.253$  in (5 and 6) and solving for  $S_d$  and  $D_d$

$$S_d = 676.9517 + 0.052582P_d \quad \dots \quad \dots \quad \dots \quad \dots \quad (39a)$$

$$= 1158.25 \text{ thousand M. tons} \quad \dots \quad \dots \quad \dots \quad \dots \quad (39b)$$

$$D_d = 840.7971 - 0.008451P_d \quad \dots \quad \dots \quad \dots \quad \dots \quad (40a)$$

$$= 763.44 \text{ thousand M. tons} \quad \dots \quad \dots \quad \dots \quad \dots \quad (40b)$$

### Welfare Effects

Welfare effects of the changes in Pakistan's Basmati rice domestic price from the existing level of  $P_{d0} = \text{Rs } 8262.30$  due to new level of  $P_{df} = \text{Rs } 9153.252$  are measured in terms of changes in producers and consumers surpluses ( $\Delta PS$  and  $\Delta CS$ ), using the following model.

$$\Delta PS = \int_{P_{d0}}^{P_{df}} S(P) dp \quad \dots \quad \dots \quad \dots \quad \dots \quad (41a)$$

$$= \int_{P_{d0}=8262.30}^{P_{df}=9153.253} (676.9517 + 0.052582) dp$$

$$= \text{Rs } 1011.08 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad (41b)$$

$$\Delta CS = -\int_{P_{do}=8262.30}^{P_{df}=9153.253} (840.7971 - 0.008451) dp \quad \dots \quad \dots \quad \dots \quad (42a)$$

$$= -\text{Rs } 683.55 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (42b)$$

$$NWG/C = \Delta PS + \Delta PS \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (43a)$$

$$= 1011.08 - 683.55$$

$$= \text{Rs } 327.53 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (43b)$$

**Post-WTO Scenario:** In the foregoing fashion, 5 percent-enhanced world price  $P_w$  would cause domestic price to rise from the existing level of  $P_{d0} = \text{Rs } 19292.28$  to new level of  $P_{df} = \text{Rs } 19950.35$  and the associated welfare effects would be measured as:

$$\Delta PS = \int_{P_{do}}^{P_{df}} S(P) dp \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (44a)$$

$$= \int_{P_{do}=19292.28}^{P_{df}=19950.35} ((898.4736 + 0.052582Pd) dp$$

$$= \text{Rs. } 1270.216 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (44b)$$

$$\Delta CS = -\int_{P_{do}=19292.28}^{P_{df}=19950.35} (1437.392 - 0.008451Pd) dp \quad \dots \quad \dots \quad \dots \quad \dots \quad (45a)$$

$$= -\text{Rs } 836.7886 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (45b)$$

$$NWG/C = \Delta PS + \Delta PS \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (46a)$$

$$= 1270.216 - 736.7886$$

$$= \text{Rs } 433.4274 \text{ million} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (46b)$$

### 3. RESULTS AND DISCUSSION

The domestic Basmati rice price (US\$368.18 per M.ton) was kept lower than the Pakistan average export price (US\$551.94 per M.ton). Thus producers suffered losses in their producer surpluses by Rs 657.95 million per year. The government collected Rs 1403.79 million per year as export tax during pre-WTO period. Although, consumers benefited by Rs 448.76 million per year in their consumer surpluses but losses to producers were greater than benefits to consumers. However, due to export tax earnings, overall benefit of Rs 1194.60 million per year was estimated for the society.

There has been an increase in domestic prices during post-WTO period (1995-2005) to (US\$381.61 per M.ton). But average export prices were (US\$476.52 per M.ton), that again resulted in losses to producers of Rs 649.48 million per year. The consumers' surplus stood at Rs 430.19 million per year while export tax collected was Rs 3063.90 million. Losses in Producers' surplus were larger than benefit to consumers' surplus but net welfare benefit was Rs 2844.61 million per year mainly due to export tax.

The interventions in Basmati rice economy resulted in net welfare gain in both, pre- and post-WTO periods due to export tax collection. Such a scenario obscured real welfare of producers and consumers. As export tax would minimise/abolish in free trade situation and producers and consumers' surpluses would remain for a comparative evaluation of welfare effects. Therefore, from trade liberalisation perspective, the study

reveals that losses to producers surplus had been greater than benefits in consumers' surplus due to government interventions and if trade liberalisation was introduced in the domestic economy, it would have incurred greater gains to Basmati rice producers than losses to consumers. The results show similar trend for international market i.e. trade liberalisation in world Basmati rice markets would have benefited Pakistan's economy by Rs 327.53 million and Rs 433.43 million per annum during pre- and post-WTO periods respectively.

#### **4. CONCLUSION AND RECOMMENDATIONS**

The foregoing results and discussions are concluded and recommendations thereof are as under.

- (1) It seems that government policy interventions in price regime have lowered during post-WTO period as compared to pre-WTO period. This is evident from relatively narrowing gaps between Pakistan's domestic price and export price of former period than that of pre-WTO period. The positive trend of narrowing gap between domestic and export (international) prices needs to be continued till international prices prevail at domestic level that will improve the profitability of producers.
- (2) The estimated welfare effects in terms of producers and consumers' surpluses revealed heavier losses than gains during both the periods but relatively lesser losses during post-WTO period. Trade liberalisation simulations for domestic economy revealed larger producers' gains relative to losses to consumers if trade was liberalised. Thus, Pakistan should continue implementing trade liberalisation in line with WTO regime.
- (3) Trade liberalisation simulations for world market also reflected higher gains to the domestic economy of Pakistan. Therefore efforts should be geared up for trade liberalisation on global basis.
- (4) Instead of coddling in State Trading Enterprises (STEs), the government should act as facilitator of trade as envisaged in the 'Green Box' of Agreement on Agriculture and other WTO agreements. It should concentrate on research, development and out-reach related investments for improvement in productivity and quality of Basmati rice.

Annex Table 1

*Pakistan's Basmati Rice Prices for 1985-05*  
(Prices per Million Ton)

| Year    | Pakistan's Domestic Wholesale Price |        | World Price<br>(US\$) | Pakistan's Export Price<br>(US\$) |
|---------|-------------------------------------|--------|-----------------------|-----------------------------------|
|         | Pak Rs                              | US\$   |                       |                                   |
| 1985-86 | 6300.75                             | 390.40 | 268.23                | 655.87                            |
| 1986-87 | 6625.75                             | 385.68 | 280.56                | 697.68                            |
| 1987-88 | 6843.75                             | 388.86 | 347.59                | 713.10                            |
| 1988-89 | 6625.25                             | 344.79 | 351.99                | 677.51                            |
| 1989-90 | 7326.00                             | 341.61 | 356.24                | 671.57                            |
| 1990-91 | 8314.50                             | 370.81 | 368.93                | 466.23                            |
| 1991-92 | 9338.25                             | 375.87 | 358.03                | 407.07                            |
| 1992-93 | 10323.00                            | 397.65 | 332.35                | 424.34                            |
| 1993-94 | 10650.50                            | 353.09 | 374.17                | 405.56                            |
| 1994-95 | 10275.25                            | 333.05 | 348.97                | 400.45                            |
| 1995-96 | 14316.75                            | 426.49 | 403.33                | 406.71                            |
| 1996-97 | 14729.25                            | 377.74 | 390.74                | 440.67                            |
| 1997-98 | 17683.25                            | 409.37 | 351.67                | 452.41                            |
| 1998-99 | 20570.75                            | 439.64 | 329.25                | 508.14                            |
| 1999-00 | 15902.00                            | 307.16 | 295.98                | 501.71                            |
| 2000-01 | 18140.25                            | 310.42 | 268.52                | 463.95                            |
| 2001-02 | 21000.50                            | 341.88 | 252.40                | 461.93                            |
| 2002-03 | 23327.75                            | 398.77 | 276.89                | 494.78                            |
| 2003-04 | 22636.25                            | 393.16 | 325.24                | 508.54                            |
| 2004-05 | 24616.00                            | 411.43 | 378.35                | 526.34                            |
| Average | 13777.29                            | 374.89 | 332.97                | 514.23                            |

Source: FAO (www.fao.org; Statistical databases).

*Agricultural Statistic of Pakistan* (Various Issues).

Annex Table 2

*Pakistan's Basmati Rice Domestic and Estimated Free Trade Prices for 1985-05*  
(Prices per Million Ton)

| Year    | Pakistan's Domestic Wholesale Price | Basmati Rice Estimated Free Export |
|---------|-------------------------------------|------------------------------------|
|         | (US\$)                              | Trade Price (US\$)                 |
| 1985-86 | 390.40                              | 441.09                             |
| 1986-87 | 385.68                              | 442.30                             |
| 1987-88 | 388.86                              | 446.55                             |
| 1988-89 | 344.79                              | 399.83                             |
| 1989-90 | 341.61                              | 391.38                             |
| 1990-91 | 370.81                              | 384.66                             |
| 1991-92 | 375.87                              | 380.02                             |
| 1992-93 | 397.65                              | 401.07                             |
| 1993-94 | 353.09                              | 358.97                             |
| 1994-95 | 333.05                              | 340.46                             |
| 1995-96 | 426.49                              | 424.48                             |
| 1996-97 | 377.74                              | 383.34                             |
| 1997-98 | 409.37                              | 412.86                             |
| 1998-99 | 439.64                              | 444.79                             |
| 1999-00 | 307.16                              | 320.49                             |
| 2000-01 | 310.42                              | 319.81                             |
| 2001-02 | 341.88                              | 348.89                             |
| 2002-03 | 398.77                              | 404.64                             |
| 2003-04 | 393.16                              | 400.32                             |
| 2004-05 | 411.43                              | 418.31                             |
| Average | 374.89                              | 393.21                             |

Source: *Agricultural Statistics of Pakistan* (Various Issues).

## REFERENCES

- Ackerman, K. Z. and P. M. Dixit (1999) An Introduction to State Trading in Agriculture. Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture. (Agricultural Economic Report No. 783).
- Ackerman, K. Z. and P. M. Dixit (1999) An Introduction to State Trading in Agriculture. Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture. (Agricultural Economic Report No. 783).
- Ahmad, B. and A. M. Chaudary (1987) Profitability of Pakistan's Agriculture. In B. A. Azhar (ed.) (1996) *Pakistan Agricultural Economics—A Book of Readings*. Islamabad: National Book Foundation.
- Ahmad, B. and A. M. Chaudhry (1987) Profitability of Pakistan's Agriculture. In B. A. Azhar (ed.) (1996) *Pakistan Agricultural Economics—A Book of Readings*. Islamabad: National Book Foundation.
- Akhtar, M. R. (1999) Effects of Trade Liberalisation on Agriculture in Pakistan: Commodity Aspects. The Regional Coordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre), Bogor Indonesia. (Working Paper 44).
- Anderson, K., W. Martin, and D. V. D. Mensbrugghe (2006) Incidence of Trade and Subsidies Policies on Developing Countries Welfare, Export and Debt Sustainability. The World Bank, Washington, DC.
- Arifullah, S. (2007) Pakistan's Crop Sector: An Economic Analysis. PhD Thesis, Department of Agricultural Economics, NWFP Agricultural University Peshawar, Pakistan.
- Ashfaq, M., G. Griffith, and K. Parton (2001) Welfare Effects of Government Interventions in the Wheat Economy of Pakistan. Agricultural Prices Commission *Pakistan Journal of Agricultural Economics* 4:1, 25–33.
- Chishti, A. F. (1994) An Evaluation of Pakistan's Rice Trade Policy: A Case Study of Basmati Rice. PhD Thesis, University of Illinois at Urbana-Champaign, USA.
- Cornelisse, P. and B. Kuijpers (1987) A Policy Model of the Wheat and Rice Economy of Pakistan. *The Pakistan Development Review* 25:4, 365–399.
- FAO (2005) The State of Food and Agriculture: Agricultural Trade and Poverty. Food and Agriculture Organisation of the United Nations, Rome. (FAO Agriculture Series No. 36).
- Hamid, *et al.* (1987) The Wheat Economy of Pakistan: Setting and Prospects. USAID/International Food Policy Research Institute, Washington, DC. (Mimeographed).
- Hamid, *et al.* (1987) The Wheat Economy of Pakistan: Setting and Prospects (Mimgraphed). USAID/International Food Policy Research Institute, Washington, DC.
- Pakistan, Government of (2008) *Economic Survey of Pakistan*. Islamabad: Ministry of Finance, Economic Adviser's Wing, Finance Division.
- Pakistan, Government of (Various Issues) *Agricultural Statistics of Pakistan*. Islamabad: Ministry of Food, Agriculture and Livestock.
- Scott, W. E., A. K. Siddiqi, S. A. William, and M. I. Muhammad (1990) Export Restrictions—A Study of Restrictions on Agricultural Exports in Pakistan. Ministry

of Food, Agriculture and Cooperatives, and United States Agency for International Development. Islamabad. (Special Report No. 17).

Trading Corporation of Pakistan (2006) *38th Annual Report 2004-05*. Available at: [www.pakistan.gov.pk](http://www.pakistan.gov.pk).

Zulfiqar, M. (2008) WTO's Trade Liberalisation: Implications for Pakistan's Crop Sector. PhD Thesis submitted to Department of Agricultural Economics, NWFP Agricultural University Peshawar.

## Competitiveness among Asian Exporters in the World Rice Market

MUHAMMAD ILYAS, TAHIR MUKHTAR, and MUHAMMAD TARIQ JAVED

### I. INTRODUCTION

The era of globalisation since the late 1940s has dramatically changed the world's trading patterns, as well as the measures employed by countries to survive in a world where trade is being liberalised. With the gradual reduction in trade barriers led by the process of globalisation, more emphasis is now being placed on promoting export competitiveness. Competitiveness by any means is not a new issue, as it seems nowadays. This concept has become more fashionable because the markets liberalisation and the emphasis in a more global economy. Competition used to be more localised within regions and nations but now, with an increasing international trade, it applies everywhere. Competitors are not fully identified as they used to be and now they might come from far away places, which it was not the case previously.

Competitiveness is an indicator of the ability to supply goods and services at the location and in the form and at the time sought after by buyers, at prices that are as good as or better than those of potential suppliers, while earning at least the opportunity cost of returns on resources employed [Frohberg and Hartman (1997)]. Thus, a competitive firm or industry or country have the ability to satisfy the consumer with a product of the right price, right quality, right packaging etc. i.e., creating place, time and form utility. Such an institution therefore beats the competitors for the scarce Dollars and Pounds etc. of the consumer [Esterhuizen, *et al.* (2001)].

Asia is the home of many of the world's top rice exporters, which accounts for 76 percent of rice exported each year. Prices are shooting up worldwide, in part because many of these countries have cut back on exports due to fears of shortage. International trade in rice is quite small relative to total production. In fact, only 6-7 percent of global rice production is traded each year, well below the trade shares for other grains and oilseeds. The reason for these market characteristics could be explained by several factors. Firstly, rice is largely produced in Asian countries, where rice is traditionally the major food source for nutrition. Secondly, besides being a major producing region, Asian countries are major importers of rice. Because of national security concerns, rice production and trade are highly protected and sensitive. The world rice market is much more conservative than other agricultural commodities, which restricts its development.

Muhammad Ilyas is PhD Scholar at the Department of Economics, Quaid-i-Azam University, Islamabad. Tahir Mukhtar is Assistant Professor at the Department of Economics, Fatima Jinnah Women University, Rawalpindi. Muhammad Tariq Javed <tj@qau.pk> is Associate Professor at the Department of Economics, Quaid-i-Azam University, Islamabad.

China is the world's largest producer and the largest consumer of rice. Thailand is the largest exporter of rice and Philippines is the largest importer of rice in the world. There exists a high degree of volatility in the world rice market because a small change in production or consumption brings a relatively large change in its total trade. Since most of the rice is produced, consumed and traded by Asian countries and main Asian exporters are Thailand, Vietnam, India, Pakistan and China. Now, the international trade under World Trade Organisation (WTO) rules is free from quantitative restrictions. A country's trade is mostly based on its comparative advantage and competitive advantage in international trade. So, obviously every country faces a tough competition in international market and tries not only to maintain but also to increase its share in market.

The objective of this study is to analyse the competitiveness by computing comparative advantage and competitive advantage for main Asian rice exporting countries and rank them according to their degree of advantage. This study thus will be helpful for trade policy managers to design efficient strategies.

Rest of the study is organised as follows. Section II presents the literature review. Section III explains methods for analysing export performance. Section IV contains analysis and discussion of the results. Final Section V concludes the study.

## II. REVIEW OF LITERATURE

The Ricardian (classical) theory of comparative advantage and Heckscher-Ohlin (neo-classical) theory explains international trade within a two-country and two-commodity world. This simple analysis becomes very difficult and even impossible when trade takes place among many countries and many commodities. To overcome this restriction Balassa (1965, 1977) developed an index of "Revealed Comparative Advantage". Jebuni, *et al.* (1988) have used the Balassa Revealed Comparative Advantage (RCA) index to analyse the comparative advantage in exports for twelve less developed countries. Yeats (1997) studies the possible distortions in trade patterns on account of discriminatory trade barriers that are characteristic of the regional trade agreements (RTAs). He uses the index of revealed comparative advantage in conjunction with the changes in the regional orientation of exports to identify any apparent inefficiency in trade patterns for the Mercusor group of countries. Richardson and Zhang (1999) have applied the same index for the U.S. to analyse the patterns of variation across time, sectors and regions. They find the patterns to differ across different parts of the world, over time as also for different levels of aggregation of the export data. Yue (2001) uses the Balassa RCA index to demonstrate the fact that China has changed its export pattern to coincide with its comparative advantage and that there are distinct differences in export patterns between the coastal regions and the interiors in China. Ferto and Hubbard (2003) investigate the competitiveness of Hungarian agriculture in relation to that of the EU employing four indices of revealed comparative advantage including the Balassa RCA index, for the period 1992 to 1998. Consistency tests implies that the indices are less satisfactory as cardinal measures, but are useful in identifying whether or not Hungary has a comparative advantage in a particular product group. Using both a version of the Balassa index and an export similarity index, Batra and Zeba (2005) have analysed revealed comparative advantage at both the two and six digit level of Harmonized System of classification for both India and China. Their analysis reveals that

the pattern of comparative advantage varies at different levels of commodity disaggregation. Brunner and Massimiliano (2006) employ an export unit values (UV's) cum real competitiveness analysis to the manufacturing sector of South Asian countries (with a particular focus on India).

Vollrath (1987) is among the earliest researchers to distinguish between comparative advantage and competitive advantage. He argues that comparative advantage is applied to efficient, well functioning and undistorted prices in markets. In case, if distortions exist competitive advantage is considered better to use. Vollrath (1987, 1991) and White (1987) are of the view that true measure of performance in global markets is competitive advantage rather than comparative advantage. Vollrath (1987, 1991) has introduced revealed competitive index that takes into account a country's exports as well as imports relative to the rest of world's export and import of a particular commodity under neo-classical framework. White (1987) has used revealed competitive advantage to measure changes in competitiveness of US agricultural trade. His method is an extension of Balassa's method and in nature similar to Vollrath's revealed competitive index. Revealed competitive advantage measure has also been used in some other empirical studies to measure economic and export performance [see, Chen (1995); Bender and Li (2002) and Ferto and Hubbard (2003)].

But, the debate for finding an appropriate method with proven properties to measure comparative advantage of the commodity patterns across countries is still continued in the literature [Elumalai (2007)]. However, this study applies both the Balassa index for revealed comparative advantage and the White index for revealed competitive advantage to analyse the export performance of major rice exporting Asian countries.

### III. METHOD OF ANALYSIS

Economic approaches to assess competitiveness differ greatly, and depend on analysis related to level of firms, sectors and overall economy [Frohberg and Hartmann (1997)]. Approaches analysing the sector level consider competitiveness to be the ability of an industry to maintain market share, and to compete with foreign counterparts in foreign and domestic markets under free trade conditions [Kim and Marion (1997); Traill (1998)]. As theoretical reference, competitiveness is mainly linked to comparative advantage, which is connected to the Heckscher-Ohlin theory, and to competitive advantage related to the Porter diamond model [Lall (2001)]. An analysis of competitiveness at the sector level is usually carried out by assessing trade indices, comparing trends and countries in the international market. In our analysis, we have considered Revealed Comparative Advantage and Revealed Competitive Advantage indices.

#### III.1. The Balassa Index

Balassa (1965) has developed "Revealed Comparative Advantage" index that deals with many countries and many commodities. He states that export ratio of a country reflects the relative comparative advantage i.e.,

$$R_{ij} = \frac{X_{ij} / X_{wj}}{X_i / X_w} \quad i = 1, 2, \dots, n, \quad j = 1, 2, \dots, m$$

where  $R_{ij}$  is revealed comparative advantage of country  $i$  for commodity  $j$ ,  $X_{ij}$  is export by country  $i$  of commodity  $j$ ,  $X_{wj}$  is total world exports of commodity  $j$ ,  $X_i$  is total world exports of country  $i$ , and  $X_w$  is total world exports. The value of  $R_{ij}$  may be equal, greater or less than 1. If it is greater than one it means the country  $i$  has a comparative advantage in exports of commodity  $j$  because its market share is larger in the commodity than its share in total exports and vice versa.

### III.2. The White's Index

This method is an extension of Balassa's method. It takes into account the export supply and import demand of a specific commodity for a country. Its advantage is that it uses both export and import data and competitive advantage is determined by both supply and demand. The revealed competitive advantage is calculated as the difference between revealed comparative export share for commodity  $j$  and revealed comparative import share for commodity  $j$ . Therefore the White's index provides the results of net comparative advantage (unlike Balassa's approach which only takes into the account of exports). The index is calculated as:

$$RCA_{ij} = RCS_{ij} - RCD_{ij}$$

$$RCA_{ij} = \frac{X_{ij} / X_{wj}}{X_i / X_w} - \frac{M_{ij} / M_{wj}}{M_i / M_w}$$

Where  $RCA_{ij}$  is revealed competitive advantage of country  $i$  for commodity  $j$ ,  $RCS_{ij}$  is the ratio of country  $i$ 's share of commodity  $j$  to its share in total world exports,  $RCD_{ij}$  is the ratio of country  $i$ 's share of commodity  $j$  to its share in total world imports,  $M_{ij}$  is import of commodity  $j$  by country  $i$ ,  $M_{wj}$  is total world imports of commodity  $j$ ,  $M_i$  is total world imports of country  $i$ ,  $M_w$  is total world imports.

If  $RCA_{ij} > 0$  and  $R_{ij} > 1$ , then the results of both the models are identical and will show that the country has an advantage in exports of commodity  $j$  and vice versa. However, if the signs are not the same then one may conclude that both models are inconsistent. The study has used data for the period 1985 to 2005 that have been collected from FAO, Trade Year book for the years 1985-2005.

The revealed comparative advantage and revealed competitive advantage indices are useful in examining international trade performance. In some cases they yield same results, so revealed comparative index may easily be applied. If they yield contradictory results it is more appropriate to apply competitive advantage index because it also takes into account import performance.

## IV. RESULTS AND DISCUSSION

The overview of data shows that Thailand (in Asian countries) has the largest exporter with 29.57 percent market share in world rice market, whereas, India remained the second largest exporter with 17.96 percent share in rice exports in 2005 (see Table 1 in the Appendix). Despite the fact that these two countries are exporting rice in large

volume with more than 40 percent share collectively in recent years, it does not mean that they have more comparative advantage and competitive advantage in rice exports over other exporters.

Since greater share is not a sign of comparative or competitive advantage over other competitors. To analyse the “competitiveness” of a country, the models of comparative advantage and competitive advantage have been applied to data. Keeping in view the fact that rice is an agricultural product; the revealed comparative advantage has been computed using agricultural trade measure (ACA). Since rice is also a product included in total merchandise exports, the revealed comparative advantage has also been computed using total merchandise trade measure (TCA).

The revealed competitive advantage has also been computed using agricultural trade measure (ACE) and total merchandise trade measure (TCE). The overall results show that for most of the years the value of revealed comparative advantage is greater than one (see Tables 2 and 3 respectively in the Appendix) and the value of revealed competitive advantage is positive (see Tables 4 and 5 respectively in the Appendix). It depicts that these countries have both comparative and competitive advantage in rice trade.

The values of mean and variance computed explain the fact that Pakistan has the greatest comparative advantage and the greatest competitive advantage in agricultural trade. Vietnam has the greatest comparative advantage and the greatest competitive advantage in merchandise exports, yet its values are relatively close to those of Pakistan. Thailand ranks third and India fourth, whereas, China is at the last of the ranking with least advantage. However, a *t*-test has also been applied to check whether the results of two models are statistically same or not.

#### IV.1. Test of Comparative and Competitive Advantage Models

The *t*-test has been applied on the mean of the difference between ACA and ACE (TCA and TCE) to determine if this difference is significantly different from zero or not. So, our null hypothesis is that the difference between comparative and competitive advantage is not different from zero.

$$H_0^a : ACA_i - ACE_i = 0$$

$$H_0^b : TCA_i - TCE_i = 0$$

The alternative hypothesis is

$$H_1^a : ACA_i - ACE_i \neq 0$$

$$H_1^b : TCA_i - TCE_i \neq 0$$

Where  $i, \dots, 5$  (1= China, 2 = India, 3=Pakistan, 4=Thailand and 5= Vietnam)

The statistical test results in Table 1 depict that the mean and standard error are not equal to zero for all countries and *t*-ratios are also statistically significant at 5 percent for China, India, Pakistan and Vietnam. So, we accept alternative hypothesis. We accept null hypothesis, as *t*-ratio is statistically not significant at 5 percent for Thailand. This means

Table 1

*Statistics on Differences between Comparative and Competitive Advantage for  
Major Asian Rice Exporters (1985-2005)*

| Country  | Agricultural Product Trade |                |         |                 | Total Merchandise Trade |                |         |                 |
|----------|----------------------------|----------------|---------|-----------------|-------------------------|----------------|---------|-----------------|
|          | Mean                       | Standard Error | t-ratio | Sig. (2-tailed) | Mean                    | Standard Error | t-ratio | Sig. (2-tailed) |
| China    | .609                       | .083           | 7.332*  | .000            | .464                    | .081           | 5.720*  | .000            |
| India    | 1.121                      | .505           | 2.221*  | .038            | .720                    | .328           | 2.192*  | .040            |
| Pakistan | .040                       | .017           | 2.397*  | .026            | .099                    | .036           | 2.715*  | .013            |
| Thailand | .021                       | .011           | 1.839   | .081            | .013                    | .007           | 1.822   | .083            |
| Vietnam  | 5.144                      | 2.324          | 2.213*  | .039            | 4.914                   | 2.263          | 2.171*  | .042            |

\* Indicates significance at 5 percent level.

that revealed comparative and revealed competitive advantage do not yield similar results for all countries except Thailand. Thus, it is more appropriate to use competitive advantage where results differ because competitive advantage also takes import performance into account.

#### IV.2. Test of Country-to-Country Comparisons

This test determines whether the  $t$ -ratio of the difference of same model for one country is significantly different from another country or not. The  $t$ -test has been applied on the mean of the difference between  $ACA_i$  &  $ACA_j$ ,  $ACE_i$  &  $ACE_j$ ,  $TCA_i$  &  $TCA_j$  and  $TCE_i$  &  $TCE_j$  to determine if this difference is significantly different from zero or not. So, our null hypothesis is that difference between any pair of country is not different from zero.

$$H_0^a : ACA_i - ACA_j = \Delta ACA = 0$$

$$H_0^b : ACE_i - ACE_j = \Delta ACE = 0$$

$$H_0^c : TCA_i - TCA_j = \Delta TCA = 0$$

$$H_0^d : TCE_i - TCE_j = \Delta TCE = 0$$

The alternative hypothesis is that difference between any pair of country is statistically different from zero.

$$H_1^a : ACA_i - ACA_j = \Delta ACA \neq 0$$

$$H_1^b : ACE_i - ACE_j = \Delta ACE \neq 0$$

$$H_1^c : TCA_i - TCA_j = \Delta TCA \neq 0$$

$$H_1^d : TCE_i - TCE_j = \Delta TCE \neq 0 \quad i = 1, \dots, 5 \quad \& \quad j = 2, \dots, 5$$

We have calculated  $t$ -ratios for each pair of countries using ( $ACA$ ,  $ACE$ ,  $TCA$ ,  $TCE$ ) measures. We can see from the results provided in Table 2 that India has both comparative and competitive advantage over China in exports of rice during 1985-2005. Same results can also be seen for Pakistan, Thailand and Vietnam when we compare them with China. India does not possess any comparative and competitive advantage

Table 2

*Statistics (t-ratios) on Differences between Countries Comparative and Competitive Advantage for Major Asian Rice Exporters (1985-2005)*

| Country           | Agricultural Product Trade |                 |          |                 | Total Merchandise Trade |                 |          |                 |
|-------------------|----------------------------|-----------------|----------|-----------------|-------------------------|-----------------|----------|-----------------|
|                   | ACA                        |                 | ACE      |                 | TCA                     |                 | TCE      |                 |
|                   | t-ratio                    | Sig. (2-tailed) | t-ratio  | Sig. (2-tailed) | t-ratio                 | Sig. (2-tailed) | t-ratio  | Sig. (2-tailed) |
| China-India       | -8.852*                    | .000            | -6.348*  | .000            | -10.158*                | .000            | -9.011*  | .000            |
| China-Pakistan    | -13.834*                   | .000            | -14.259* | .000            | -14.857*                | .000            | -15.032* | .000            |
| China-Thailand    | -31.005*                   | .000            | -29.946* | .000            | -9.852*                 | .000            | -9.916*  | .000            |
| China-Vietnam     | -7.674*                    | .000            | -3.094*  | .006            | -6.973*                 | .000            | -5.237*  | .000            |
| India- Pakistan   | -12.016*                   | .000            | -14.434* | .000            | -9.609*                 | .000            | -9.704*  | .000            |
| India- Thailand   | -5.485*                    | .000            | -4.956*  | .000            | -4.073*                 | .001            | -4.057*  | .001            |
| India-Vietnam     | -4.921*                    | .000            | -1.633   | .118            | -5.073*                 | .000            | -3.748*  | .001            |
| Pakistan-Thailand | 6.185*                     | .000            | 6.180*   | .000            | 3.908*                  | .001            | 3.902*   | .001            |
| Pakistan-Vietnam  | 2.342*                     | .030            | 2.635*   | .016            | -.547                   | .590            | -.050    | .960            |
| Thailand-Vietnam  | -2.071                     | .052            | -.020    | .984            | -2.225*                 | .038            | -1.412   | .173            |

\* Denotes significance at 5 percent level.

against Pakistan, Thailand. Vietnam has comparative advantage over India in rice exports. But in case of competitive advantage, Vietnam's advantage is only in merchandise exports and there is no significant difference in agricultural product exports between these two countries. Pakistan has both comparative and competitive advantage (in agricultural product trade and total merchandise trade) over Thailand in exports of rice. Pakistan has both comparative and competitive advantage in agricultural product trade over Vietnam but there are no significant differences of revealed comparative and competitive advantage in total merchandise trade. The paired comparison between Thailand and Vietnam depicts that Vietnam has only comparative advantage over Thailand in total merchandise trade otherwise There is no statistically significant difference between agricultural product trade and no competitive advantage on one another in total merchandise trade.

## V. CONCLUSION

From the analysis, we come to the conclusion that India, Pakistan, Thailand and Vietnam all have both comparative and competitive advantage over china in rice exports. There are no significant differences of revealed competitive advantage between Thailand and Vietnam or between India and Vietnam in agricultural product trade or Pakistan and Vietnam in total merchandise trade. Pakistan has a revealed comparative and competitive advantage in agricultural product trade (in rice) over all other countries and in total merchandise trade (in rice) over China, India and Thailand. Although Thailand and India are the two largest Asian exporters of rice with 47 percent of the market share in 2005, on average they do not have the greatest comparative and competitive advantage in rice exports. Pakistan has the greatest advantage in rice exports, Vietnam ranks second and Thailand ranks third in five major Asian exporters. Thus, we may conclude that both Pakistan and Vietnam can take the advantage of competitiveness and raise their share respectively in world rice market as compared with other Asian competitions. Therefore, competitive advantage in rice export should be exploited to improve the foreign sector position of both these countries.

As this study has shown that Pakistan has a quite strong position in rice trade *vis-à-vis* its Asian competitors, therefore, to further enhance the overall gain through increase in rice exports, following comprehensive measures should be applied:

- Government agencies should be responsible for day-to-day administration of rice quality control in order to build up the trust and confidence of importers in the quality and safety of the food supply system.
- Government representatives and advisors should take part in identifying technical, institutional and policy constraints faced by the exporters in meeting sanitary and phytosanitary (SPS) requirements.
- Government should play its role in terms of funding new research and development activities, aimed at rice quality improvement and cost reduction.

### Appendices

Appendix Table 1

*Market Shares of Major Asian Exporters in International Rice Trade 1985-2005*

| Year | China | India | Pakistan | Thailand | Vietnam | Others |
|------|-------|-------|----------|----------|---------|--------|
| 1985 | 7.29  | 4.07  | 6.90     | 25.97    | 0.00    | 55.77  |
| 1986 | 6.80  | 3.02  | 10.99    | 24.79    | 0.02    | 54.38  |
| 1987 | 6.84  | 4.95  | 9.06     | 27.27    | 0.07    | 51.82  |
| 1988 | 5.03  | 5.64  | 9.00     | 33.79    | 0.55    | 45.99  |
| 1989 | 2.21  | 5.07  | 6.15     | 35.05    | 7.57    | 43.95  |
| 1990 | 2.37  | 5.95  | 5.84     | 26.23    | 7.36    | 52.26  |
| 1991 | 4.08  | 7.61  | 7.75     | 26.85    | 4.21    | 49.49  |
| 1992 | 4.36  | 6.95  | 7.73     | 26.72    | 7.83    | 46.42  |
| 1993 | 5.32  | 8.22  | 6.40     | 25.99    | 6.35    | 47.73  |
| 1994 | 8.85  | 6.28  | 4.01     | 25.88    | 6.21    | 48.77  |
| 1995 | 0.77  | 19.30 | 6.31     | 26.61    | 5.34    | 41.67  |
| 1996 | 1.80  | 11.68 | 6.76     | 26.30    | 9.86    | 43.60  |
| 1997 | 4.08  | 14.68 | 7.04     | 17.41    | 10.93   | 45.87  |
| 1998 | 9.79  | 15.76 | 5.94     | 21.94    | 10.66   | 35.91  |
| 1999 | 8.57  | 9.23  | 7.51     | 24.79    | 13.03   | 36.87  |
| 2000 | 8.95  | 10.15 | 8.26     | 25.36    | 10.33   | 36.96  |
| 2001 | 5.01  | 10.08 | 7.42     | 22.50    | 8.91    | 46.09  |
| 2002 | 5.78  | 17.87 | 6.79     | 24.05    | 10.69   | 34.82  |
| 2003 | 2.75  | 12.65 | 7.94     | 25.84    | 10.27   | 40.54  |
| 2004 | 2.28  | 18.22 | 7.88     | 29.79    | 11.96   | 29.87  |
| 2005 | 2.86  | 17.96 | 14.00    | 29.57    | 11.25   | 24.36  |

Source: FAO Trade Year Book.

Others: Remaining rice exporting countries in international market.

Appendix Table 2

*Revealed Comparative Advantage for Major Asian Rice Exporters  
Using Agricultural Trade Measure (ACA), 1985-2005*

| Year            | China       | India        | Pakistan     | Thailand     | Vietnam       |
|-----------------|-------------|--------------|--------------|--------------|---------------|
| 1985            | 2.36        | 3.75         | 20.53        | 16.91        | 0.02          |
| 1986            | 1.97        | 2.90         | 23.94        | 15.74        | 0.15          |
| 1987            | 1.90        | 5.21         | 24.58        | 17.35        | 0.81          |
| 1988            | 1.42        | 7.45         | 20.86        | 19.25        | 5.21          |
| 1989            | 0.65        | 5.75         | 12.45        | 17.57        | 31.88         |
| 1990            | 0.78        | 6.08         | 19.20        | 15.80        | 36.83         |
| 1991            | 1.15        | 8.21         | 24.67        | 15.01        | 24.35         |
| 1992            | 1.30        | 8.44         | 22.36        | 14.33        | 34.57         |
| 1993            | 1.48        | 8.30         | 24.92        | 14.71        | 29.37         |
| 1994            | 2.36        | 7.52         | 22.71        | 14.10        | 22.71         |
| 1995            | 0.24        | 15.54        | 27.42        | 13.04        | 15.34         |
| 1996            | 0.58        | 9.29         | 22.54        | 12.85        | 26.10         |
| 1997            | 1.37        | 12.90        | 38.03        | 14.67        | 29.18         |
| 1998            | 3.54        | 13.22        | 22.56        | 13.55        | 19.50         |
| 1999            | 3.04        | 8.31         | 26.42        | 14.48        | 22.17         |
| 2000            | 2.82        | 8.45         | 31.83        | 14.37        | 18.53         |
| 2001            | 1.60        | 7.97         | 30.13        | 12.54        | 18.20         |
| 2002            | 1.77        | 14.32        | 30.35        | 13.03        | 22.36         |
| 2003            | 0.85        | 10.16        | 33.59        | 13.03        | 24.05         |
| 2004            | 0.85        | 15.47        | 37.48        | 14.99        | 22.30         |
| 2005            | 0.94        | 12.58        | 51.51        | 15.36        | 18.67         |
| <b>Mean</b>     | <b>1.57</b> | <b>9.13</b>  | <b>27.05</b> | <b>14.89</b> | <b>20.11</b>  |
| <b>Variance</b> | <b>0.76</b> | <b>13.30</b> | <b>68.85</b> | <b>3.07</b>  | <b>115.66</b> |

Appendix Table 3

*Revealed Comparative Advantage for Major Asian Rice Exporters  
using Total Merchandise Trade Measure (TCA), 1985-2005*

| Year            | China       | India        | Pakistan      | Thailand      | Vietnam        |
|-----------------|-------------|--------------|---------------|---------------|----------------|
| 1985            | 2.44        | 8.82         | 52.73         | 70.83         | 0.04           |
| 1986            | 1.98        | 6.91         | 74.99         | 59.51         | 0.42           |
| 1987            | 1.83        | 10.23        | 59.98         | 52.42         | 2.08           |
| 1988            | 1.33        | 11.55        | 56.88         | 60.67         | 15.27          |
| 1989            | 0.57        | 9.41         | 40.02         | 53.87         | 119.89         |
| 1990            | 0.64        | 11.37        | 40.14         | 39.74         | 116.93         |
| 1991            | 0.97        | 14.85        | 43.88         | 33.26         | 75.32          |
| 1992            | 0.98        | 12.78        | 42.20         | 30.88         | 113.81         |
| 1993            | 1.13        | 13.80        | 34.54         | 26.37         | 79.71          |
| 1994            | 1.77        | 10.14        | 24.88         | 24.46         | 65.50          |
| 1995            | 0.15        | 29.91        | 40.61         | 24.08         | 50.08          |
| 1996            | 0.36        | 18.92        | 43.37         | 25.18         | 72.46          |
| 1997            | 0.74        | 23.59        | 47.90         | 16.63         | 67.99          |
| 1998            | 1.82        | 25.45        | 38.67         | 21.84         | 62.30          |
| 1999            | 1.54        | 14.12        | 53.53         | 24.01         | 63.99          |
| 2000            | 1.44        | 14.29        | 58.35         | 23.82         | 45.52          |
| 2001            | 0.79        | 13.94        | 49.26         | 21.82         | 36.32          |
| 2002            | 0.82        | 21.47        | 44.06         | 23.14         | 41.20          |
| 2003            | 0.35        | 16.59        | 49.68         | 24.60         | 38.02          |
| 2004            | 0.34        | 22.60        | 52.43         | 27.62         | 52.78          |
| 2005            | 0.41        | 24.11        | 96.75         | 29.59         | 38.46          |
| <b>Mean</b>     | <b>1.07</b> | <b>15.95</b> | <b>49.76</b>  | <b>34.02</b>  | <b>55.15</b>   |
| <b>Variance</b> | <b>0.42</b> | <b>40.11</b> | <b>225.86</b> | <b>244.45</b> | <b>1242.22</b> |

Appendix Table 4

*Revealed Competitive Advantage for Major Asian Rice Exporters  
Using Trade Agricultural Measure (ACE), 1985-2005*

| Year            | China       | India        | Pakistan     | Thailand     | Vietnam       |
|-----------------|-------------|--------------|--------------|--------------|---------------|
| 1985            | 1.89        | 3.17         | 20.53        | 16.91        | -33.33        |
| 1986            | 1.32        | 2.51         | 23.94        | 15.74        | -27.36        |
| 1987            | 1.02        | 5.06         | 24.57        | 17.35        | -25.90        |
| 1988            | 0.83        | 1.77         | 20.84        | 19.25        | -10.18        |
| 1989            | -1.07       | -2.58        | 12.44        | 17.57        | 30.15         |
| 1990            | 0.68        | 0.80         | 19.20        | 15.80        | 35.35         |
| 1991            | 0.85        | 7.79         | 24.66        | 15.01        | 23.72         |
| 1992            | 1.03        | 7.08         | 22.36        | 14.33        | 34.40         |
| 1993            | 1.20        | 7.21         | 24.92        | 14.71        | 29.36         |
| 1994            | 1.70        | 7.45         | 22.54        | 14.10        | 22.60         |
| 1995            | -1.15       | 15.54        | 27.42        | 13.04        | 15.13         |
| 1996            | -0.32       | 9.29         | 22.52        | 12.85        | 26.02         |
| 1997            | 0.84        | 12.90        | 38.03        | 14.67        | 29.15         |
| 1998            | 3.10        | 13.21        | 22.55        | 13.54        | 19.49         |
| 1999            | 2.75        | 8.22         | 26.40        | 14.46        | 22.10         |
| 2000            | 2.37        | 8.37         | 31.82        | 14.36        | 18.46         |
| 2001            | 1.18        | 7.97         | 30.05        | 12.54        | 18.17         |
| 2002            | 1.31        | 14.31        | 30.26        | 13.02        | 22.09         |
| 2003            | 0.40        | 10.16        | 33.53        | 12.98        | 24.02         |
| 2004            | 0.85        | 15.47        | 37.48        | 14.99        | 22.30         |
| 2005            | 0.94        | 12.58        | 51.51        | 15.36        | 18.67         |
| <b>Mean</b>     | <b>0.96</b> | <b>8.01</b>  | <b>27.01</b> | <b>14.87</b> | <b>14.97</b>  |
| <b>Variance</b> | <b>1.18</b> | <b>24.88</b> | <b>68.12</b> | <b>3.08</b>  | <b>420.41</b> |

Appendix Table 5

*Revealed Competitive Advantage for Major Asian Rice Exporters using  
Total Merchandise Trade Measure (TCE), 1985-2005*

| Year            | China       | India        | Pakistan      | Thailand      | Vietnam        |
|-----------------|-------------|--------------|---------------|---------------|----------------|
| 1985            | 2.13        | 8.30         | 52.73         | 70.83         | -29.01         |
| 1986            | 1.52        | 6.61         | 74.98         | 59.51         | -30.25         |
| 1987            | 1.06        | 10.09        | 59.96         | 52.42         | -24.58         |
| 1988            | 0.83        | 6.58         | 56.84         | 60.67         | 2.64           |
| 1989            | -1.06       | 4.62         | 40.00         | 53.87         | 118.58         |
| 1990            | 0.55        | 8.68         | 40.14         | 39.74         | 116.04         |
| 1991            | 0.74        | 14.67        | 43.88         | 33.26         | 74.78          |
| 1992            | 0.81        | 12.01        | 42.20         | 30.88         | 113.68         |
| 1993            | 0.99        | 13.28        | 34.53         | 26.37         | 79.66          |
| 1994            | 1.33        | 10.08        | 24.59         | 24.46         | 65.32          |
| 1995            | -1.05       | 29.91        | 40.60         | 24.08         | 49.82          |
| 1996            | -0.38       | 18.92        | 43.34         | 25.18         | 72.35          |
| 1997            | 0.34        | 23.59        | 47.89         | 16.63         | 67.95          |
| 1998            | 1.52        | 25.43        | 38.64         | 21.83         | 62.28          |
| 1999            | 1.36        | 14.03        | 53.48         | 24.00         | 63.90          |
| 2000            | 1.15        | 14.23        | 58.33         | 23.81         | 45.42          |
| 2001            | 0.51        | 13.94        | 48.93         | 21.82         | 36.28          |
| 2002            | 0.56        | 21.46        | 43.74         | 23.13         | 40.93          |
| 2003            | 0.08        | 16.58        | 49.42         | 24.57         | 37.99          |
| 2004            | 0.34        | 22.60        | 52.43         | 27.62         | 52.78          |
| 2005            | 0.41        | 24.11        | 96.75         | 29.59         | 38.46          |
| <b>Mean</b>     | <b>0.60</b> | <b>15.22</b> | <b>49.66</b>  | <b>34.00</b>  | <b>50.23</b>   |
| <b>Variance</b> | <b>0.69</b> | <b>50.05</b> | <b>223.89</b> | <b>244.63</b> | <b>1853.92</b> |

## REFERENCES

- Balassa, B. (1965) Trade Liberalisation and Revealed Comparative Advantage. *The Manchester School of Economics and Social Studies* 33, 99–117.
- Balassa, B. (1977) 'Revealed' Comparative Advantage Revisited: An Analysis of Relative Export Shares of the Industrial Countries 1953-1971. *The Manchester School of Economic and Social Studies* 45:4, 327–44.
- Batra, A. and Zeba Khan (2005) Revealed Comparative Advantage: An Analysis for India and China. Indian Council for Research on International Economic Relations. (Working Paper No. 168).
- Bender, S. and Kui-Wai Li (2002) The Changing Trade and Revealed Comparative Advantages of Asian and Latin American Manufacture Exports. Yale University, Economic Growth Centre. (Discussion Paper Series No. 843).
- Brunner, H. P. and C. Massimiliano (2006) The Dynamics of Manufacturing Competitiveness in South Asia: An Analysis through Export Data. *Journal of Asian Economics* 17 :4, 557–82.
- Chen, J. (1995) An Empirical Test of Competitiveness among Major Rice Exporting Countries. M Sc Dissertation, Michigan State University, USA.
- Elumalai, K. (2007) Measuring Comparative Advantage in Export of India's Dairy Products. *The Asian Economic Review* 49:3, 407–20.
- Esterhuizen, D., *et al.* (2001) How Competitive is the South African Agricultural Industry? Production, Processing and Inputs. A Report by the Agricultural Business Chamber, ABSA Chair in Agribusiness Management, University of Pretoria and the Agricultural Research Council, South Africa.
- Ferto, I. and I. J. Hubbard (2003) Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors. *World Economy* 26:2, 247–59.
- Frohberg, K. and M. Hartmann (1997) Comparing Measures of Competitiveness. Institute of Agricultural Development in Central and Eastern Europe, Halle, Germany. (Discussion Paper No. 2).
- Jebuni, C. D., *et al.* (1988) Market Structure and LDCs's Manufactured Export Performance. *World Development* 12:15, 11–20.
- Kim, D. and B. W. Marion (1997) Domestic Market Structure and Performance in Global Markets: Theory and Empirical Evidence from U.S. Food Manufacturing Industries. *Review of Industrial Organization* 12, 335–54.
- Lall, S. (2001) Competitiveness Indices and Developing Countries: An Economic Evaluation of the Global Competitiveness Report. *World Development* 29:9, 1501–25.
- Richardson, D. and Chi Zhang (1999) Revealing Comparative Advantage: Chaotic or Coherent Patterns Across Time and Sector and U.S. Trading Partner? National Bureau of Economic Research. (Working Paper 7212).
- Traill, B. (1998) Structural Changes in the European Food Industry: Consequences for Competitiveness. In W. B. and TraillIE Pitts (eds.) *Competitiveness in the Food Industry*. Blackie Academic & Professional (London), 35–57.
- Vollrath, T. L. (1987) Revealed Comparative Advantage for Wheat, U.S. Competitiveness in the World Wheat Market. Proceedings of a Research Conference. Washington, DC. USDA, ERS, International Economics Division.

- Vollrath, T. L. (1991) A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage. *Weltwirtschaftliches Archive* 130, 265–279.
- White, T. K. (1987) *Comparative Advantage, Competitive Advantage and U.S. Agricultural Trade*. USDA, ERS, International Economics Division. (Working Paper No.87-2).
- Yeats, A. J. (1997) Does Mercosur's Trade Performance Raise Concerns about the Effects of Regional Trade Arrangements. International Economics Department, The World Bank.
- Yue, Changjun (2001) Comparative Advantage, Exchange Rate and Exports in China. Paper Prepared for the International Conference on Chinese Economy, CERDI, France.

## Enhancing Livestock Productivity in the Desert Ecologies of Pakistan: Setting the Development Priorities

UMAR FAROOQ, MUNIR AHMAD, and IKRAM SAEED

### 1. INTRODUCTION

Livestock farming is practiced in all over Pakistan by millions of farming and landless households. The livestock sub-sector constitutes a more important source of food and means of sustenance in rainfed, mountainous and desert ecologies of Pakistan. Livestock farming is main agricultural activity in deserts because in these areas crop farming opportunities are relatively few due to very low rainfall, sandy soils and meagre availability of good quality ground water. This sector shares by 53.2 percent in the total agricultural value added and about 11.4 percent in national GDP [Pakistan (2010)]. Pakistan is situated in the neighborhood of world's largest milk producer (i.e. India) and herself is world's 4th largest milk producer. Livestock farming in Pakistan can broadly be classified into grazing and stall feeding based. The grazing based is the peculiarity of the mountainous, rainfed, saline affected and desert areas of Pakistan while stall-fed farming is mainly found in irrigated areas of Pakistan.

The total area of Pakistan is 79.6 million ha, of which 88 percent is arid to semi-arid. About 50.88 million ha (or 63.9 percent) are rangelands.<sup>1</sup> The ecologies of NWFP and Northern Areas are semi-arid to humid. The Sindh province is primarily arid while Punjab and Balochistan have arid-semiarid ratios as 58:29 and 43:57, respectively. By ecologies, 51.5 percent of total country area is arid, 36.9 percent is semi-arid, 5.4 percent is sub-humid and 6.2 percent is mixed. About 41 million ha is solely arid including about 11 million ha comprising deserts where mostly the climate is hyper-arid [PCRWR (1999); Iqbal, *et al.* (2000)]. The rangelands of Pakistan extends from alpine pastures in the northern mountains to temperate and Mediterranean ranges in the western mountains and arid/semi-arid deserts of the Indus Plain. Due to bio-climatic variations, the rangeland vegetation varies from one area to the other. Because of low prospects of crop

Umar Farooq <umar2parc@yahoo.com> is Chief Scientific Officer, Pakistan Agricultural Research Council, Islamabad. Munir Ahmad <camunir@yahoo.com> is Chief of Research at the Pakistan Institute of Development Economics, Islamabad. Ikram Saeed <ikram\_saeed@yahoo.com> is Principal Scientific Officer at the Pakistan Agricultural Research Council, Islamabad.

<sup>1</sup>Pakistan's rangelands are: Western Balochistan ranges (18.50 million ha), Central Balochistan ranges (8.00 million ha), Desert rangelands (7.97 million ha), Eastern Balochistan ranges (5.00 million ha), trans-Himalyan grazing lands (3.50 million ha), Kohistan ranges (2.38 million ha), Alpine pastures (1.68 million ha), Pothwar scrub ranges (1.68 million ha), Suleiman mountain ranges (1.50 million ha) and Himalayan forest grazing lands (0.67 million ha).

cultivation and availability of grazing vegetation, livestock farming is an important source of livelihood for the dwellers in rangelands, deserts and marginal lands. For instance, in Balochistan, livestock farming primarily depends upon rangelands. Sheep and goats obtain about 60 percent of their feed from rangeland vegetation [Zaffaruddin (1977)] while in Balochistan, 90 percent of the required livestock feed is provided by rangelands [FAO (1983)]. Most rangelands in Pakistan are over-exploited due to uncontrolled nomadic grazing, grazing places being common tribal (or village property), their carrying capacity<sup>2</sup> is declining because of little rehabilitation/regeneration efforts. On the other hand, rapidly increasing demands for livestock products further intensifying the already enormous triggered pressure on these rangelands [Pakistan (2007a)].

The sandy desert falling districts of Pakistan contain about 8.1 percent of buffalo, 13.5 percent of cattle, 15.3 percent of sheep and 14.4 percent of goat population in the country<sup>3</sup> [Pakistan (2007b)]. In a situation when the contribution of livestock sub-sector is more than half of the total agricultural GDP, whereas its only one product (i.e. milk) is worth more than the combined value of wheat and cotton. Moreover, this sector had never experienced a negative growth. It is not plausible to ignore desert economies possessing such a notable proportions of different livestock species.

The livestock farming in the desert economies also deserve special attention of researchers and policy makers on all types of poverty indicators (e.g. income, nutritional, access to research, extension, education and other institutional support etc.), and much lagging behind in the infrastructure development (roads, electricity, transport, means of communication etc.). Before taking any developmental initiative for the livestock sector, it is imperative to have some empirical information on the livestock farming in deserts of Pakistan. Generally, livestock farming in these areas is characterised as low paid because of poor animal health attributed to limited supply of forage and fodder, more physical exertion of animal during grazing, frequent incidence of diseases and droughts cycles, difficulties in getting health services and vaccination, highly limited milk marketing opportunities, non-existence of milk preservation facilities with the herders, and a generally poor institutional support. A highly limited literature was available on livestock farming in deserts of Pakistan till year 2000. In year 2000, a relatively detailed baseline survey was carried out in Cholistan desert of Punjab, but this information was limited to only one desert. Secondly, this study lacked information on various aspects like economic analysis of livestock farming, grazing and stall feeding patterns, feed composition during stall feeding and stall feeding expenditures for small and large ruminants, trading intensity of various age groups of different animal species, etc. This study fills such gaps and expands the scope of the work to other deserts namely Thal and Tharparkar. The major objectives of this exercise are: (a) to examine the similarities and differences in socio-economic characteristics, livestock composition, grazing and feeding systems and marketing aspects; (b) to carry out economic analysis of livestock farming in desert ecologies; (c) to review the socioeconomic, institutional and policy constraints faced by the livestock sector in the desert areas of Pakistan; and (d) to suggest guidelines for the

<sup>2</sup>Carrying capacity means the natural capacity of land and/or rangeland to feed human and/or animal population at given technological level [Tiffen and Mortimore (2002)].

<sup>3</sup>The district falling in sandy desert include Cholistan, Bahawalpur, Bhawalnagar and Rahim Yar Khan from Cholistan desert; Bhakkar, Layyah, Khushab from Thal desert; Tharparkar and Umerkot from Thar desert; and Chagai, Awaran and Kharan from Chagai-Kharan deserts.

development of the livestock farming in deserts of Pakistan. It is expected that the suggested recommendations shall positively contribute in increasing livestock productivity in the area along with contributing to poverty alleviation as in MDGs, we are committed to halve poverty incidence in the country by 2015.

The rest of the paper is organised in to five sections. Section 2 describes analytical techniques under the tile of research methodology. Section 3 named as results and discussion is devoted to discuss the research findings. Section 4 is pertained to conclusions and suggestions. The references quoted at various stages in the paper are detailed in fifth section.

## 2. RESEARCH METHODOLOGY

### Sampling Design and Survey Methods

Sampling is the first step towards empirical analysis after conceiving the problem, literature review and deciding about the study area. Before going for actual sampling, variations in the physical and socio-economic environment were considered. Since the livestock farming is spread over the desert, therefore, geographical area of the desert dominated tehsils/talukas were taken as the basis for research study sampling. The sample villages in these tehsils/talukas were selected after consulting the officials from the Livestock Department, Animal Husbandry Department, the Department of Agricultural Extension present in the area and the local NGOs.

Regarding the respondents selection, a true randomisation was not possible mainly because of lack of information about the number of livestock farming households. Even if such information were available, it was again difficult and costly to trace the selected farmers in deserts as they might have left for grazing, migrated to other places. Hence chance meeting method of respondent selection was adopted. Under this method, some resource person or *wadera* or old person from the villages/settlements was first contacted. The survey objectives were explained to him to win his confidence. Later on, based on the composition by herd size, livestock species and herder types, a request for the desired number of respondents was placed to him. This procedure greatly helped in drawing a representative sample of needed size.

Regarding sample composition, 122, 120 and 120 livestock farmers/herders data were gathered from Cholistan, Tharparkar and Thal deserts, respectively. In this way, the results discussed in subsequent section pertain to total sample of 362 livestock farmers. The primary level data were formally gathered through field surveys in the three deserts by using a pre-tested questionnaire. The survey teams were consisted of Economists, Agricultural Economists, Statistician, Agricultural Extensionists and Rural Sociologists. The surveys were cordially facilitated by the staff of the provincial animal Husbandry/Livestock and Dairy Development Department, the Department of Agricultural Extension and the local NGOs.

The data for these studies pertains to year 2000 for Cholistan, year 2006-07 for Thal and year 2007-08 for the Tharparkar desert.

## Analytical Procedures

### *Conversion Factors Used for Various Livestock Species*

Because of large variations in age, sex and type composition, the livestock were expressed in equivalent adult animal units for comparison purposes. The weights assigned to various livestock species by age and sex for computing adult livestock units were taken from Iqbal, *et al.* (2000).

### *Method of Scoring the Priority Orders/Objectives/Development Needs*

In the questionnaire, the respondents were asked to delineate and prioritise the objectives of keeping various types of animals in their herds. For instance, the feedback of the respondent farmers was recorded by using Likert scale.<sup>4</sup> For instance, the priority order was recorded as '0' if 'not important', '1' as 'least important', '2' as 'important', '3' as 'very important', '4' as 'highly important' and '5' if 'most important'. The recorded scores for each quarry type were transformed into percentages by using the following transformation.

$$W_i = \frac{X_i}{\sum_{i=1}^n X_i} \cdot 100 \quad \dots \quad (1)$$

where

- $W_i$  = Percent weight of the  $i$ th objective of keeping a specific type of animal.
- $X_i$  = Score of the  $i$ th objective of keeping a specific type of animal.
- $\sum X_i$  = Total sum of the scores of all included objectives of keeping that animal.
- $i = 1, 2, \dots, 5$  are the objectives of keeping a specific type of animal.

### *Livestock Breed Diversity*

From methodological perspective, breed diversity could be estimated using various diversity measuring index (e.g. Inverse Herfindahl Index, Simpsons Diversity Index etc.), but here for simplicity purposes, on the number of breeds of an animal species was utilised.

### *Livestock Trading Intensity*

The livestock trading intensity on sample farms was estimated as follows:

$$\text{Trading intensity} = ((\text{animals bought} + \text{animals sold})/\text{total population}) * 100$$

### *Economic Analysis of Livestock Farming*

Livestock farming in the deserts is consisted of grazing and stall feeding components. The grazing cost is estimated on the basis of number of animal heads a grazer can manage easily and the prevailing wages of grazers (in terms of monthly salary) during the survey period. For estimating inputs costs, the value of purchased items were directly considered

<sup>4</sup>In this study, the questions were recorded in the form of order of importance of suggestions, objectives and/or reasons of carrying out certain activity or degree of urgency of some developmental needs of the area. The scales used in the questionnaire were from 0 to 5 and 0 to 4.

on the cost side whereas the imputed costs/shadow prices were used for home-contributed items like family labour, grazing labour, self-grown feed items (dry fodders, grains etc.), domestically consumed milk and dairy products, interest on the capital invested, as these items are weakly marketed. For other cost items, various assumption (also narrated in the foot notes of the tables) based on informal discussion with the knowledgeable farmers of the area were also used. For estimating animal quality depreciation, various methodologies are available in the literature, but in this study for cattle, we assumed that 5-7 pregnancies per working life and salvage value at the end of working life were considered. In this way, the annual animal quality depreciation allowance came about 10 percent per annum. Among sheep/goats, the average productive life is 4 years but the salvage value is very low and there is a high probability of suffering from diseases in small ruminants. Considering these factors, the animal depreciation allowance considered was again 10 percent per annum.

On the returns side, for cattle, the value of milk produced/annum, value of infant born and value of the animal at the end of the year (because females are kept for further reproduction) were summed to estimate gross value of output. In case of small ruminants the male sheep became marketable as slaughter purpose animal at the age of 9 months and goats at one year of age. For drawing inferences, net profit per adult animal, returns per month per animal and average monthly income per herd were estimated for both ruminant types.

### 3. RESULTS AND DISCUSSION

#### 3.1. Socioeconomic Profile of Livestock Farmers

The average age of the household head ranged from 36 in Tharparkar to 48 years in Cholistan. Their mean crop farming experiences vary from 15 years in Cholistan to about 22 years in Thal. The mean livestock farming experience vary from 19 years in Tharparkar to 32 years in Cholistan. Large variations in possession of formal education were observed across deserts, the lowest in Cholistan and almost primary level in Thal and Tharparkar deserts. Likewise, the proportion of sample respondents able to read and write was also lowest in Cholistan (Table 1).

The average family size of the respondent families was about 13 persons, composed of 1 old person, about 6 adult persons and 6 children. Joint family living pattern is dominant in all three deserts. The human resource development was probed through children education. Out of six children per family, nearly two were in primary schools and about 0.5 children were in middle/high schools. A negligibly small number of children were in colleges/universities. In Thal desert, relatively more number of children was in college/university. While examining allocation of adult male family labour, variations across deserts were observed. For instance, the number of adults engaged in livestock farming was higher in Cholistan than other two deserts.

The number of standard animal units or "sau" managed per person was about 26.8 sau in Cholistan, 16.7 sau in Tharparkar and 14.5 sau in Thal. The mean operational holding managed per person was about 10.45 acres in Cholistan, 40.97 acres in Tharparkar and 56.08 acres in Thal desert (Table 1). Less per person land allocation in Cholistan is because of their agricultural lands are lying in Lesser Cholistan where seasonal canal irrigation facilities are

Table 1

*Socioeconomic Profile of Sample Livestock Farmers in Three Deserts of Pakistan*

| Items                                       | Cholistan | Tharparkar | Thal  |
|---|-----------|------------|-------|
| Age (years)                                 | 48.09     | 36.36      | 43.5  |
| Crop farming experience (years)             | 15.44     | 17.95      | 21.5  |
| Livestock farming experience (years)        | 32.45     | 19.18      | 21.2  |
| Livestock trade experience (years)          | n.a.      | 4.98       | 10.1  |
| Formal education (years)                    | 1.05      | 5.45       | 4.8   |
| Can read and write (% Yes)                  | 4.85      | 69.20      | 61.7  |
| Family size (#)                             | 13.36     | 11.56      | 12.6  |
| Living pattern (% Joint)                    | 61.50     | 85.00      | 71.7  |
| <b>Family Composition (Nos.)</b>            |           |            |       |
| – Old males (> 60 years)                    | 0.49      | 0.38       | 0.6   |
| – Old females (> 60 years)                  | 0.49      | 0.32       | 0.6   |
| – Adult males (16–60 years)                 | 3.18      | 3.12       | 3.6   |
| – Adult females (16–60 years)               | 3.18      | 2.80       | 3.0   |
| – Boys (upto 16 years)                      | 3.01      | 2.73       | 2.5   |
| – Girls (upto 16 years)                     | 3.01      | 2.22       | 2.3   |
| <b>Children Acquiring Education (Nos.)</b>  |           |            |       |
| – Boys in primary school                    | n.a.      | 1.34       | 1.2   |
| – Girls in primary school                   | n.a.      | 0.93       | 0.6   |
| – Boys in high school                       | n.a.      | 0.30       | 0.5   |
| – Girls in high school                      | n.a.      | 0.06       | 0.1   |
| – Boys in college/university                | n.a.      | 0.06       | 0.2   |
| – Girls in college/university               | n.a.      | –          | 0.1   |
| <b>Household Labour Distribution (Nos.)</b> |           |            |       |
| – Adults in crop farming                    | 1.30      | 0.71       | 1.30  |
| – Adults in livestock farming               | 2.40      | 1.35       | 1.20  |
| – Adults in off-farm activities             | 0.18      | 0.16       | 0.20  |
| – Adults in non-farm activities             | 0.18      | 1.03       | 0.80  |
| <b>Farm and Herd Size per Labourer</b>      |           |            |       |
| <b>Allocated</b>                            |           |            |       |
| – Farm area per person (acres)              | 10.45     | 40.97      | 56.08 |
| – Animal units of livestock per person (#)  | 26.80     | 16.70      | 14.53 |
| <b>Family Contact Methods (%)</b>           |           |            |       |
| – Mobile                                    | n.a.      | 23.30      | 43.50 |
| – Messenger                                 | 46.50     | 1.70       | 21.70 |
| – Telephone/V-Phone                         | n.a.      | 65.80      | 21.70 |
| – Mobile + Telephone                        | n.a.      | 6.70       | –     |
| – Other                                     | 54.50     | 2.50       | 13.00 |
| <b>Fuel Source for Cooking/Heating (%)</b>  |           |            |       |
| – Firewood                                  | 29.70     | 46.70      | 35.00 |
| – Firewood + Dung cakes                     | 39.90     | 18.30      | 49.20 |
| – Firewood + Dung cakes + Kerosene oil      | 24.60     | 27.50      | 13.30 |
| – Firewood + Dung cakes + LPG/other         | 0.80      | –          | 2.50  |
| – Other                                     | 5.90      | 6.60       | –     |

available and at least one person on full time basis needs to be present there for caring crops and other household members. In other two deserts, the livestock and crop farming activities operate simultaneously, therefore, livestock farming labour also assist crop farming labour during peak season.

For communication with family members and relatives, the use of wireless telephones (V-Phone) and cellular/mobile phones was more common in Thal and Tharparkar deserts and about same may be prevailing in Cholistan because the information presented in Table 1 about Cholistan desert pertains to year 2000 when the communication facilities were not as developed as it is now-a-days. In conclusion, least heterogeneity across deserts may be prevailing regarding utilisation of communication facilities. About sources of energy for cooking and heating, firewood and dried animal dung cakes (firewood separately and with dung cakes also) are main sources of energy for cooking among sample households (Table 1).

### ***Crop Farming Profile of Livestock Farmers***

The average farm size, consisted of 2-3 parcels was smallest (about 14 acres) in Cholistan followed by Tharparkar and Thal deserts. Majority was owner operators. Animal muscle was main source of traction power for plowing in Tharparkar while tractor is common used for ploughing in Cholistan and Thal. Being desert ecology, the soils of the area were mainly sandy followed by sandy loam. On irrigated parcels, well/tubewell irrigation was applied in Cholistan and Thal, whereas, in Tharparkar, the sample farms were mainly rainfed. In Thal, 95 percent farmers reported low to medium brackish under ground water, 70 percent in Tharparkar whereas a high degree of brackishness in under ground water was generally reported in Cholistan (Table 2).

Table 2

#### *Farm Characteristics of Livestock Farming Households in Three Deserts of Pakistan*

| Items  | Cholistan | Tharparkar | Thal  |
|--|-----------|------------|-------|
| Total operational holding (acres)                      | 13.58     | 28.68      | 72.90 |
| Own land (acres)                                       | 12.00     | 25.92      | 67.20 |
| Tenancy status (% owners)                              | 81.80     | 73.30      | 71.40 |
| Number of parcels                                      | n.a.      | 2.18       | 2.90  |
| <b>Source of Power for Plowing (% Farms)</b>           |           |            |       |
| - Animals  | 3.90      | 70.30      | –     |
| - Animals + Tractor                                    | 1.30      | 27.00      | 6.70  |
| - Tractor  | 94.00     | 2.70       | 93.30 |
| <b>Soil Type of Major Parcel (% Farms)<sup>1</sup></b> |           |            |       |
| - Sandy  | 81.00     | 66.70      | 77.30 |
| - Sandy loam   | –         | 31.50      | 16.80 |
| - Loam   | 2.00      | 1.80       | 4.30  |
| - Sandy + sandy loam                                   | –         | –          | 1.60  |
| - Saline sodic   | 17.0      | –          | –     |
| Tubewell as irrigation source (% farms)                | 68.30     | 5.40       | 68.30 |
| <b>Brackishness in Ground Water (% Farms)</b>          |           |            |       |
| - Low  | n.a.      | 43.60      | 72.41 |
| - Medium   | n.a.      | 26.40      | 22.99 |
| - High   | n.a.      | 30.00      | 4.60  |

### 3.2. Livestock Ownership, Composition and Livestock Farming Objectives

The average herd size was much larger in Cholistan than Tharparkar and Thal deserts. This may be because of simultaneous management of crop and livestock farming in Tharparkar and Thal deserts. In Cholistan, crop+livestock and livestock farming was carried out by family members staying in Lesser and Greater Cholistan, respectively. Cattle are the most important animal of all three deserts. Buffaloes were reported at only 5 percent sample farms in Tharparkar, nearly 21 percent and 55 percent farms in Cholistan and Thal deserts, respectively. In Cholistan, goats were present on two-third farms while camels and sheep were present on almost every second herd in the area. In Tharparkar, almost every farmer kept goats along with cattle while camel and sheep were present in about half of the sample farms. In Thal, majority of the farmers kept cattle and goats simultaneously, while sheep were present on 77 percent farms, buffaloes on 54 percent farms and camels on 48 percent farms (Table 3).

Table 3

*Animal Species Kept by Sample Herders (Percent Yes) in Three Deserts of Pakistan*

| Animal Species          | Cholistan | Tharparkar | Thal |
|-------------------------|-----------|------------|------|
| Buffalo                 | 20.5      | 5.0        | 54.2 |
| Cattle                  | 95.1      | 76.7       | 95.8 |
| Camels                  | 45.1      | 48.3       | 48.3 |
| Sheep                   | 50.0      | 54.2       | 76.7 |
| Goats                   | 67.2      | 95.0       | 95.8 |
| Animal species/farm (#) | 2.2       | 2.8        | 3.8  |

Considering the composition of different livestock species, in large ruminants, the average number of cattle per farm was the largest in all three deserts. Camel was the second most kept animal in Cholistan and Tharparkar deserts while the average number of camels per household in Thal is quite low. The total number of small ruminants per household in Cholistan was highest followed by Tharparkar and Thal deserts. Regarding composition of sheep and goats, the average number of sheep per household were much higher than goats in Cholistan, while opposite was true in Tharparkar desert. In Thal desert, the difference in the number of sheep and goats per household was quite narrow. Donkey is a pack animal in all three deserts, however, their number per herd was the highest in Tharparkar compared with other two deserts (Table 4). These findings are almost similar to the results reported by earlier studies carried out in the area [e.g. Mahmood, *et al.* (1987); Khan, *et al.* (1993); Iqbal, *et al.* (2000)].

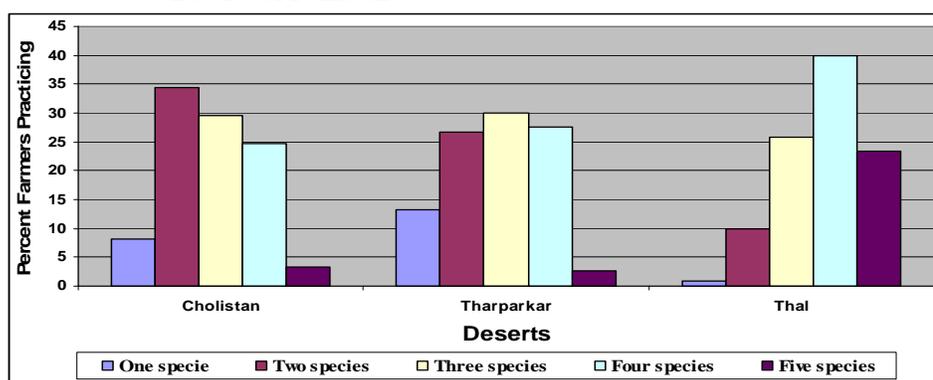
In Cholistan and Tharparkar, 2–4 animal species, while in Thal, 3–5 species were commonly present on sample farms (Figure 1). On two species farms, cattle+goats was more commonly available combination in all three deserts. Among three species farms, cattle-sheep-goats combination was relatively more common. In Tharparkar, cattle-camels-goats combination was also common. Amongst four species farms, more common combination was cattle-camel-sheep-goats. In Thal, cattle-buffalo-sheep-goats combination was also almost equally popular in addition to cattle-camels-sheep-goats. Having all five animal species was least practiced except in Thal, where this combination was present on

Table 4

*Livestock Types and Composition on Sample Farms in Three Deserts of Pakistan*

| Animal Types                          | Cholistan     | Tharparkar   | Thal         |
|---------------------------------------|---------------|--------------|--------------|
| <b>Cattle (No. of Heads)</b>          | <b>51.01</b>  | <b>9.37</b>  | 7.00         |
| – Cow                                 | 33.53         | 6.59         | 4.21         |
| – Bullocks/bulls                      | 0.05          | 0.18         | 0.09         |
| – Heifers                             | 8.70          | 1.84         | 0.87         |
| – Sires                               | 0.82          | 0.05         | 0.12         |
| – Young stock                         | 7.91          | 1.84         | 1.72         |
| Cattle breed diversity (# of breeds)  | <b>n.a.</b>   | <b>1.07</b>  | <b>2.89</b>  |
| <b>Buffaloes (No. of Heads)</b>       | <b>1.12</b>   | <b>0.31</b>  | <b>2.52</b>  |
| – Buffaloes                           | 0.79          | 0.18         | 1.46         |
| – Male buffaloes                      | 0.00          | 0.01         | 0.05         |
| – Heifers                             | 0.10          | 0.08         | 0.35         |
| – Sire                                | 0.00          | 0.01         | 0.03         |
| – Young stock                         | 0.23          | 0.04         | 0.06         |
| Buffalo breed diversity (# of breeds) | <b>n.a.</b>   | <b>1.00</b>  | <b>1.00</b>  |
| <b>Camels (No. of Heads)</b>          | <b>4.31</b>   | <b>1.60</b>  | <b>0.89</b>  |
| – Female camels                       | 2.69          | 1.08         | 0.48         |
| – Male camels                         | 0.70          | 0.39         | 0.22         |
| – Heifers                             | 0.43          | 0.03         | 0.03         |
| – Sires                               | 0.01          | 0.01         | 0.00         |
| – Young stock                         | 0.48          | 0.09         | 0.16         |
| Camel breed diversity (# of breeds)   | <b>n.a.</b>   | <b>1.03</b>  | <b>0.66</b>  |
| <b>Sheep (No. of Heads)</b>           | <b>60.76</b>  | <b>17.83</b> | <b>16.55</b> |
| – Adult sheep                         | 49.63         | 13.31        | 14.37        |
| – Young stock                         | 11.13         | 4.52         | 4.88         |
| Sheep breed diversity (# of breeds)   | <b>n.a.</b>   | <b>1.09</b>  | <b>1.51</b>  |
| <b>Goats (No. of Heads)</b>           | <b>19.45</b>  | <b>43.23</b> | <b>22.81</b> |
| – Adult goats                         | 14.84         | 33.23        | 16.36        |
| – Young stock                         | 4.61          | 10.01        | 6.65         |
| Goats breed diversity (# of breeds)   | <b>n.a.</b>   | <b>1.08</b>  | <b>2.13</b>  |
| Donkeys (No. of heads)                | 0.42          | 2.13         | 0.21         |
| Mules (No. of heads)                  | 0.00          | 0.04         | 0.06         |
| Other animals (No. of heads)          | 0.00          | 0.08         | 0.08         |
| <b>Total Livestock Heads (Nos.)</b>   | <b>136.65</b> | <b>72.33</b> | <b>49.76</b> |
| <b>Total Animal Units (#)</b>         | <b>63.62</b>  | <b>22.54</b> | <b>17.44</b> |

Fig. 1. No. of Species Commonly Present on Sample Farms in Three Deserts of Pakistan



about ¼th of the sample farms (Table 5). Thus, on all two or more species farms, both small and large ruminants were kept. The possible reasons of keeping small with large ruminants were: (i) the non-significant additional labour, feed and/or grazing expenses involved; and, (ii) small ruminants are easy to sell to meet monetary needs.

Table 5

| <i>Livestock Enterprise Combinations (Percent Farms) Practiced in Three Deserts of Pakistan</i> |             |             |             |
|---|-------------|-------------|-------------|
| Species Combinations  | Cholistan   | Tharparkar  | Thal        |
| <b>Single Specie</b>  | <b>8.2</b>  | <b>13.3</b> | <b>0.8</b>  |
| – Cattle only   | 8.2         | 0.8         | –           |
| – Buffaloes only  | –           | –           | –           |
| – Camels only   | –           | –           | –           |
| – Sheep only  | –           | 2.5         | –           |
| – Goats only  | –           | 10.0        | 0.8         |
| <b>Two Species</b>  | <b>34.4</b> | <b>26.7</b> | <b>10.0</b> |
| – Cattle and Buffaloes  | 2.5         | –           | –           |
| – Cattle and Camels   | 11.5        | 0.8         | –           |
| – Cattle and Goats  | 13.1        | 19.2        | 6.7         |
| – Cattle and Sheep  | 3.3         | –           | 1.7         |
| – Buffalo and Sheep   | 0.8         | –           | –           |
| – Buffalo and Goats   | 0.8         | –           | 0.8         |
| – Camels and goats  | –           | 1.7         | –           |
| – Sheep and Goats   | 2.4         | 5.0         | 0.8         |
| <b>Three Species</b>  | <b>29.5</b> | <b>29.9</b> | <b>25.8</b> |
| – Cattle, Sheep and Goats   | 14.8        | 11.7        | 15.0        |
| – Cattle, Buffaloes and Goats   | 1.7         | 0.8         | 5.8         |
| – Cattle, Camels and Buffaloes  | 1.6         | –           | –           |
| – Cattle, Camels and Goats  | 8.2         | 12.5        | 2.5         |
| – Cattle, Camels and Sheep  | 1.6         | 0.8         | –           |
| – Buffaloes, Sheep and Goats  | 0.8         | 0.8         | –           |
| – Camels, Sheep and Goats   | –           | 3.3         | 1.7         |
| – Cattle, Buffaloes and Sheep   | 0.8         | –           | 0.8         |
| <b>Four Species</b>   | <b>24.6</b> | <b>27.5</b> | <b>40.0</b> |
| – Cattle, Camels, Sheep and Goats   | 16.4        | 26.7        | 16.7        |
| – Cattle, Buffaloes, Sheep and Goats  | 5.7         | 0.8         | 15.0        |
| – Cattle, Buffaloes, Camels and Goats   | 2.5         | –           | 6.7         |
| – Cattle, Buffaloes, Camels and Sheep   | –           | –           | 1.7         |
| <b>All Five Species</b>   | <b>3.3</b>  | <b>2.6</b>  | <b>23.3</b> |
| – Cattle, Buffaloes, Camels, Sheep and Goats  | 3.3         | 2.6         | 23.3        |

Since cattle and sheep/goats are major animals in all three deserts, the objectives of keeping them were recorded on Likert scale in a prioritised fashion which then transformed into percent scores. Overall, home milk consumption and selling of adults and young stock were the primary objectives of livestock farming in all the deserts. A very small proportion of households found producing animals for selling on *Eid-ul-Azha*, to sell these animals at premium prices (Table 6). Perhaps this low percentage is mainly because the ecological conditions of desert do not permit the farmers to produce premium quality animal. It is also equally possible that local livestock traders may not be offering satisfactorily higher prices for better quality animals to the farmers as livestock markets in the desert ecologies are situated at far distant places.

Table 6

*Objectives (Percent Scores) of Keeping Various Animal Types in Three Deserts of Pakistan*

| Animal Species/Objective Types | Cholistan | Tharparkar | Thal |
|--------------------------------|-----------|------------|------|
| <b>Cattle</b>                  |           |            |      |
| – Home consumption of milk     | 15.6      | 37.5       | 44.5 |
| – Sale of young stock          | 33.4      | 22.5       | 18.7 |
| – Sale of adult animals        | 18.1      | 17.3       | 12.3 |
| – Sale of dairy products       | 29.5      | 9.7        | 2.5  |
| – Sale as sacrificial animals  | 0.4       | 5.7        | 12.5 |
| – Status symbol                | 0.8       | 4.5        | 3.8  |
| – Sale as breeding animals     | 0.7       | 1.1        | 4.6  |
| – Draft animal for plowing     | –         | 0.4        | –    |
| – Other                        | 1.5       | 1.3        | 1.2  |
| <b>Sheep/Goats</b>             |           |            |      |
| – Home consumption of milk     | 6.7       | 30.8       | 16.6 |
| – Sale of young stock          | 43.8      | 22.0       | 29.1 |
| – Sale of adult animals        | 25.2      | 21.0       | 20.4 |
| – Sale of sacrificial animals  | 9.3       | 9.8        | 18.2 |
| – Sale of wool/hairs           | 11.1      | 7.8        | 6.9  |
| – Status symbol                | 0.5       | 3.7        | 2.1  |
| – Sale of dairy products       | –         | 3.0        | 0.5  |
| – Sale as breeding animals     | 0.6       | 1.1        | 4.4  |
| – Other                        | 13.2      | 0.8        | 2.0  |

**3.3. Livestock Grazing and Stall Feeding Practices**

Both separate and combined grazing of small and large ruminants found practiced by livestock herders in the area. Separate grazing was dominant in Cholistan, while it was practiced by 2/3rd of the sample farmers in Tharparkar and Thal. In Tharparkar and Thal, mixed grazing was practiced by 33 percent and 27 percent farmers, respectively. Separate grazing was also generally practiced by large herd sized farmers, which seem intuitively justified (Table 7).

Table 7

*Livestock Grazing Methods (Percent Farmers) Practiced in Three Deserts of Pakistan*

| Items   | Cholistan      | Tharparkar     | Thal           |
|---|----------------|----------------|----------------|
| No grazing or only stall feeding                | –              | –              | 4.2<br>(13.7)  |
| Separate grazing of small and large ruminants   | 91.5<br>(n.a.) | 66.3<br>(28.7) | 65.8<br>(18.2) |
| Mixed grazing of both small and large ruminants | 8.5<br>(n.a.)  | 33.7<br>(18.0) | 26.7<br>(12.5) |
| Both separate and mixed grazing                 | –              | –              | 3.3<br>(26.3)  |

Figures in parentheses are herd size estimated in standard animal units.

Since livestock farming in Cholistan is mainly grazing based and herders frequently travel between its Lesser and Greater parts, their movement patterns are given in Table 8. Also, in deserts, herders generally travel to distant places for grazing and return home after 2-3 days. Both family and hired labour were used for grazing. Two systems, i.e. monthly salary and payment on per animal basis, prevail in the area. The salaries vary across deserts, but fairly homogenous within deserts. In Tharparkar, average monthly grazing charges per cattle, camel and sheep/goat were Rs 115, Rs 200-250, and Rs 30 respectively, during 2007.

Table 8

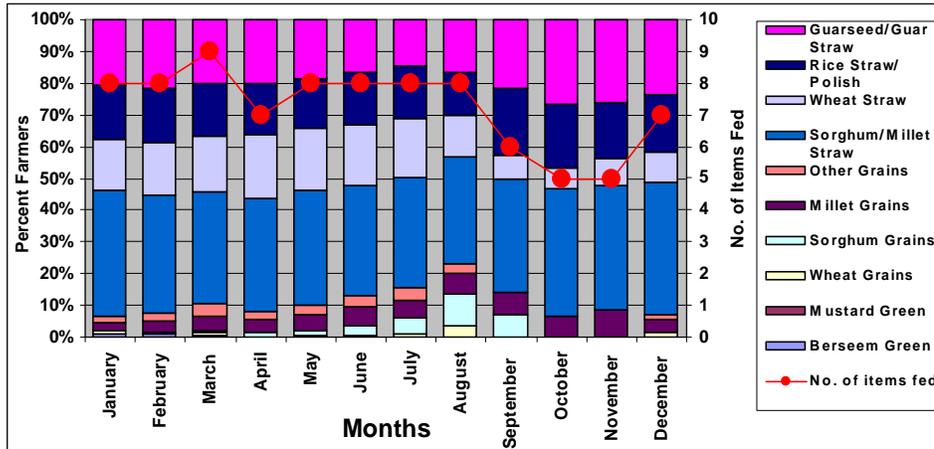
*Movement Schedule and Activities of Herders between Lesser and Greater Cholistan*

| Months            | Location/Movement and Livestock Production Activities Carried Out   |
|-------------------|---|
| July–August       | Migration from irrigated areas of Lesser Cholistan, canal and riverbanks to the owned <i>tobas</i> . Livestock generally grazes on the vegetation around <i>tobas</i> .                               |
| September–October | Depending upon the size of <i>tobas</i> and water available, generally, movement to temporary encampments at <i>tobas/kunds</i> started. Livestock grazes distance from <i>tobas/kunds</i> increases. |
| November–December | Movement to <i>tobas/kunds</i> in search of water and vegetation continues. Livestock grazes relatively at very distant places around <i>tobas/kunds</i> .  |
| January–February  | Movement to <i>tobas/kunds</i> in search of water & vegetation continue with slow retreat to Lesser Cholistan. Livestock grazes relatively at very distant places around <i>tobas/kunds</i> .         |
| March–April       | Return to irrigated fringes of Lesser Cholistan increases as wheat harvesting period arrives closer. Livestock grazes relatively at very distant places around <i>tobas/kunds</i> .                   |
| May–June          | Stay in villages and temporary congregations on wastelands. Livestock is fed by grazing and stall feeding of purchased or self-planted fodder.  |

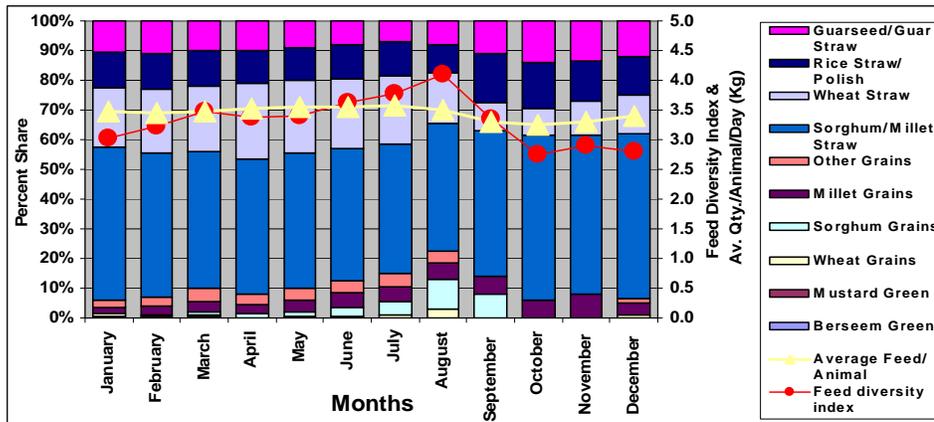
Source: FAO/ADB (1993) and some survey observations.

The stall-feeding practices were investigated by ruminant type by recalling memories of the respondents about feed types, their feeding periods and approximate quantities fed. In Tharparkar, ten different types of fodders were fed to large ruminants. In various calendar months, 6–9 types of fodders were fed. Among them sorghum/millet straw followed by guar seed straw remained dominant throughout the year while minor quantities of food grains were also fed to lactating animals (Figure 2). In feed composition, again sorghum/millet straw remained dominated around the year and its maximum proportions were fed in December-January (Figure 3).

**Fig. 2. Stall-feeding Patterns (Percent Farmers) of Large Ruminants in Tharparkar Desert**

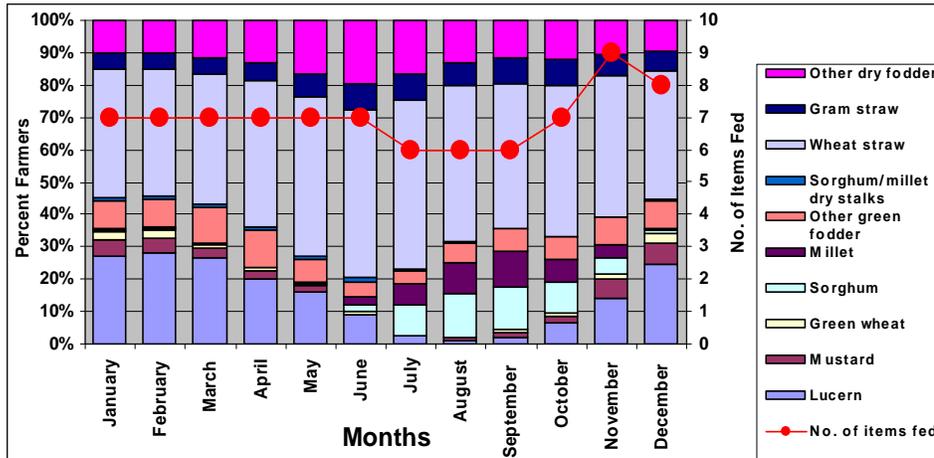


**Fig. 3. Stall-feed Composition (Percent Share) of Large Ruminants in Tharparkar Desert**

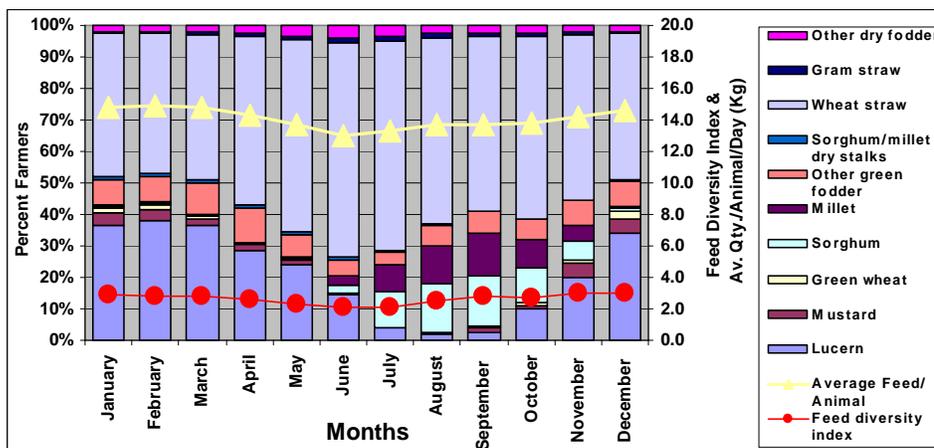


Like Tharparkar, in Thal, ten different types of fodders and crop by-products were fed by sample respondents to large ruminants. These were wheat straw followed by lucern, other green fodder, other dry fodders, mustard, green wheat, green and dry stalks of sorghum and millet, and gram straw. In various calendar months 6–9 types of fodders were used. Among them, wheat straw and other dry fodders remained dominant all over the year while lucern was increasingly fed during December to April, March whereas gram straw was utilised from May to September (Figure 4). Regarding feed composition, again wheat straw remained dominated ingredient throughout the year and its maximum quantity was fed in June-July months (Figure 5). The share of lucern was highest in February and March. The average quantity of feed during stall feeding varied from 23.3 kg/day/animal during June to 15.8 kg/day/animal during February-March months. The feed diversity index was as low as 1.5 in June and as high as 2.8 in December.

**Fig. 4. Stall-feeding Patterns (Percent Farmer) of Large Ruminants in Thal Desert of Pakistan**

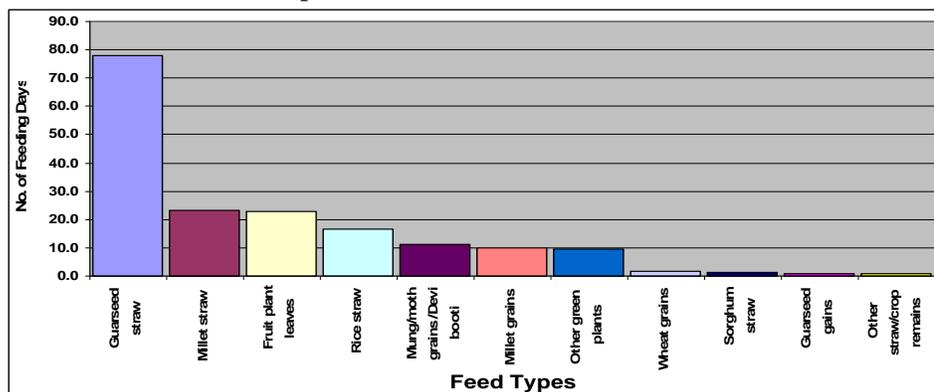


**Fig. 5. Stall-feed Composition (Percent Share) of Large Ruminants in Thal Desert of Pakistan**

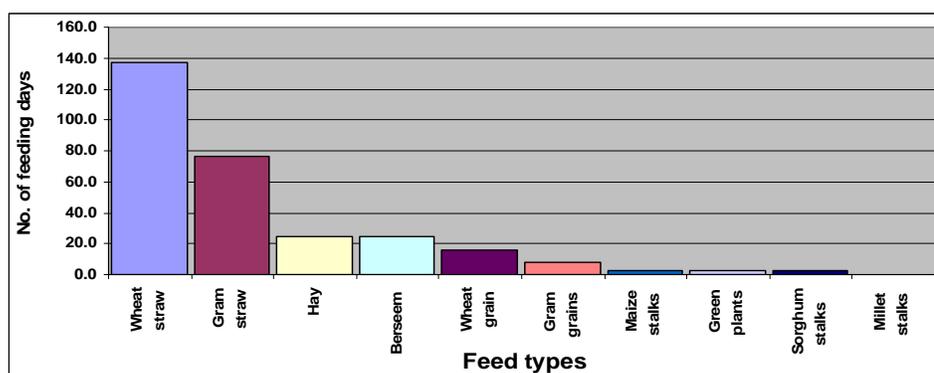


Considering stall-feeding to small ruminants, in Tharparkar, again the longest fed item was guar seed straw followed by millet straw, fruit plant leaves and rice straw. A highly limited use of food grains like millet, mung bean/moth beans and wheat grains was also reported (Figure 6). In Thal desert, ten types of fodders were fed during stall feeding, i.e. wheat straw, gram straw, dried hay, berseem, wheat grain, gram grains, green leaves of the plants/trees and stalks of maize, sorghum and millet. Wheat straw was the most frequently fed item followed by gram straw, hay, berseem/lucern, wheat grain, maize, green leaves, sorghum and millet stalks (Figure 7). The above discussion leads to conclude that the crop byproducts/dry straws are main stall-feeding items of both small and large ruminants. The use of food grains is very small and limited to lactating and sale purposes small ruminants. Khan, *et al.* (1993) also reported same for Thar.

**Fig. 6. Stall-feeding Patterns (Number of Days) of Small Ruminants in Tharparkar Desert**



**Fig. 7. Stall-feeding Patterns (Number of Days) of Small Ruminants in Thal desert**



### 3.4. Livestock Reproduction and Health Management

Natural breeding is predominantly practiced in all desert ecologies with due ethical considerations.<sup>5</sup> Small sized herders usually do not have their own sires, hence, are dependent on other herders' for sire services. The sires (from own or other herds) are usually selected on the basis of characteristics like better milk yield of the offspring and its mother, colour, physical health, better conceiving rate and its beautiful look. Sometimes the sires of other herds incidentally mates as herds get mixed during grazing in an area. In this way, both controlled and uncontrolled natural breeding methods found practiced in all three deserts. The chances of uncontrolled natural breeding are relatively high in small ruminants. It was found that natural breeding is dominant in all three deserts. Between natural controlled and uncontrolled methods, natural controlled is dominant in Thal and relatively more adopted in Cholistan. In Tharparkar, practicing natural uncontrolled is more common than natural

<sup>5</sup>In large ruminants, the services of a sire are utilised by a herd for 3-5 years because by the time his daughters attain sexual maturity. The farmers in the area are of the view that it is not good to breed this sire with his own daughters. Therefore, the owners of breeding bull either sell it out or exchange with other owners in the area. In small ruminants, sires are replaced in 2-3 years.

controlled method, mainly because of dominance of one breed (i.e. Thari) and frequent mixing of herds having breeding bulls with other herds during grazing (Table 9).

Male young stock of large ruminants are usually sold before reaching to their sexual maturity, therefore, castration in large animals is minimal. In small ruminants, males are castrated by traditional method by using knife while, veterinary hospitals' staff uses castrators for this purpose. The sires remain with the herds during grazing. The livestock breeding seasons are reasonably well defined as majority of births take place in spring. In good seasons, sheep/goats also have second breeding during September-November.

Table 9

| <i>Livestock Breeding Methods (Percent Farmers) Practiced in Three Deserts of Pakistan</i> |           |            |      |
|--|-----------|------------|------|
| Breeding Methods   | Cholistan | Tharparkar | Thal |
| Natural controlled   | 54.9      | 35.8       | 60.8 |
| Natural uncontrolled   | 45.1      | 47.4       | 6.7  |
| Artificial insemination  | –         | 1.8        | 10.0 |
| More than one from the above   | –         | 15.0       | 22.5 |

About disease incidence, in Cholistan, frequent disease epidemics were reported among both small and large ruminants. The common diseases of large ruminants were Haemorrhagic Septicemia, Black Quarter, Foot and Mouth Disease, Anthrax, Mange, Sura, Camel Pox, Endo- and Ecto-parasites, etc. The small ruminants' common diseases were Enterotoxaemia, Pleuro-pneumonia, Sheep/Goat Pox, Anthrax, Liver Fluke, and Endo-/Ecto-parasites, etc. A small fraction of camel herders (5.5 percent) reported disease(s) incidence among camels in their herds. The disease occurrence was reported on about 46 percent, 59 percent and 34 percent of sheep, cattle and goat farms, respectively.

Similarly in Tharparkar, the common diseases of large ruminants were Black Quarter, Foot and Mouth Disease, Enterotoxaemia, Anthrax, contagious Caprine Pleuro-Pneumonia, Sura and Mange. Diseases like Haemorrhagic Septicemia, Sheep and Goat Pox, Mastitis and abortion were relatively less prevalent. Black quarter in cattle and Enterotoxaemia and Anthrax in sheep/goats are more common [Mahmood, *et al.* (1987)]. In Thal, highest incidence was reported for Foot and Mouth followed by haemoglobin-urea, Enterotoxaemia, Haemorrhagic Septicaemia and Pneumonia.

### 3.5. Marketing of Livestock and Livestock Products

Information about livestock trade on sample farms shows that in Cholistan and Tharparkar, the adult animals trading intensity was lower than the young stocks whereas in Thal, the trading intensity of all age groups was almost same. In Cholistan, the adult animals trading intensity varied from 5.3 percent in cattle to 9.5 percent in goats, in Tharparkar from 2.7 percent in cattle to 15.7 percent in goats, in Thal from 7 percent in buffaloes to 15.5 percent in camels. On the other hand, the young stock trading intensity varied from nearly 15 percent in cattle to nearly 24 percent in camel; in Tharparkar from 22.1 percent in goats to 46.4 percent in cattle; in Thal from 7.3 percent in buffaloes to 15.8 percent in camels (Table 10).

Table 10

*Livestock Trading Intensity (Percent Animal Population Traded) by Age Group of Animal Species in Three Deserts of Pakistan*

| Animal Species     | Cholistan | Tharparkar | Thal  |
|--------------------|-----------|------------|-------|
| <b>Adults</b>      |           |            |       |
| – Buffaloes        | n.a.      | 0.00       | 7.03  |
| – Cattle           | 5.32      | 2.69       | 11.70 |
| – Camels           | 3.76      | 5.01       | 15.48 |
| – Sheep            | 7.41      | 13.71      | 9.29  |
| – Goats            | 9.54      | 15.73      | 10.44 |
| <b>Heifers</b>     |           |            |       |
| – Buffaloes        | n.a.      | 0.00       | 14.63 |
| – Cattle           | n.a.      | 3.17       | 11.54 |
| – Camels           | n.a.      | 25.00      | 50.00 |
| <b>Young Stock</b> |           |            |       |
| – Buffaloes        | n.a.      | 0.00       | 0.00  |
| – Cattle           | 14.96     | 46.43      | 7.28  |
| – Camels           | 23.97     | 27.27      | 15.79 |
| – Sheep            | 22.18     | 22.07      | 8.52  |
| – Goats            | 19.17     | 22.07      | 8.52  |

Cattle are the major milk producing animal and wide variations in average milk yield/animal were observed during summer and winter seasons. In Cholistan, the average daily milk yield/cow was 3.99 and 2.35 liters in summer and winter, respectively. The average summer season daily milk production per household was over 42 liters, whereas, the winter milk production per household was about 23 liters. In summer, about 9 percent of the daily milk production was used for domestic consumption, 56 percent processed into *desi ghee*, 6 percent was fed to infants/young stock (for quick and better growth) as a feed supplement and about 29 percent was sold as fresh milk. In winter despite decline in total milk production, the proportions of milk consumed at home and marketed increased (i.e. from 9 percent to 16 percent for home consumption and from 29 percent to 31 percent for marketing purpose), whereas, the percentage of milk in other uses (processed for *ghee* making and fed to young stock) steadily decreased. In Tharparkar, the average daily milk

production per household was about 26 liters, more than half of which was from sheep/goats. Approximately, one-fifteenth of total milk produced is sold within or nearby villages and remaining is consumed at home as liquid milk, yogurt, and/or converted it into butter or *desi ghee*. The average production of *desi ghee*/household was around 3 kg/household/month. A small part of *desi ghee* is domestically consumed and remaining is sold to shopkeepers in the villages and nearby towns. In Thal, the average daily milk production per household was 13-14 litres, of which sheep/goat milk constitutes about 36 percent. About 15 percent-50 percent of total milk produced is sold within or nearby villages and remaining is consumed as liquid milk, yogurt, converted to butter and *desi ghee*. The average production of *desi ghee* per household was about 6.50 kg/month. The produced *desi ghee* is sold to village shopkeepers and nearby towns.

### 3.6. Economic Analysis of Livestock Production

Economic analysis of livestock farming is a dire felt need of policy and development circles in Pakistan because such information is highly scarce in general and no such information exist for desert ecologies. To fill this gap, an economic analysis of livestock farming in Thal and Tharparkar deserts was carried out, while the information was updated for Cholistan after gathering the update on prices from the study area for the year 2007-08. The livestock farming in both Tharparkar and Thal deserts is grazing-cum-stall feeding type. Referring to Table 8, the average stall feeding period in Cholistan is about 3 months. As feed composition varies during a calendar year, therefore, monthly information on quantities of different items fed by animal type was used for cost estimation. For Cholistan, the average stall feeding expenses per cattle were almost same as in Tharparkar.

The economic analysis of cattle and sheep/goat farming in Cholistan, Tharparkar and Thal deserts is given in Tables 11 and 12, respectively. Various assumptions (narrated in footnotes of the tables) based on informal discussions with knowledgeable farmers of the area were also used during economic analysis of cattle and sheep/goats farming. From economic cost accounting perspective, in Cholistan, the net income per adult cattle was Rs 2383 per annum, whereas, sheep and goats farmers earned Rs 148 and Rs 305 per adult animal, respectively. On average herd size bases, the net income per month from cattle (for milk purpose), sheep and goats (for meat purpose) farming were Rs 10128, Rs 990, and Rs 508, respectively. In Tharparkar, the net income per adult cattle was Rs 1176 per annum, whereas, sheep and goats farmers earned Rs 161 and Rs 92 per adult animal, respectively. On average herd size bases, the net income per month from cattle (for milk purpose), sheep and goats (for meat purpose) farming were Rs 918, Rs 322, and Rs 331, respectively. In Thal desert, for cattle production, the net income per adult cattle was Rs 783 per annum whereas sheep and goats farmers earned Rs 196 and Rs 287 per adult animal, respectively. On average herd size basis, the net income/month from cattle (for milk purpose), sheep and goats farming (for meat purpose) were Rs 457, Rs 360, and Rs 552, respectively (Tables 11 and 12).

Table 11

*Economic Analysis of Cattle Farming in Three Deserts of Pakistan*

| Items   | Cholistan<br>(Rs/Animal<br>Head) | Tharparkar<br>(Rs/Animal<br>Head) | Thal<br>(Rs/Animal<br>Head) |
|---|----------------------------------|-----------------------------------|-----------------------------|
| <b>Costs Side</b>   |                                  |                                   |                             |
| – Stall feeding expenses (3 months)   | 2115.00                          | 8457.03                           | 6477.72                     |
| – Grazing and livestock management <sup>1</sup>   | 4200.00                          | 3600.00                           | 2400.00                     |
| – Value of the cattle   | 25000.00                         | 25000.00                          | 25000.00                    |
| – Health management expenses  | 600.00                           | 412.19                            | 350.00                      |
| – Animal quality depreciation allowance <sup>2</sup>  | 2500.00                          | 2500.00                           | 2500.00                     |
| – Interest on capital invested <sup>3</sup>   | 3441.50                          | 3996.92                           | 3832.77                     |
| <b>Total Cost</b>   | <b>37856.50</b>                  | <b>43966.14</b>                   | <b>40400.49</b>             |
| <b>Returns Side</b>   |                                  |                                   |                             |
| – Opportunity value of milk production <sup>4</sup>   | 11239.50                         | 16141.92                          | 12183.50                    |
| – Value of infant born  | 4000.00                          | 4000.00                           | 4000.00                     |
| – Value of the cattle <sup>5</sup>  | 25000.00                         | 25000.00                          | 25000.00                    |
| <b>Total value of output (live animal + milk produced + baby born)</b>  | <b>40239.50</b>                  | <b>45641.92</b>                   | <b>41183.50</b>             |
| <b>Returns Analysis</b>   |                                  |                                   |                             |
| Net profit per adult animal   | 2383.00                          | 1175.78                           | 783.01                      |
| Returns per month per animal  | 198.58                           | 97.98                             | 65.25                       |
| Average monthly income/herd (Rs) (using sample average of 51 animals in Cholistan, 9.37 animals in Tharparkar and 7 in Thal desert) | <b>10127.75</b>                  | <b>918.09</b>                     | <b>456.75</b>               |
| Returns per Rupee Investment (%)  | <b>6.29</b>                      | <b>2.67</b>                       | <b>1.94</b>                 |

<sup>1</sup>From the informal discussions with the farmers in Tharparkar and Thal deserts, it was found that keeping in view the localised conditions like availability of grazing vegetation and mean grazing hours, one man can easily manage grazing and other tasks of 20 cattle in Tharparkar and 25 cattle in Thal. The prevailing mean opportunity wage rate (in the forms of cash and kind) for the livestock grazier were Rs 6000 per month in Tharparkar and Rs 5000 per month in Thal.

<sup>2</sup>There are various methodologies available in the literature for working out animal depreciation allowance. Based on 5–7 pregnancies per working life and salvage value at the end of working life, the annual animal quality depreciation allowance came about 10 percent of the total value of the animal at beginning of the year.

<sup>3</sup>Interest on invested capital was calculated @ 10 percent per annum.

<sup>4</sup>According to Iqbal, *et al.* (2000), average milking days of cattle in Cholistan are 236 days/annum and average milk yield was 4 liters/day in summer and 2.35 liters/day in winter. For Cholistan, the average milk price during the 2007-08 was Rs 15/day. In Tharparkar, the average milk yield per cattle was 4.82 liters/day and average milk price in the area was Rs 14.63/liter. The value of one day old cattle baby was taken as Rs 3500. In Thal, the average milk yield per cattle was 3.5 liters/day and average milk price in the area was Rs 14.75/liter. The value of one day old cattle baby was taken as Rs 4000.

<sup>5</sup>Here, the value of animal was taken as such because the animal quality deterioration is already taken care of in the item on interest on capital invested on the cost side.

Table 12

*Economic Analysis of Small Ruminants' Production in Three Deserts of Pakistan*

| Items  | Cholistan                       |                    | Tharparkar                      |                    | Thal                            |                    |
|--|---------------------------------|--------------------|---------------------------------|--------------------|---------------------------------|--------------------|
|  | Sheep <sup>1</sup><br>(Rs/Head) | Goats<br>(Rs/Head) | Sheep <sup>1</sup><br>(Rs/Head) | Goats<br>(Rs/Head) | Sheep <sup>1</sup><br>(Rs/Head) | Goats<br>(Rs/Head) |
| <b>Costs Side</b>  |                                 |                    |                                 |                    |                                 |                    |
| – Stall feeding expenses   | 125.00                          | 150.00             | 339.29                          | 452.39             | 500.72                          | 667.63             |
| – Grazing and livestock management <sup>2</sup>  | 900.00                          | 1200.00            | 825.00                          | 1100.00            | 900.00                          | 1200.00            |
| – Infant value   | 500.00                          | 700.00             | 466.40                          | 559.03             | 500.00                          | 600.00             |
| – Health management expenses   | 120.00                          | 100.00             | 109.57                          | 66.03              | 179.08                          | 108.12             |
| – Animal quality depreciation allowance <sup>3</sup>   | 220.00                          | 300.00             | 233.20                          | 279.51             | 279.10                          | 350.70             |
| – Interest on capital invested <sup>4</sup>  | 186.50                          | 245.00             | 197.35                          | 245.70             | 235.89                          | 292.65             |
| <b>Total cost</b>  | <b>2051.50</b>                  | <b>2695.00</b>     | <b>2170.81</b>                  | <b>2702.66</b>     | <b>2594.79</b>                  | <b>3219.10</b>     |
| <b>Returns Side</b>  |                                 |                    |                                 |                    |                                 |                    |
| Average sale price per adult animal  | <b>2200.00</b>                  | <b>3000.00</b>     | <b>2332.00</b>                  | <b>2795.14</b>     | <b>2791.00</b>                  | <b>3507.00</b>     |
| <b>Net Returns</b>   |                                 |                    |                                 |                    |                                 |                    |
| Net profit per adult animal  | 148.50                          | 305.00             | 161.19                          | 92.48              | 196.21                          | 287.91             |
| Returns per month per animal   | 16.50                           | 25.42              | 17.91                           | 7.71               | 21.80                           | 23.99              |
| Average monthly income/herd of 60 sheep and 20 goats in Cholistan, 18 sheep and 43 goats in Tharparkar, 16.5 sheep and 23 goats in Thal desert | <b>990.00</b>                   | <b>508.30</b>      | <b>322.39</b>                   | <b>331.39</b>      | <b>359.72</b>                   | <b>551.82</b>      |
| Returns/Rupee Investment (%)   | <b>7.24</b>                     | <b>11.32</b>       | <b>7.43</b>                     | <b>3.42</b>        | <b>7.56</b>                     | <b>8.94</b>        |

<sup>1</sup> The mean animal raising period in sheep was 9 months and one year in goats, before it becomes ready for sale.

<sup>2</sup> In Tharparkar desert, the average herd size of farmers raising more than 10 adult animal equivalents was 59.4 animals per herd. Based on discussions with local farmers, one person can easily manage grazing etc. of a herd of 60 sheep/goats. The monthly salary of shepherd was Rs 5500/month. In Thal desert, the average herd size of farmers raising more than 10 adult animal equivalents was 45 animals per herd. Based on discussions with local farmers, one person can easily manage grazing etc. of a herd of 60 sheep/goats. The monthly salary of shepherd was Rs 5500/month.

<sup>3</sup> There are various methodologies available in the literature for working out animal depreciation allowance. In case of small ruminants, the average productive life is 4 years, however, the number of babies born during productive life is quite high, but the salvage value is very low and there is also a high probability of suffering from diseases. In order to take care of these factors, again an annual animal quality depreciation allowance for sheep/goats was taken as 10 percent of the total value of the animal at beginning of the year.

<sup>4</sup> Interest on invested capital was calculated @ 10 percent per annum.

The net returns per rupee investment in cattle farming were as 6.29 percent, 2.67 percent and 1.94 percent in Cholistan, Tharparkar and Thal deserts, respectively. The net returns per rupee investment in sheep farming were as 7.24 percent, 7.43 percent and 7.56 percent in Cholistan, Tharparkar and Thal deserts, respectively. The net returns per rupee investment in goat farming were as 11.32 percent, 3.42 percent and 8.94 percent in Cholistan, Tharparkar and Thal deserts, respectively (Tables 11 and 12). Many conclusions can be drawn from the above discussed economic analysis: (i) returns to both small and large ruminants farming are very low in all the deserts; (ii) returns to small ruminants' farming are relatively higher than cattle farming; (iii) returns to investment in cattle farming contain relatively larger variations across deserts than sheep/goats farming. This implies a strong need of introducing livestock productivity enhancing measures in all deserts under consideration.

### 3.7. Socioeconomic, Production, Institutional and Policy Constraints to Livestock Productivity

From the economic analysis of small and large ruminants farming, it is clear that returns from livestock farming are quite low. A number of socio-economic, institutional and policy related constraints are associated with it. The discussion in the subsequent sub-sections is based on already discussed findings, literature review and observations during the survey.

#### *Socioeconomic Constraints*

Relatively more peculiar socioeconomic problems in Cholistan include limited supply of forage and fodders, poor health of the animals, more physical exertion of animals during grazing, frequent incidence of diseases and droughts, difficulties in getting health services and approaching all herders in vaccination campaigns, least opportunities of getting children's education as the herders keep moving from one *toba* to the other, low milk productivity per animal with high seasonal variations, highly limited milk marketing opportunities, non-existence of milk preservation facilities with the herders leaves few options like early consumption of milk, feeding milk to young stock, and/or processing for making *ghee*. Since marketing of live animals mostly takes place in summer on arrival of herders in Lesser Cholistan, therefore, the benefits of sudden rise in animal supplies are harvested by livestock traders or *beoparies* and butchers. This leads to sub-optimal returns to the year long hard work of the herders [Iqbal, *et al.* (2000)].

In Tharparkar, livestock farming was seriously constrained by low carrying capacity of the rangelands and frequent droughts. On the other hand, the average farm and herd sizes were fairly large, therefore, creating serious difficulties in animal feed management, particularly during droughts. Limited crop farming opportunities (mostly confined to kharif season) and high tubewell irrigation cost, little availability and high levels of brackishness in ground water, negligibly small proportion of total operational holding is irrigated. This leads to heavy dependence of livestock farming upon grazing. The average daily grazing hours of cattle and sheep/goats are quite long and grazing is performed within a radius of 4.5 to 5 kilometers. There is a dearth of supply of the sires of improved breeds having high breeding performance. The availability of health facilities, the veterinary hospitals/dispensaries and veterinary medicines' shops are located at very long distances. As only 42 percent sample villages were electrified, therefore, the households cannot keep refrigerator for chilling milk till it is disposed off to some milk marketing agency. These conditions compel the farmers to either consume the milk immediately or preserve it by heating and then converting into various products. Due to distant location of livestock markets, livestock traders or *beopries* are the only major market intermediary in the area [Farooq, *et al.* (2008b)].

Livestock farming in Thal desert has income-supplementing role in total household income, as the mean operational land holdings of farming households are quite large. The average herd size was estimated as about 17 standard animal units (SAU). Wheat and gram straws are main source of animal feeding in stall-feeding. On average, the cattle and sheep/goats graze in the rangelands for 4 and 6 hours/day, respectively. The mean quantity of fodder provided to cattle ranges from 12.3 kg/day to 15.8 kg/day, and 1.16 kg/day to sheep/goats, which is quite high when compared with stall feeding in

Tharparkar desert. This also indicates the death of rangeland vegetation in the desert as well as substantial monetary needs for financing stall-feeding expenditures. This also partially explains the smallest herd size of the Thal desert farmers compared to other two deserts (Ref. Table 4). The stall-feed is mainly composed of wheat and gram straws, thus seriously deficit in minerals and vitamins requirement, i.e. below the Recommended Dietary Allowances. For improving milk and meat productivity, the natural cross-breeding method is mainly used. The farmers on their own are trying to increase cattle milk productivity by crossing them with Sahiwal, Friesian and Jersey breed bulls. For sheep breeding, the rams of *Kajli* breed and in goats the bucks of *Beetle* and *Teddi* breeds are also available in the area, but their supply is quite limited than the demand of the area. On one hand, this indicates that the farmers of the area are trying to increase their livestock sector income by increasing milk productivity which may be partly used for financing their stall-feeding expenditure. On the other hand, it shows that by better feeding and producing good quality cross-bred animals, they shall be able to earn more from the sale of live animals. However, due to distant location of milk and livestock markets, livestock traders or *beopries* are the only major market intermediary in the area. In general, the farmers have to accept lower prices (than reserve price) of their animals when sold to local *beoparies* [Farooq, *et al.* (2008a)].

### ***Production Constraints***

As livestock farming in all the desert ecologies is heavily dependent on sufficient availability of vegetation in the rangelands, sweet water availability for drinking of the animals, human beings and irrigation purposes. Cholistan has a variety of vegetation ranging from under-grasses to tall trees having feed, medicinal, timber and shelter values. Unfortunately, due to various reasons like frequent incidence of droughts, land degradation, over grazing, slow re-plantation of forage trees, the carrying capacity of rangelands has been declining fast. Thus the carrying capacity of rangelands is much below the requirements. Seven to ten hours daily grazing cannot fulfil the forage requirements of the animals. Therefore, the need of supplementary stall-feeding is increasing for both small and large ruminants. Unfortunately, the supplementary feeding is also expensive because of meagre crop production opportunities and purchasing crop by-products are highly costly.

### ***Institutional Constraints***

At present, the agricultural research and extension, water research and development, provincial departments like Livestock and Dairy Development Department/Animal Husbandry, Forest Department/Range Management Circles and Agricultural Extension, and numerous NGOs (the largest number in Tharparkar desert compared to other two deserts), NRSP and development authorities are working in the desert areas. No doubt, the objectives/ functions assigned to these agencies are laudable in their own place, but there is no institutional coordination or coordinating agency presently observed in the area. This is why, despite all the efforts, no significant developments has taken place in these deserts since ages and livestock productivity and rangelands carrying capacity related issues are persistently low in the desert ecologies [Iqbal, *et al.* (2000); Farooq, *et al.* (2008a, 2008b)].

### ***Policy Constraints***

The Prime Minister of Pakistan approved the first livestock development policy on March 1st, 2006 [Afzal (2007)]. On the other hand, like other parts of the country, no market regulations or regulatory framework were implemented in the study areas. However, the meat price fixing policies of the local governments is more seriously affecting the incentives of producing quality animals. Therefore, a significant proportion of the farmers of the study area opted to keeping *desi* breeds of cattle, sheep and goats. The farmers of the area are attempting to increase their livestock sector incomes on their own by adopting self-devised measures like purchasing good quality animals from co-villagers and using the services of high-repute sires (e.g. sires of Sahiwal, Friesian breeds) through natural breeding, but their efforts are partly successful because of the non-existence of milk and livestock marketing infrastructure as a serious constraint in this regard. In sheep and goats the rams/bucks of improved breeds are present with few farmers in the area. The remote presence of livestock markets and exploitive role of *beoparies* are serious bottlenecks. Strong developmental potential exists in the area, if the strategies delineated in the livestock policy 2006 are also implemented along with provision of market linkages.

## **4. CONCLUSIONS AND RECOMMENDATIONS**

The livestock farming is an important source of food and means of sustenance in rainfed, mountainous and desert ecologies of Pakistan. Livestock farming is also main agricultural activity in deserts because of highly limited crop farming opportunities. Wage earnings opportunities from adjacent irrigated of these deserts provide substantial support in total household income. A notable proportion of total livestock population of the country is present in desert ecologies of Pakistan. It is not plausible to ignore livestock farming in desert economies on various grounds like, they have equal right to be benefited from development activities in livestock farming, their livestock productivity is very low, the incidence of poverty by any measure is very high in these areas, and dwellers of these areas are far behind in human resource development—a necessary condition for contributing to household income through non-farm employment.

The common livestock farming constraints are longer grazing hours, highly sub-optimal stall feeding, periodic occurrence of droughts leading to expansion in bigger average herd sizes as shield against financial/drought shocks, poor health coverage, poor performance of rangeland development institutions leading to low carrying capacity of vegetation, poor animal health. Negligible existence of milk marketing system and poor livestock marketing linkages further reduces farmers' returns to livestock farming. Larger average herd sizes further exert pressures, feed, fodder, heath and other agro-ecological systems of the areas. Live animals, milk and *desi ghee* are the main livestock products of the area and none of these items is produced on commercial lines. Thus, livestock is kept as a mean to social security, a way of saving and a sign of wealth and social status. With this low input–low output type of livestock farming in the area, a highly institution-coordinated comprehensive approach is needed to increase the carrying capacity of the rangelands and planting drought tolerant varieties of food and fodder crops in areas where underground water is less brackish in order transform the livestock farming of the area from low

productive and low marketable surplus oriented to a highly productive market oriented and commercial farming system. To rectify this situation, the following suggestions for the overall development of the livestock sector in the area are hereby proposed:

### High Priority Areas

#### **1. Increasing availability of rangeland vegetation and green fodders:**

Availability of rangeland vegetation and livestock productivity are directly correlated. Local Forest and Rangeland Departments are recommended to re-plant palatable fodder plants/trees and shady trees (as shelter places for animals and humanity during mid-day rest hours) with proper fencing (for prohibiting grazing till some recommended age for allowing grazing /browsing) in rangelands of the deserts with the active participation of local communities along with demonstrating their management practices. Moreover, the farmers of the area should be educated about benefits of controlled grazing.

**2. Improvement of the genetic potential of local livestock breeds:** A number of local livestock breeds like Cholistani and Thari cattle, Thali breed of sheep are highly productive under highly variant weather conditions. The farmers in the area are trying to increase their milk and meat production through wild crossing their animals. As a result, the proportion of non-descriptive breeds is increasing in the area. There is a strong need of organised efforts for increasing genetic potential of local livestock breeds. The provincial Livestock/Animal Husbandry Departments are suggested to design animal genetic potential enhancing projects for the area, in which the breeding bull of genetic purity and high breeding efficiency are selected and reared under recommended animal husbandry management practices. The services of these sires should be offered to the farmers of the area during breeding seasons. At the same time, the local communities should be trained to learn managing pedigree records of their animals to use it for getting premium prices for their live animals.

**3. Provision of efficient livestock health coverage:** At present a number of provincial veterinary hospitals, dispensaries and veterinary centres are present in desert areas. These veterinary health institutions are facing serious shortage of funds and unable to effectively manage widespread incidence of some fatal diseases. Effective control of major fatal diseases by launching regular vaccination campaigns and prompt medical coverage of the affected animals is needed. Mobile veterinary services on call basis are suggested for all the deserts of the country on urgent basis.

**4. Establishment of milk collection centres linked to some milk processing plants:** A number of national and multinational firms are now entered in milk processing and its marketing. These firms established their milk collection centres in deep rural areas. For instance, Nestle is engaged in collecting milk from Lesser Cholistan and Halla (cooperative society) has recently started milk collection from Thal desert. Such interventions should be replicated in other deserts of the country. The local government are suggested to offer appropriate monetary and fiscal incentives to promote milk collection from these neglected areas.

### Low Priority Areas of Long-term Impacts

**1. Regulatory framework for milk and livestock marketing:** There is also a strong need to design some regulatory framework for milk and livestock marketing

systems in order to increase due returns to the farmers' effort and attracting investment in livestock farming on commercial lines. Popularising sale-purchase of animals on their live-weight basis is one of policy measures need to be implemented for slaughter purpose animals as early as possible in livestock markets of the country.

**2. Human capacity building:** Substantially high ratio of primary level students indicates a further need of middle and high schools at close distances to the settlements. It is suggested to either up-grade the existing primary schools as poor families cannot afford sending their children to distant places. The dearth of colleges also a genuine necessity of the area as high education will facilitate successful out-migration of talented youth of the area. The District and Tehsil Nazims are suggested to increase their struggles for developing infrastructures like opening new schools, up-gradation of roads, human and veterinary hospitals, establishing new milk and livestock markets for their respective area. The National Vocational and Technical Education Commission (NAVTEC) is also suggested to include Veterinary Assistant courses for agricultural neglected areas in their vocational training programs with appropriate stipend and other incentives.

**3. Institutional credit facilities:** The institutional credit facilities should be provided to the farmers in the areas for installing tubewells where underground water is suitable for irrigation. To improve feed and fodder security, the cultivation of appropriate varieties of fodder crops should be introduced in the area. Local communities should be mobilised for re-plantation of multi-purpose and fast growing fodder trees, shrubs and grasses in order to fulfill the feed, timber and fuel needs of the dwellers of the deserts.

**4.** Various incentives may be offered to the veterinary staff posted in the area and the rotation of replacement should be shortened to avoid lowering the morals of those serving in the area as they are generally deprived of various facilities during their posting period. Incentives like providing scholarships to the children of staff posted in deserts, awarding high scores to posting periods in deserts during departmental promotions, etc. are proposed for those posted in hard areas like deserts.

## REFERENCES

- Afzal, M. (2007) *Livestock Development Policy*. Islamabad: Livestock and Dairy Development Board, Ministry of Food, Agricultural and Livestock, Government of Pakistan.
- FAO (Food and Agriculture Organisation) (1983) Report of the Assistance to Rangeland and Livestock Development Survey in Balochistan. FAO, Rome Italy.
- Farooq, U., N. A. Shah, M. N. Akmal, W. Akhtar, A. Akram, and A. B. Rind (2008a) Socioeconomic, Institutional and Policy Constraints to Livestock Productivity in Thal Desert of Pakistan. ALP Project Report, Social Sciences Institute, National Agricultural Research Centre, Islamabad.
- Farooq, U., N. A. Shah, M. N. Akmal, W. Akhtar, A. Akram, and A. B. Rind (2008b) Socioeconomic, Institutional and Policy Constraints to Livestock Productivity in Tharparkar Desert of Pakistan. ALP Project Report, Social Sciences Institute, National Agricultural Research Centre, Islamabad.
- Iqbal, M, U. Farooq, A. Bashir, N. A. Khan, and S. Z. Malik (2000) A Baseline Survey for the Development of Livestock Sector in Cholistan. Joint Publication of AERU, AARI, Faisalabad, SSI, NARC, Islamabad and GTZ, Lahore (May 2000).

- Khan, M. A., M. I. Khan, and A. M. Khushk (1993) Farming Systems of the Thar Desert: Crop-Livestock Management Under Dry Conditions. Joint Report of the Social Sciences Institute, National Agricultural Research Centre, Islamabad and Agricultural Economics Research Unit, ARI, Tandojam Sindh, August.
- Mahmood, K., M. Munir, and A. Wahid (1987) Livestock Production and Socio-economic Aspects of the Farming Systems of the Thar Desert (A Reconnaissance Survey). Arid Zone Research Institute, Pakistan Agricultural Research Council, Islamabad, March.
- Pakistan, Government of (2007a) Vision 2030. Vision 2030 Committee, Planning Commission, Government of Pakistan, Islamabad (Working Draft).
- Pakistan, Government of (2007b) Livestock Census 2006. (Provincial Reports), Agricultural Census Organisation, Statistics Division, Government of Pakistan, Lahore.
- Pakistan, Government of (2010) *Pakistan Economic Survey, 2009-10*. Islamabad: Economic Advisor's Wing, Finance Division.
- PCRWR (1999) Pakistan Council of Research in Water Resources, Regional Office, Bahawalpur. Information Booklet.
- Tiffen, M. and M. Mortimore (2002) Questioning Desertification in Dryland Sub-Saharan Africa. *Natural Resources Forum* 26, 218–233.
- Zaffaruddin, C. (1977) Development of Rangelands in Desert/Arid Areas of Pakistan. Proceedings of the International Conference on *Alternative Strategies for Desert Development*. Organised by UNITAR and Published by Pergamon Press, New York, USA.

## Fostering FDI in the Agriculture Sector

AREEF SULEMAN

### I. INTRODUCTION

Irrespective of the level of sophistication and technological advancement achieved by mankind, agriculture remains the backbone of human existence and survival. Despite the benefits arising from technological progress, the corresponding higher yields and more resistant crop varieties, the basic need and fundamental problem still facing the world is food security.

With approximately 65 percent of Pakistan's population living in rural areas, and agriculture contributing approximately 20 percent to its GDP, it is clear that at the core of any sustainable development and poverty reduction strategy is the development of agriculture.<sup>1</sup> Gallup (1997) shows that an additional one percent increase in per capita agricultural output would result a 1.6 percent increase in the incomes of the poorest 20 percent of the population. These findings are further supported by Thirtle, *et al.* (2001), who on the basis of cross-country analysis, found that a 1 percent increase in agriculture yields would reduce the number of people living on less than \$1 a day by 0.83 percent. In addition, the growth linkages/multiplier effects between agriculture and the rest of the economy are relatively strong with every \$1 of additional farm income creating a further \$0.8 non-farm income in Asia [Bell, *et al.* (1982); Hazell and Ramaswamy (1991)]. The multipliers are even stronger in the case of Africa where it ranges from \$0.96 in Niger to \$1.68 in Burkina Faso [Delgado, *et al.* (1998)].

The importance attributed to the agriculture sector was given further impetus in 2008, when food prices surged, and limited food supplies threatened food security in several countries, and triggered civil unrest in several others. This resulted in many countries (notably the GCC), exploring alternatives for investing in the agriculture sector. In the case of the GCC, investing in agriculture is a shift from previous self-sufficiency schemes, and is being undertaken to firstly ensure food security, and secondly to maintain price stability and reduce exposure to market volatilities in their home countries. This presents a unique opportunity for countries such as Pakistan which have under-utilised agriculture land to benefit from the potential FDI in agriculture.

However, despite significant interest in FDI in the agriculture, and the desire to promote FDI in the sector, progress with investment remains minimal, and the constraints

Areef Suleman <areef@isdb.org> is associated with Islamic Development Bank Jeddah, Saudi Arabia.

*Author's Note:* This paper is a distillation of the findings of the IDB occasional paper on "Fostering Intra-OIC FDI in the Agriculture Sector" prepared by the author.

<sup>1</sup>IDB (2008a).

to the FDI continue to pose a serious challenge for countries wishing to attract FDI in the agriculture sector. It is submitted that without appropriate investment in creating an enabling environment in Pakistan that is at least as good (if not better) than those available in elsewhere in the world, investment flows will remain unsatisfactory.

## II. SCOPE AND OBJECTIVES

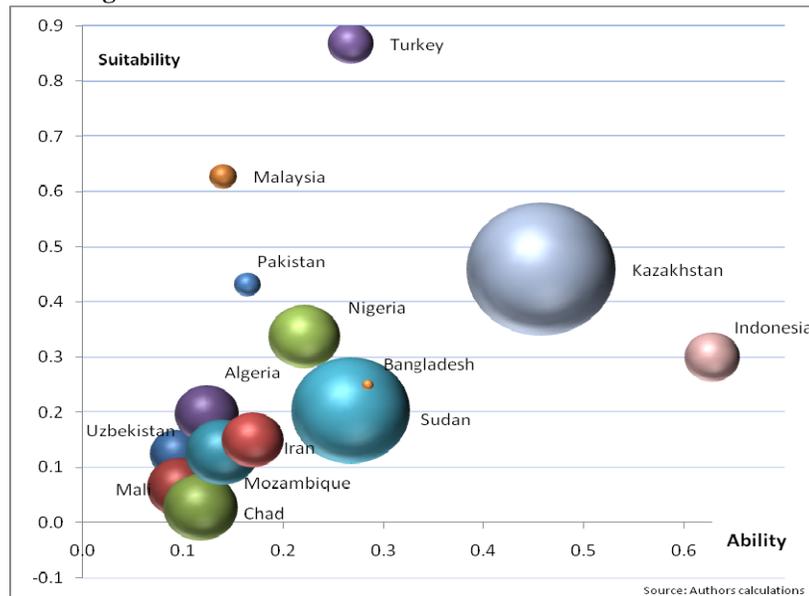
This paper seeks to: (i) highlight the agriculture potential in Pakistan; (ii) review the experiences of potential investors in the agriculture sector; and (iii) identify potential roles for countries seeking FDI and their development partners including the IDB in fostering FDI in the agriculture sector.

The growth in agriculture is dependent on investments at all levels from investments in agriculture inputs, infrastructure and across the value chain. Due to resource constraints and other development priorities, FDI in the agriculture sector is critical, and an important tool in the fight against poverty. In order to ascertain the investment potential two indices “Ability” and “Suitability” were developed. These are combined to create an overall Agriculture Potential Index. In order to explore what needs to be done to attract FDI in the agriculture sector, the initiatives to invest in the sector by the GCC is examined in detail. This leads to the identification of key challenges and agriculture bottlenecks that could hamper investment in this sector. The potential role of the IDB and other MDBs in helping foster FDI throughout the agriculture value-chain is also presented.

## III. AGRICULTURE POTENTIAL IN SELECTED COUNTRIES

Many OIC member countries including Pakistan have large tracts of under-developed arable land, sufficient water resources and high levels of unemployment in rural areas. These countries were identified in order to ascertain their potential for encouraging investment in the agriculture sector. In order to determine the potential to attract investment into the agriculture sector, two indices were computed. The first is based on the agricultural ability of the country (“Ability Index”). The “Ability Index” was computed using three variables, namely, water resource availability, land available for agriculture development and transport infrastructure (amount of paved roads was used as a proxy for transport infrastructure). The second index computed was the “Suitability Index”. This was derived by combining the net FDI inflows to the country (as an indicator of the attractiveness of the country for FDI/investment climate) with the “ease of doing business index” (as an indicator of the overall business environment). Thus, the suitability index may be viewed as a proxy for the overall enabling environment. By combining these two indices, it was possible to determine the overall potential of a country to attract FDI specifically into the agriculture sector. In Figure 1, the horizontal axis shows the resource “ability” of the country with regards to arable land, renewable water resources and availability of infrastructure. The vertical axis portrays the “suitability” of the country as a destination for FDI based on historic FDI flows and the conduciveness of the business and investment climate. The size of the “bubble” depicts the available land size for FDI in the agriculture sector (the larger the size of the bubble, the more land is available for agriculture development).

**Fig. 1. OIC Member Countries with High Potential to Attract FDI in the Agriculture Sector**



It may be noted that the countries are classified based on an overall availability of agriculture land, water resources and infrastructure. This does not in any manner suggest that there are no potentials for agriculture in countries not identified as having high potential. Clearly specific investment opportunities may well exist, and yield potentially high rates of return. Rather, the information presented must be viewed as highlighting countries that could generally be targeted for FDI in the agriculture sector. In terms of the overall agriculture potential index, the countries exhibiting the most potential are Pakistan, Turkey, Indonesia, Kazakhstan, Malaysia and Sudan. From a resource perspective (Ability), Indonesia and Kazakhstan are the countries with the highest ability to attract FDI. Purely in terms of land available for agriculture development, the largest amounts are available in Kazakhstan and Sudan. From an investor perspective, with a focus on specific projects, Turkey emerges as arguably the first choice given its very strong business climate and is reasonable ability for agriculture. In terms of suitable business and investment climate for FDI, the top ranking countries are Turkey and Malaysia. Although Turkey does not have as much un-utilised agriculture land as countries like Iran and Mozambique, due to the very conducive business and investment environment, it features prominently as a potential destination for FDI in the agriculture sector. It may be noted that the above research provides an overall country level perspective, and gives an indication of the potential of countries to attract FDI in the agriculture sector. There is still a need to identify specific projects and investment opportunities. In countries with limited land availability, there may exist excellent agriculture projects that could yield high returns on investments. If the other issues surrounding the investment are easily resolved, then such countries may be among the early recipients of FDI in the agriculture sector. However, from the perspective of broadly targeting specific countries, then the study provides a good indication of which

destinations make the most sense to be considered first. On the basis of the above analysis, it is clear that there exists significant potential for the development of the agriculture sector in several countries including Pakistan.

#### **IV. EXPERIENCES OF FDI IN THE AGRICULTURE SECTOR**

The rising oil prices from 2005 through July 2008, resulted in an increased focus on bio-fuels as an alternative and viable source of energy. This coupled with subsidies on bio-fuels resulted in the diversion of croplands away from production for food towards bio-fuels. The overall impact was a scarcity of key agriculture commodities, and higher food prices. This exposed an important vulnerability and created panic in some countries (specifically the GCC). In response to this phenomenon, there was an increased desire to acquire land and secure food resources by these countries. Many private sector investors and governments hastened to secure agriculture land that exhibited potential in anticipation that this land would be used to secure food supplies for their home countries. The increased activity surrounding FDI in the agriculture sector peaked towards the end of 2008, with new announcements published in the media on virtually a weekly basis from GCC investors stating their intentions to undertake FDI in the agriculture sector. In this context, countries identified as potential recipients of FDI included Pakistan, Sudan, Morocco, Algeria, Egypt, Syria, Kazakhstan, Indonesia, Turkey, Vietnam, Philippines and South Africa. In many instances, Sudan was highlighted as the initial destination of choice, with some announcements stating that investments were already being undertaken in Sudan.

Simultaneously, many countries that are well endowed with arable land and sufficient water resources sought to benefit from this revived interest in agriculture and welcomed the additional attention their economies were receiving from foreign investors.

Although one cannot generalise from these limited discussions on the key issues, it is possible to get some indications of the private and public sector perspectives on this important subject. Lessons learnt and best-practices from the case study may also provide an indication to other investors and recipient countries of some of the key issues affecting the investment decision.

#### **V. INVESTOR COUNTRY INITIATIVE: SAUDI ARABIA**

The King Abdullah Initiative for Saudi Investment in Agriculture Abroad (KAI) was announced with the aim of achieving national food security through building integrative partnerships with countries that have high agricultural potential to develop and manage agricultural investments in various strategic crops. The wisdom behind the Initiative is also to move away from providing aid to stimulating growth and employment opportunities in LDCs that are abundant in natural resources (trade not aid). The KAI aims at stimulating and encouraging the Saudi Arabian private sector to invest in agriculture abroad.

##### **The Role of KAI**

The KAI acts as an investment facilitator, and its role in a potential host country begins by undertaking bilateral discussions on behalf of the Kingdom. It will focus on paving the way in making it easy for investors to undertake FDI in third countries. Important elements of their focus and role would include:

- Facilitating the identification of potential investment opportunities;
- Securing land and undertaking negotiations with the host country to ensure appropriate quality and quantity of land is made available to the Saudi investor in a manner which is conducive to long-term development; and
- Undertaking discussions with host countries to ensure that an appropriate incentive basket is made available to Saudi investors. This to a large extent will focus on ensuring that other investors are not receiving preferential treatment as opposed to the Saudi investor.

The focus of the investment facilitated by the King Abdullah Initiative is strategic in nature focusing to a large extent on food security as opposed to purely economic merit. Although economic merit is an important element of the investment decision, the investment destination and investment supported would be of a strategic nature, this would allow the Initiative to assist Saudi investors undertake strategic investment while simultaneously meeting the objectives of facilitating development in these third countries. Thus, focusing on development via trade and investment as opposed to merely aid.

In addition, the investment mindset is based on a “win-win” principle where the interests of the Kingdom as well as the receiving country are protected. In this regard, it is anticipated that the agricultural produce from the investment should be exported to the Kingdom, with reasonable proportion of the produce going to the markets in which they are produced. Although preference is laid on production of strategic crops such as rice, wheat and barley, the investing firms will have the freedom of choosing the type of crops they grow.

The Initiative will only support agriculture investments in countries with abundant agricultural resources that are long-term in nature, based on either land ownership or long-term leases. It is envisaged that the Initiative will sign bilateral agreements between Saudi Arabia and the government of receiving country as a means of paving the road for Saudi investment in the agriculture sector. In addition, the KAI pays attention to the proximity of the country to Saudi Arabia. Among others the KAI has initiated discussions with Senegal, Turkey, Ukraine, Egypt, Sudan, Kazakhstan, Ethiopia, South Africa, and Brazil. The logic behind considering many countries is simply to spread risk and capitalise on the best opportunities.

A key feature of the KAI is that it will only entertain discussion on Saudi investment in agriculture abroad in instances where the host/recipient country is not a net importer. It will also not focus on countries that are not keen on attracting FDI in Agriculture (e.g. India and China). In addition, countries that impose restrictions on the trade of agriculture output will be disregarded.

Although the KAI is intended to be short-term, a longer term mechanism in the form of an agricultural holding company is under establishment. This holding company will be 100 percent government owned (via the Public Investment Fund) and is called Saudi Company for Agricultural Investment and Animal Production. It will be an important source of financing for the investors, and act as a catalyst and facilitator, fostering cooperation at government level in order to ensure that the private sector can undertake the necessary investments. However, its modus operandi, actual focus areas and nature of its assistance are being finalised.

It is anticipated that it will provide soft loans to investors in the agriculture sector along with undertaking equity participation where applicable and subsidising to some

extent the investment. In addition, the holding company may be responsible for off-take agreements to purchase the output of the FDI investment in agriculture.

## VI. FACTORS DETERMINING THE INVESTMENT DESTINATION

The key issues considered by the KAI to ascertain the suitability of a country as an investment destination include:

- **Security of Tenure/Land Ownership:** A minimum renewable lease period of 25 years is considered suitable, with the ideal situation being land ownership.
- **Availability of Suitable Land, Water, and Infrastructure:** Electricity; transport and logistics are among the key success factors for potential investments.
- **Government and Political Stability:** Is an important consideration by the investor.
- **Existing Relationship with Host Government:** Countries that have mutual relationships may be the first to be targeted for investments. The underlying purpose for the investments are to guarantee food supply from the source country and as such, existing relationships with potential host governments would facilitate access to resources and output even in times of crisis.
- **Appropriate Legal and Regulatory Framework:** It is contended that the legal and regulatory framework of the potential recipient country must be conducive for investors.
- **Friendly Investment Policies:** Consideration is also given to the willingness of government to attract FDI in the agriculture sector and an appropriate policy environment.
- **Proximity to Saudi Arabia:** The distance of the receiving country to the investor country is essential because cost and security issues before the food reaches the destination.

The KAI has recognised that in order to facilitate security of investment, local communities in the host countries should benefit from the investments in the form of having access to some of the output along with employment, technology and knowledge transfer. Although the KAI expressed preference for investments to flow to Muslim world, it is recognised that the investment is undertaken by the private sector who seek to maximise profitability and rate of return on their investments and long-term sustainability of the projects. Thus, the investment will go to the country that offers the best overall “package” for the investor, and the decision will not be made on an emotional basis, but rather based on economic merit.

In addition, the focus will be on large scale commercial farming predominantly on unutilised agricultural land. However, in order for the projects to be viable, appropriate infrastructure must be put in place. Downstream beneficiation would take place either in the recipient country or closer to market depending on economic merit and competitiveness.

### Envisaged Role for Development Partners

The KAI was clear that development partners such as MDBs have an important role to play in facilitating FDI in the agriculture sector. The soon to be established holding company will play a complementary role to that of MDBs who may assist by:

- Adopting a more proactive approach to agriculture through the provision of funding to host/recipient countries for de-bottlenecking infrastructure (e.g. electricity, transport and logistics) that could unlock the agriculture potential in their countries and facilitate the flow of FDI into the agriculture sector in these countries;
- Committing funds for technical assistance grants (TAs) in order to assist in the training of labour in recipient country, to benefit more directly from the investment from the perspective and employability and ability to assimilate new technology. The TAs could also be utilised to set-up appropriate research institutions;
- Engaging their member countries in dialogue on the guiding principles and requirements to attract FDI specifically in the agriculture sector. This could provide additional security to the investment;
- Sharing of risk via equity participation in the actual commercial enterprises, and providing insurance and guarantees. MDBs “putting their money where their mouth is” will not only reduce the commercial risk, but also the political risk given their relationship and leverage with their member countries; and
- Undertaking detailed studies on the agriculture potential of their member countries including their legal and regulatory environments, land ownership regulations, status of infrastructure and willingness to attract FDI into these countries.

## VII. INVESTOR INITIATIVES

### **Abraaj Capital**

Abraaj Capital is a Dubai based private equity investment firm with a focus on the MENA and South Asian (MENASA) regions. The firm is widely recognised as an important player in private equity in the region and has undertaken several key investments across the MENASA region. It has also received several awards including ‘Middle Eastern Private Equity of the Year’ in 2005, 2006 and 2007; the Banker Middle East Award for ‘Best Private Equity Institution’ in 2006 and ‘Best Private Equity House’ at the World Private Equity Awards in 2007.

### **The Role of Abraaj**

Abraaj as a private equity investor follows an investment strategy that is based on the acquisition of controlling or significant interests with board representation in stable, mature, well-managed businesses. It aims to create value through operational and financial improvements and management incentives. In some instances, it focuses on a ‘Buy and Build’ strategy where it will help further develop a company that exhibits growth potential. Its focus is on businesses that maximise shareholder return through strong operational growth and significant capital appreciation.

As a private equity investor, it has clear exit strategies up-front, and embarks on investments with the ultimate aim of profitably exiting from these investments. The ultimate objective of the firm is to attain “value through structured exits to strategic and trade buyers or onto public markets in the region and beyond, within a three to five year investment horizon”. The focus of Abraaj in the agriculture sector is that of a financial

and strategic partner that would be in a position to provide overall strategic and management expertise. However, the nature of the firm is such that it needs to find suitable technical partners with experience in the management of large scale commercial agriculture in order to invest in the sector. Based on its modus operandi, it is not part of its business model to start-up new projects, but rather to buy existing well managed entities, and increase their value by bringing in specific management skills, and increasing productivity and efficiency. This would allow it to increase the value of the business, and yield a healthy profit for its shareholders on exiting the investment.

### **Factors Determining the Investment Destination**

As a private equity firm, the focus of Abraaj is largely on maximising value for shareholders. Hence, any investments undertaken are based on this fundamental principle. In this regard, the agriculture sector will compete with other sectors for investment funds. Abraaj's key considerations of regarding FDI in the agriculture sector include:

- **Access and Availability of Water Resources:** Their focus is on water surplus countries, and it was acknowledged that there are very few water surplus countries in the world.
- **Land Ownership / Security of Tenure:** The minimum lease period that is considered by Abraaj is 25 years, and this should ideally be on a renewable basis. This will allow it sufficient time to increase the value of the investment, and sell to a third party who would have sufficient time (over 15 years lease remaining) to capitalise on the investment. Any shorter lease period would make exiting the investment with a suitable return more difficult.
- **Availability of Suitable Infrastructure:** Suitable road, electricity and telecommunications infrastructure are among the key elements considered from an infrastructure perspective.
- **Security of Personnel:** The safety and ease of movement of personnel outside the project area is of paramount importance for the investor to be in a position to attract skilled manpower from outside the recipient country.
- **Skilled Manpower:** The availability of appropriate human resources with experience in large scale commercial farming is also a key consideration. In many respects, semi-skilled manpower is available in potential recipient countries. However, expertise and experience in large scale mechanised commercial farming that is globally competitive is severely long.
- **Spreading of Risks / Risk Sharing:** The ability to attract other investors to the project also plays an important role in determining the investment destination. In order to spread risk there is a strong preference for equity participation from like-minded partners. In addition investing in several countries spread the geographic and political risk.
- **Overall Investment and Business Climate:** The extent of law and order, the legal and regulatory framework and ability to enforce contracts along with the business and investment climate are examined in order to ensure that the environment is conducive, and facilitates the achievement of the key objective of maximising shareholder value.

### **Al-Qudra Holdings**

Al-Qudra Holding is an Abu Dhabi based, private joint stock investment company focusing on strategic investments with a view to contributing to the sustainable development of the Middle East region. The company is involved in several key sectors including real estate, infrastructure development, utilities production and distribution, industrial production and agriculture. It is exploring various investment opportunities and has facilitated the development of various projects to meet local and regional market needs.

In order to devote sufficient attention to the agriculture sector, it established Al-Qudra Agriculture which is committed to meeting the higher demand for food and reducing the effects of rising food prices. In July 2008, the company announced its plan to acquire 400,000 hectares of farmlands in the Asia (Pakistan, Vietnam, Thailand and India), Middle East (Syria), and Africa (Sudan, Morocco, and Algeria). Its focus on FDI in agriculture stems from the recent crisis and the resultant higher prices along with expectations of lower levels of food supply from the West.<sup>2</sup> It is on this basis that strategic investments are being sought in the agriculture sector.

### **The Role of Al-Qudra in Agriculture**

Al-Qudra could best be classified as a “strategic semi-private investor”. Its focus is on exploring potential for investment in the agriculture sector from both the perspective of ensuring food security and obtaining a return on investment. Al-Qudra sees itself as undertaking assessments on a country-by-country basis to identify potentials, and acquiring appropriate agricultural land. It proposes using advanced technology to provide efficient solutions to the sector. Its investment time horizon is long-term and is in line with the timelines for investment in the agriculture sector.

Being semi-private, an additional constraint for Al-Qudra is the issue of outright purchase of land in host countries (as a result of sovereignty issues- there are political issues and considerations that arise when a company linked to a government tries to buy land in a third country). Hence, the preference and less problematic, cheaper alternative of long-term renewable leases (minimum 25 years) as opposed to out-right land acquisition.

It is envisaged that from a business perspective, it will function purely as a private investor that will operate on sound management principles. However, its focus will be on strategic crops that can firstly address the food requirements of the UAE, secondly the Muslim world, and then the rest of the world. Although Al-Qudra will function to a large extent as financier, and have equity participation, it will also be involved in the management of the projects. Given its strong linkages to the government of Abu Dhabi, its focus will be on strategic crops, and it will have upfront off-takes agreements with the government. Therefore, from the market perspective, the risk is minimised.

In light of the above, with the guaranteed markets and relatively lower risk, the focus for Al-Qudra is on strategic crops as opposed to high value crops (such as papino,

<sup>2</sup>In light of the recent financial crisis, access to credit from the banking and financial sectors will become more restrictive. In addition, the financial crisis resulted in governments re-focusing limited sources away from subsidising food production towards stemming the adverse impacts of the financial crisis. The potential net resultant affect would be lower levels of the production in the West, and further strain on limited supply of agriculture output for human consumption.

mangoes and vegetables) that have higher risk and markets that are not guaranteed. However, in instances where there is still surplus capacity to undertake high value crop production, these may be exploited.

### **Factors Determining the Investment Destination**

The factors considered by Al-Qudra holdings prior to embarking on an investment in the agriculture sector is similar to that of Abraaj Capital. This is not surprising as both operate on private sector principles. Nonetheless, for the sake of completeness, the key factors considered prior to undertaking an investment in agriculture include:

- Resource availability (land and water);
- Availability of suitable infrastructure;
- Contractual laws to govern the investment from a long-term security perspective which will minimise the investment risk;
- Long-term land tenure guarantees / cover by international law;
- Ease of movement for personnel and investor both in and out of the country and within the country;
- Ease of doing business for foreign investment;
- Support from recipient government in addressing community-based issues,
- Securing land and water rights;
- Proximity to the Gulf region; and
- Level of inter-governmental relationships, bilateral agreements between governments, stability and security in host country government.

### **VIII. ENVISAGED ROLE FOR DEVELOPMENT PARTNERS AS IDENTIFIED BY THE PRIVATE SECTOR<sup>3</sup>**

Both Abraaj Capital and Al-Qudra Holdings highlighted that development partners including the IDB could play an important role in the stimulating of FDI in the agriculture sector. The MDBs could, among others, facilitate FDI in the agriculture sector by:

- Making available finance for:
  - Funding infrastructure projects that unlock key constraints inhibiting the development of the agriculture sector;
  - Equity participation in projects. By “putting their money where their mouths are”, development partners could take equity stakes in the potential investments. This would assist in reducing the risk exposure, and also increase confidence in the investment and business climate in the recipient country. It may also serve the dual purpose of marketing the country as an investment destination to other private sector investors;
- Providing advisory services by, among others, acting as an honest broker between the various parties to facilitate public-private dialogue, and ensure a level playing field.

<sup>3</sup> This section covers the considerations by both Abraaj Capital and Al-Qudra Holdings. Where the issue is relevant for only one of the investors, it is identified as such.

### **Investor Perspective on Key Impediments to Investment in Agriculture**

On the basis of details provided by KAI, Abraaj Capital, Al-Qudra Holdings, and the Abu Dhabi Fund for Development several constraints were identified with regard to investment in the agriculture sector. These include:

- Lack of access to information on specific investment opportunities and other key factors relating to specific potential projects. The requirement from the private sector is for clearly identifiable / identified opportunities in the form of bankable projects that have at the very least scoping / pre-feasibility undertaken by reputable independent third party; and
- Lack of professionalism by recipient governments in dealing with prospective investors. This is to a large extent due to a mismatch between the actual regulations and what is implemented. Also, investors (even where backed by their governments) find that the bureaucracy related to foreign investment is onerous. The lack of clear upfront commitment, clear channels of communication and single point of contact, long term-contractual guarantees, openness, good governance and transparency from recipient governments further compounds the problem.

### **IX. STIMULATING FDI IN AGRICULTURE**

There is significant potential for FDI in OIC member countries specifically in the agriculture sector. However, these potentials remain largely untapped. Issues considered by potential investors were highlighted earlier. Countries wishing to successfully attract FDI will have to take cognizance of these factors and create an environment that is conducive to FDI. In the case of Sudan, some of the key bottlenecks hampering FDI were discussed. Potential recipient countries along with their development partners will need to make a concerted effort if they aim at attracting large amounts of investment into their economies.

#### **Potential Recipient Countries**

The changing environment warrants new directions to be explored, and special efforts made, to mobilise capital for sustainable agriculture by countries such as Pakistan who are rich in arable land. These countries need to exploit the potential investment opportunities available and ensure that they have a favourable investment climate to entice suitable investors.

The benefits would thus accrue both to the investor nation in the form of securing food supplies and reducing the price volatilities in their home countries, while the investment destination would benefit from the FDI (including assistance in its own endeavours at ensuring food security) and the corresponding job creation that would follow. Thus, it emerges as a “win-win scenario” for the host and investor nations. Hence, a shift from a protected and isolated approach to economic development in which international competitiveness, regional co-operation and a more diversified economic base is paramount. Potential recipient countries need to be cognizant that the opportunities to promote FDI in the agriculture sector need to be exploited as a matter of urgency since such investments could result in the “crowding-in” of other investors, with the resultant positive externalities to the domestic economy.

Recipient countries need to pursue an industrial strategy that is directed at both a sectoral (industrial clusters specifically agriculture) and spatial level (to exploit the under-utilised potential in terms of arable land, water resources, etc.). This form of “targeting” is particularly appropriate in the current environment of readily available markets. However, due to lack of financing specifically in LDMCs, huge tracts of arable land remain un-exploited.

Although it is important for these economies to attract such investments, it is important that such FDI also meet objectives of the recipient country which should include:

- Addressing its own food security needs;
- Generating economic growth and development in underdeveloped areas;
- Mobilising foreign (and domestic) private sector investment;
- Generating long-term and sustainable employment;
- Exploiting the spin-off opportunities that arise from this relative crowding-in of private and public sector investments for the development of SMEs and the empowerment of the local communities;
- Taking advantage of under-utilised locational and economic advantages for export orientated growth; and
- Attracting modern technology into the agriculture sector.

On the basis of the above-mentioned objectives, it is proposed that the potential recipient countries embark on an exercise that allows for potential projects to be identified along with undertaking the basic pre-feasibility of such potentials with a view to marketing these potentials to the investor countries. Such an exercise could be undertaken with the assistance of experts and technical assistance from MDBs such as the IDB.

In this context, recipient governments will have three key strategic roles that could be played namely: (i) interventionist, (ii) catalytic, and (iii) facilitator. At the interventionist level, it would be to identify the potential areas of un-utilised potential, map the area, identify suitable projects, undertake pre-feasibility studies, arrange investor conferences, and undertake strategic investments in de-bottlenecking projects etc.

The catalytic role will, to a large extent, follow the investment where government could play an indirect, supporting role. In this regard, governments should attempt to facilitate the further development of agriculture clusters/hubs by encouraging private sector efforts and ensuring an environment that is conducive for these developments.

Recipient governments may also need to undertake local skills audits. Importantly, the identification of potential demand levels and skills determinations will have to be undertaken with key stakeholders involvement. Moreover, mechanisms to ensure effective skills transfer from foreign companies to form competent local farmers will need to be explored and agreed upon.

As a facilitator, governments could play a proactive role in stimulating the agriculture sector by creating a conducive environment for agriculture development. In this regard, a key role would be to assist in resolving land issues, and facilitating dialogue between the investors and local communities to ensure community buy-in and participation on the project. This could assist in mitigating some of the political risks on the project (see Box 1 where lack of such consultations resulted in the project being cancelled).

Investments in transport infrastructure, agriculture research and related infrastructure could also contribute towards these efforts. From the financial perspective, access to finance is still a key stumbling block for the farming communities. Innovative financing solutions that are not overly burdensome on small scale farmers needs to be devised and effectively implemented.

### Box 1

#### Daewoo's Experience of FDI in Agriculture in Madagascar

Madagascar is the fourth largest island located in the Indian Ocean and East of Mozambique, with population of 19.7 million, of which 71 percent lives in rural areas. The country's economy is highly dependent on agriculture with it contributing 26.5 percent of the GDP. Out of a total land area of 582 thousand square kilometers, 2.95 million hectares are arable land. Similar to many African economies, the agriculture sector in Madagascar has is under-developed and exhibits significant potential. Daewoo (Korea) sought to secure food supplies for Korea by undertaking FDI in the agriculture sector in Madagascar. In November 2008, Daewoo secured a lease on 1.3 million hectares of arable land for 99 years at a nominal cost in remote Western Madagascar to grow corn for export to South Korea. The investment was anticipated at US\$ 6 billion (the biggest agriculture FDI in the history) over a 25 year period, and could potentially create between 45,000 and 70,000 new jobs. Unfortunately, civil society including rural communities and farmers were not consulted. The resultant public outcry and subsequent violent protests claimed at least 100 lives. This coupled with the negative public sentiment lead to the collapse of the government. The deal was cancelled by the new government who claimed that it was unconstitutional and the people were not consulted. There are key lessons that OIC member countries seeking to undertake FDI in the agriculture sector can learn. These include:

- Recipient countries and investors must ensure that communities are widely consulted and receive tangible benefits from the project via either being part of the overall project, or benefiting from extension services and technical support from the investment.
- Countries must undertake detailed feasibility studies and ensure that the land tenure system meets the community concerns and investor requirements considering the political history of the country and social justice.
- In the case of large-scale agriculture investment land lease, failure to have balanced deal and proper consultation with the concerned communities will lead to many disappointments in both parties, particularly the host country.
- The investment should be of a reasonable size suitable for large-scale commercial farming (and not excessive as in the case of Daewoo).
- The cost of the lease should be realistic and not merely a nominal fee as it contributes to negative perceptions that the "country is being given away" to foreigners.

Source: [www.africanagriculture.blogspot.com](http://www.africanagriculture.blogspot.com); [www.en.afrik.com](http://www.en.afrik.com); [www.bloomberg.com](http://www.bloomberg.com); [www.rjkoehler.com](http://www.rjkoehler.com)

Access to appropriate technology, technical support and new crop varieties could also be made available to small scale agriculture enterprises via public private partnerships. Arguably a most important element is security of investment through land ownership and property rights. This would encourage farmers to take risk and the land could be used as security in accessing finance.

In order to attract investors, the possibilities of preferential agreements regarding wages, labour flexibility, subcontracting and training to assist with the development of these labour intensive industries could be explored. The recipient government could also examine the possibility of giving the investors “tax holidays” / “tax breaks” on condition that they will provide extension services to the local farmers, and help with skills transfer and technology diffusion.

In addition, from the perspective of investors, there are several areas in which the host country government could play an important facilitatory role. These include:

- Providing access to suitable water resources;
- Identification of suitable large tracks of land;
- Providing security of tenure;
- Good governance and transparency;
- Facilitating discussions with local communities;
- Ensuring microeconomic stability; and
- Provision of key infrastructure.

If the above areas related to general enabling environment are addressed, then investment opportunities could potentially be exploited. Countries are competing for FDI with the rest of the world. If they cannot provide a business and investment climate that is at the very least as good as the rest of the world, they will not be in a position to attract investors. Investment funds will flow to those countries that offer the best overall package. As such, in the case of Sudan, the specific issues identified earlier and those highlighted by potential investors will have to be addressed. This will require commitment from local, provincial and national governments and coordinated efforts to ensure the success of such endeavours.

### **Role of Development Partners**

Multilateral Development Banks including the IDB have viewed the support and financing to the agriculture sector as an integral element of their efforts at moving people out of poverty. With approximately 75 percent of the Worlds residing in rural areas, the sector is crucial to addressing this key challenge. Since inception, at the sectoral level, 11 percent of IDB financing, 6 of World Bank financing between 1990 and 2008 and 17 percent African Development Bank went to the agriculture sector. Given the importance of this sector, it was expected that it would receive a significantly higher percentage of these development institutions financing allocations. However, many infrastructure projects funded by these institutions may assist in addressing some of the constraints in this sector. In order to provide more effective development assistance to the agriculture (and rural sector), strategic priorities were identified by these institutions.

There has been a global response to prevent a catastrophe arising out of the higher food prices and supply shortages. Notably, the World Bank launched its initiative the “New Deal for Global Food Policy” wherein it will provide cash transfers, food-for-work programmes and assist with measures to increase agriculture productivity. It has also stated that it will double its agriculture financing to Africa to US\$800 million per annum. The International Fund for Agriculture Development (IFAD), the African Development Bank (AfDB) and the Asian Development Bank (AsDB) have also announced similar initiatives. Moreover, many donors have pledged support to the most severely affected countries.

The IDB has also launched its own initiative commonly known as the “Jeddah Declaration” wherein its assistance package of US\$1.5 billion to be financed over a period of 5 years was approved in May 2008. It is intended to cater for both the urgent and medium to long term needs. The programme aims at regenerating the agriculture sector in the IDB member countries by supporting agriculture to become more productive and commercially oriented so as to increase the income level of the farmers and livestock raiser, and promote economic growth. In terms of the Jeddah Declaration, it is apparent that all private sector entities in the IDB Group have an important role to play albeit for different activities. Under the Jeddah Declaration, both recipient and investor countries could potentially benefit from the IDB Group initiative. Investor nations could be assisted by the financing activities, whilst recipient countries could also obtain short-term assistance specifically with regards to meeting immediate food security needs.

It was highlighted earlier that development partners are key to fostering FDI in the agriculture sector. The nature of the interventions by development partners would be to create the appropriate enabling environment to attract FDI in the agriculture sector. Their role would be at three levels namely, (i) provision of technical assistance; (ii) advisory services (acting as an “honest broker”); and (iii) financing. These three roles are within the expertise of the MDBs including the IDB and could complement existing activities and operations. In this regard, it is proposed that development partners may consider:

- **Provision of *Technical Assistance* to:**
  - Build domestic capacity in the agriculture sector;
  - Assist recipient countries by provision of information/undertaking appropriate studies and project appraisals;
  - Fund skills development programmes in the agriculture sector using their technical assistance budgets. In this regard, the focus should not be on establishing/maintaining large training centres on site, rather on on-the job training (both theoretical and practical) and the utilisation of outside training providers for basic/generic training; and
  - Strengthen relevant institutions; and Establish centres of research similar to International Centre for Biosaline Agriculture (ICBA) that could undertake strategic research in the agriculture sector.
- **Advisory Services**
  - *Honest Broker*: In this context, the focus may be on facilitating policy dialogue between the private sector, public sector and other social partners; in promoting public private partnerships (specifically around infrastructure

development); and in communicating the concerns of key stakeholders and communities to project owners;

- Package projects for Investor Conferences and participate therein; and
- Facilitate implementation of projects, and the forging of strategic partnerships.

- **Financing**

- Take up equity in such projects.

## X. CONCLUSIONS

Despite the wide publicity in recent times about foreign direct investment in the agriculture sector following the food crisis, it is interesting to note that little real investment has been made on the ground. Investors have undertaken preliminary discussions with potential recipient countries, but these are still at the early stages. In order for investors to progress to the stage where actual investments occur, prefeasibility and feasibility studies, along with key infrastructure are pre-requisites. The current status of investments is not surprising given the time lag of approximately 2 years between identification of a specific new investment opportunity and the actual investment. Consequently, it is anticipated that it may take 2-3 years before the announced investments may come to fruition (if there are no additional investment constraints). However, the easing of commodity prices coupled with the financial crisis and subsequent recession, resulted in proponents of FDI in the agriculture sector taking a more pragmatic and cautious approach. It is therefore expected that this timeline might shift out with priorities shifting.

Although countries such as Pakistan, Turkey, Indonesia and Sudan, have a strong 'ability' to attract FDI into their agriculture sectors, 'ability' on its own is not sufficient to attract investors. Of paramount importance is the need for an appropriate business and investment climate ('suitability'). In terms of the enabling environment for the agriculture sector, Turkey emerged as a preferred destination given its very strong business climate and reasonable 'ability' for agriculture. This is regardless of the fact that it has less unutilised agriculture land than countries such as Iran and Mozambique. In this regard, it is important to note that without an appropriate investment and business climate, foreign investors will be cautious.

The decision to invest in a country is a rational one, based on the risks and returns associated with the project. On the issue of risk, there are several constraints that may hamper the investment decision. As long as these constraints are not addressed, foreign direct investment in countries will remain elusive. In the agriculture sector, the investment time horizon is typically between 5 to 7 years in order to determine the ex-ante rate of return on the investment. Investors (specifically from the GCC region) are seeking short-term quick returns on investment while the agriculture sector tends to require a longer-term commitment.

Overall, it must be recognised that investment will flow to countries that offer good returns with lower associated risk. Therefore, potential recipient countries must ensure that the investment climate is at the very least as good as those offered in alternate investment destinations. If this externally imposed market discipline is not adhered to, countries may find it extremely difficult to attract FDI into the agriculture sector.

Assuming the enabling environment is suitable, the missing link would then be the technical and managerial expertise required to successfully undertake investments in the agriculture sector. This is as an important third ingredient to the potential investment funds from the GCC and the ability to undertake agriculture (abundant water and land resources) in some countries.

In addition, there is a need for partnerships between recipient governments, investors and development partners. These partnerships are required in order to increase risk adjusted returns on investment. Potential recipient countries along with their development partners will need to address the business and investment climate by rationalising procedures, building capacity at the institutional level, training the workforce, tackling governance issues, and building productive infrastructure. These will enable countries to provide a suitable business and investment climate that is attractive to foreign investors.

The experience of Sudan highlights some key lessons for countries wishing to attract FDI into their agriculture sectors. Firstly, they should adopt a holistic perspective of the investors and type of investments that they wish to attract to their economy specifically in the agriculture sector. There must be a coordinated approach to land allocation with clear performance and investment agreements included in any land allocated/sold to potential investors. Secondly, governments need to develop clear guidelines and mechanisms to handle unsolicited requests for land and other investments. Thirdly, development partners have an important role to play in fostering FDI in the agriculture sector.

It must be recognised that there are several constraining factors impeding investment in the agriculture sector. Countries and their development partners will need to address these as a matter of urgency. If the business and investment environment is not conducive, investors will go to other countries as they seek to maximise long-term profit and return on investment resulting in a lost opportunity.

## REFERENCES

- Abraaj Capital (2007) *Annual Review*.
- Arab Authority for Agriculture Investment and Development (2001) *Strategy for the Years 2002-2012*.
- Arab Authority for Agriculture Investment and Development (2007) *Annual Report*. *Arab News*, Sunday, April 13, 2008.
- Broun, J. V. and Diaz-Banilla (2007) *Globalisation of Food and Agriculture and the Poor*. IFRI, Oxford University Press.
- Braun, J. V. (2008) *Food Policy Report, Food and Financial Crises—Implications for Agriculture and the Poor*. International Food Policy Research Institute, Washington, D.C.
- Conceicao, P. and R. Mendoza (2009) *Is the Food Crisis Over?* 18 April.
- Conceicao, P. and R. Mendoza (2009a) *Aggregate Income Shocks, Poor Households and Children: Transmission Channels and Policy Responses*. New York, UNICEF. (UNICEF Social Policy Working Paper).
- Farm Foundation (2008) *Agriculture's Strategic Role in Feeding and Fueling a Growing World*. Issue Report.

- Food and Agriculture Organisation (2008) *The State of Food Insecurity in the World; High food Prices and Food Security Threats and Opportunities*.
- Food and Agriculture Organisation (2009) *FAO Food Price Index* [www.fao.org/worldfoodsituation/FoodPrice Index/en](http://www.fao.org/worldfoodsituation/FoodPriceIndex/en)
- Gollin, D., D. Parente, and R. Rogerson (2002) *The Role of Agriculture in Development*. *American Economic Review* 92:2, 160–162.
- IDB (2001) *Promoting Investment Flows in IDB Member Countries*. (Occasional Paper No. 6).
- IDB (2008a) *Fertiliser Industry: Prospects for IDB Member Countries*. (Sector Insight No. 2).
- IDB (2008b) *Pesticides in IDB Member Countries*. Economic Policy and Statistics Department. (Sector Insight No. 4).
- IDB (2008c) *The Jeddah Declaration on the Initiative of the IDB Group for the Support of Member Countries Affected by the World Food Crisis*.
- IDB (2008d) *Report and Recommendations of the President on IDB Group Response to the Food Crisis in IDB Member Countries*.
- IDB (2008e) *Report and Recommendations of the President on IDB Group Response to the Food Crisis in IDB Member Countries*.
- IMF (2008) *Food and Fuel Prices—Recent Developments, Macroeconomic Impact, and Policy Responses*.
- Knight Frank (2009) *The Wealth Report*. Citi Private Bank.
- Ng and M. Ataman Aksoy (2008) *Who are the Net Food Importing Countries?* The World Bank.
- United Nations (2008) *World Investment Prospect Survey; 2008-2010*. United Nations Conference on Trade and Development (UNCTAD).
- World Bank (2008) *Annual Report*. Washington, DC.: World Bank.
- World Bank (2009) *Global Economic Prospects: Commodities at the Crossroads*. Washington, DC.

## **The Impact of Foreign Direct Investment on Employment Opportunities: Panel Data Analysis: Empirical Evidence from Pakistan, India and China**

SYED ZIA ABBAS RIZVI and MUHAMMAD NISHAT

### **I. INTRODUCTION**

One of the most important and sensitive areas for developing countries is foreign direct investment (FDI). It is now defined as not only a simple transfer of money, but as a mixture of financial and intangible assets such as technologies, managerial capabilities, marketing skills and other assets. There is a major debate in the literature regarding the impact of FDI on economic growth. The traditional argument states that an inflow of FDI improves economic growth and thereby enhances employment opportunities. Most studies [Hill and Athukorala (1998) have shown that FDI's social and distributional impact on the host country has been generally favourable in developing countries of various regions. Apart from bringing in a package of highly productive resources into the host economy there have been a visible positive impact on the creation of jobs not only in those sectors attracting FDI inflows but also in the supportive domestic industries.

In recent years, Asia received a large amount of FDI from developed regions. With in the Asia, India and China received a major chunk of foreign direct investment and FDI flows to Pakistan also increased significantly. The objective of this study is to undertake an empirical study regarding creation of employment opportunities by FDI in the continent of Asia during 1985–2008. Our sample consists of three Asian countries i.e., Pakistan, India and China. We use the panel data technique in order to overcome some econometric problems (i.e., autocorrelation in time series data and heteroscedasticity in cross-sectional data) from the data, save the time for applying tests on each country individually and get results in disaggregated form. In addition, as panel data technique gives disaggregated results it will help us to recommend policies for each country individually. The paper has been organised as follows. A brief introduction is given in Section I while the review of literature is presented in Section II. Section III describes the methodology and data followed by empirical results which are discussed in Section IV. Section V provides summary and concluding remarks.

Syed Zia Abbas Rizvi <zia.rizvi@yahoo.com> is Lecturer at Institute of Business Management (IoBM), Karachi. Muhammad Nishat <mnishat@iba.edu.pk> is Professor, Department of Finance and Economics, Institute of Business Administration (IBA), Karachi.

## II. REVIEW OF LITERATURE

Nunnenkamp, Bremont, and Waldkirch (2007) raised the question whether foreign direct investment (FDI) contributed to employment generation in Mexico and, thereby, helped overcome the country's pressing labour market problems. The analysis drew on highly disaggregated FDI and employment data covering almost 200 manufacturing firms. They estimated dynamic labour demand functions for blue and white collar workers, including both FDI and its interaction with major industry characteristics. By employing the GMM estimator suggested by Arellano and Bond (1991), they accounted for the relatively short time dimension of the panel data (1994–2006). It turned out that FDI had a significantly positive, though quantitatively modest impact on manufacturing employment in Mexico. In contrast to a widely held view, this applies to both white collar and blue collar employment. Moreover, the positive effect on blue collar employment diminished with increasing skill intensity of manufacturing industries.

Another important study was done by Altzinger and Bellak (1999). The objective of this paper is to analyse, whether the relatively better domestic employment performance of domestic firms (direct FDI) compared to foreign-owned firms (indirect FDI) could be linked to FDI abroad.<sup>1</sup> Based on an analysis of the sales and trade structure of a sample of Austrian investors in Central and East European Countries (CEECs), this paper tested the hypothesis that these two groups of investors had different motives to invest in CEECs and therefore their activities in CEECs differ by type (sales affiliate, production abroad) and consequently the employment effects at home. Regression results confirmed that direct FDI were more strongly determined by labour costs and exhibit an employment pattern related to a deeper international division of labour (including production), while indirect FDI was based relatively more on market seeking investment. Empirical results also confirmed that employment effects at home differ. The positive (negative) effect of one additional unit of parent (affiliate) sales on domestic employment for indirect FDI compared to direct FDI was larger (smaller).

According to established theory, the activities of affiliates can be related to the motives of FDI, namely efficiency seeking, market seeking and strategic-asset seeking flows. The impact of these types of FDI on trade patterns are explained by distinguishing four kinds of trade linkages between the parent firm and her affiliates: (a) the substitution of former exports through FDI, (b) growing (re-)imports of goods and services produced abroad, (c) FDI associated exports of goods and services and (d) FDI induced exports of other product lines neither produced by the foreign affiliate nor exported earlier by the parent firm [Agarwal (1996); Altzinger and Winklhofer (1998)]. The overall impact of FDI on trade (and consequently on domestic employment) is the sum of negative (export substitution, re-imports) and positive effects (associated and induced exports) and can be tested only empirically. Any distinction between direct and indirect FDI is justified only if their trade linkages differ.

Empirically, if different trade linkages between parent firms and affiliates exist for direct and indirect FDI, their effect on domestic employment will differ as well. Blomström, *et al.* (1997) argued, that rivalry for markets is one of the main reasons for a

<sup>1</sup>Indirect FDI is a characteristic of outward FDI made by any country's owned firms. While direct FDI is a characteristic of outward FDI in which a large part is carried out by firms, which themselves are affiliates of foreign Multinational Enterprises (MNEs) Altzinger and Bellak (1999).

positive relationship between foreign production and domestic employment, which provides one argument to distinguish market-oriented from efficiency-oriented FDI.

A related question is, whether the trade linkages change from the period of entry into a foreign market and the maturing of the FDI. Several theories suggest that entry occurs first via a sales subsidiary, which may be extended into a production unit later on e.g. [Bergsten, *et al.* (1978)]. In newly developed markets with low-cost production locations, some firms may switch their operations there over time. These considerations lead to a number of questions, such as: Do direct and indirect FDI follow different trajectories or are such strategies idiosyncratic to firms? Do they result in different trade linkages between parent firms and affiliates for direct and indirect FDI and consequently change the effect on domestic employment?

Ajaga and Nunnenkamp (2008) investigated the long-run relationships between inward FDI and economic outcomes in terms of value added and employment at the level of US states. Johansen's (1988) cointegration technique and Toda and Yamamoto's (1995) Granger causality tests were applied to data for the period of 1977 to 2001. They found cointegration as well as two-directional causality between FDI and outcome variables. This holds for both measures of FDI (stocks and employment in foreign affiliates) and independently of whether they considered the states' overall economy or their manufacturing sector alone.

Federico and Alfredo (2007) assessed the impact of Italy's outward foreign direct investment (FDI) on local (domestic) employment growth between 1996 and 2001 for 12 manufacturing industries and 103 administrative provinces. Their main result was that, controlling for the local industrial structure and area fixed effects, FDI is associated with faster local employment growth, relatively to the national industry average. They also found that employment in small plants was not negatively influenced by higher levels of FDI. Their findings did not support the idea that FDI was detrimental to local employment growth in the home country.

While the recent increase in foreign direct investment (FDI) to African countries is a welcome development, the question remains as to the impact of these resource inflows on economic development. Ndikumana and Verick (2008) investigated a key channel of the impact of FDI on development is through its effects on domestic factor markets, especially domestic investment and employment. In this context, they analysed the two-way linkages between FDI and domestic investment in Sub-Saharan Africa. Their results suggested that firstly, FDI crowds in domestic investment, and secondly, countries will gain much from measures aimed at improving the domestic investment climate. Moreover, they identified alternatives to resource endowments as a means of attracting foreign investment to non-resource rich countries.

Buffie (1993) analysed the impact of foreign investment on underemployment and domestic capital accumulation in a two-sector dual economy model. He found that foreign investment in the high-wage manufacturing sector crowded out domestic capital on a greater than one-for-one basis and lowered the level of manufacturing sector employment in the long-run. By contrast, foreign investment in an enclave sector or in the primary export sector crowded in domestic capital and unambiguously reduces underemployment. Furthermore, under weak conditions, foreign investment in the enclave or primary export sector was unambiguously welfare enhancing viewed over the entire transition path.

Broadly the literature survey shows that MNE employment can promote growth and poverty reduction in host countries in four ways.

### **(i) MNE Employment has a Direct and Indirect Impact on Domestic Employment**

FDI often generates new employment (direct employment is higher in green field investments) and creates jobs (indirectly) through forward and backward linkages with domestic firms. Estimates for a number of developing countries indicate that FDI has a multiplier effect on domestic employment. Aaron (1999) estimated that FDI in developing countries created about 26 million direct jobs and 41.6 million indirect jobs in 1997 (a multiplier of about 1.6). Iyanda (1999) obtained a higher estimate for Namibia: about 2 to 4 jobs were created for each worker (directly) employed by foreign affiliates.

### **(ii) MNE Employment Boosts Wages in Host Countries**

A number of studies have shown that MNEs pay higher wages than domestic firms even after controlling for firm and worker characteristics [see Lipsey (2002) for a survey]. Furthermore, the presence of multinationals sometimes generates wage spillovers: wages tended to be higher in industries and in provinces that have a higher foreign presence [Lipsey (1994); Lipsey and Sjöholm (2001)].<sup>2</sup>

### **(iii) MNE Employment Fosters Technological Transfers**

One of the most common and least expensive ways by which foreign technology gets diffused in host countries' is through labour turnover, as domestic employees (especially employees in higher level positions) move from foreign firms to domestic firms.<sup>3</sup> Bloom (1992) found substantial technological transfer in South Korea when production managers left multinationals to join domestic firms. Indeed, foreign firms sometimes pay higher wages in order to retain their workers, and thereby prevent domestic firms from appropriating their superior technology [cf., Glass and Saggi (2002)].

### **(iv) MNE Employment Enhances the Productivity of the Labour Force in Host Country**

Several studies have shown that workers in foreign owned enterprises (FOEs) are more productive than workers in domestic owned enterprises (DOEs). For example, Harrison (1996) analysed differences in labour productivity between FOEs and locally owned firms in Morocco and Cote d'Ivoire.

In 8 out of 12 industries in Morocco, output per worker was higher in FOEs than in domestically owned firms, with a difference in productivity ranging from 50 percent in electronics to about 130 percent in nonmetallic minerals. In Cote d'Ivoire, the productivity gap existed in fewer industries (3 out of 12), however the gap was wider: ranging from 50 percent in chemicals to about 500 percent in oil.

Ramachandran and Shah (1998) also report that added value per worker is 59 percent higher for wholly owned foreign enterprises than for local firms in Kenya, 178

<sup>2</sup>The conclusions of Lipsey (1994) and Lipsey and Sjöholm (2001) are based on data from the United States and Indonesia, respectively. The empirical evidence regarding wage spillovers is mixed. For example, Aitken, *et al.* (1996) do not find evidence of wage spillovers in Mexico and Venezuela. For a discussion of this issue see Lipsey (2002).

<sup>3</sup>See Blomstrom and Kokko (1998) for a survey of the literature on FDI and technological spillovers.

percent higher for FOEs in Zimbabwe and 1,422 percent higher for FOEs in Ghana. The worker productivity gap may be partly explained by the differences in training opportunities for workers in FOEs and DOEs.

### **III. METHODOLOGY**

#### **III.1. Data**

In this study, we consider a balanced panel of three countries i.e. Pakistan, India and China over the period of 24 years from 1985–2008. Three variables (i.e. employment, foreign direct investment and gross domestic product) are used for empirical investigation. All of the data except gross domestic product (GDP) of Pakistan is taken from IFS. The GDP of Pakistan is taken from various issues of Economic Survey of Pakistan. In order to remove the biasness from the estimates due to differences in sizes of the economies we use employment to labour force ratio and FDI to GDP ratio. Moreover, GDP is used in the form of growth. The E-views 6.0 is used for empirical work.

#### **III.2. Estimation Techniques**

In order to find out the long run relation between three variables we first check the order of integration by applying the unit root tests given by Im-Pesaran-Shin (IPS). Then, after getting the order of the integration the Pedroni's test of cointegration is applied. Finally, a Seemingly Unrelated Regression (SUR) test is applied to find out whether FDI has an impact upon employment in case of Pakistan, India and China.

#### **III.3. Unit Root Test**

The first step in determining a potentially cointegrated relationship is to test whether the variables involved are stationary or non-stationary. If all the variables are stationary traditional estimation methods can be used to estimate the (causal) relationship among variables. If, however at least one of the series is non-stationary more care is required. There are many tests available for testing unit root in panel data which are;

- Fisher's ( $p\lambda$ ) test (1932).
- Maddala and Wu (1999).
- The Levin-Lin (LL) tests (2002).
- The Im-Pesaran-Shin (IPS) test (2003).

Although the Fisher test can be applied but the disadvantage is that the p-values have to be derived through Monte Carlo simulation. So, we apply Im-Pesaran-Shin (IPS) test for unit root because it does not have only comparative advantage over all other tests but it is appropriate for our data as well. More over IPS test is the most powerful test as compared to the other tests. Another reason for using IPS test is that we have a balanced panel instead of different time series for different samples. In addition, the IPS test is the most cited unit root test in the literature. Another advantage of using the IPS test is that it is based on heterogeneity of the autoregressive parameters (there is a possibility of heterogeneity in the error variances and the serial correlation structure of the errors).

### III.4. Cointegration Test

With confirmation on the integrated order of variables of interest, the question is that they might or might not have a common stochastic trend, or, they might or might not be cointegrated. We resolve this question by looking for a long-run relationship among the variables using the panel cointegration technique. The available methods for panel data cointegration are given as follows.

- Johansen (1988).
- Larsson, Lyhagen and Lothgren (2001).
- Pedroni (1999).

We apply the Pedroni (1999) test of cointegration. This technique is a significant improvement over the conventional cointegration tests applied on a single series. As explained in Pedroni (1999), conventional cointegration tests usually suffer from unacceptable low power when applied on data series of restricted length. The Panel cointegration technique addresses this issue by allowing one to pool information regarding common long-run relationships between a set of variables from individual members of a panel. Further, with no requirement for exogeneity of the regressors, it allows the short-run dynamics, the fixed effects, and the cointegrating vectors of the long-run relationship to vary across the members of the panel. Furthermore, it provides appropriate critical values even for more complex multivariate regressions. Pedroni (1999) refers to seven different statistics for testing unit roots in the residuals of the postulated long-run relationship. Of these seven statistics, the first four are referred to as panel cointegration statistics; the last three are known as group mean panel cointegration statistics. In the presence of a cointegrating relation, the residuals are expected to be stationary. A positive value for the first statistic and large negative values for the remaining six statistics allows rejection of the null hypothesis.

### III.5. Seemingly Unrelated Regressions (SUR)

The seemingly unrelated regression (SUR) method, also known as the multivariate regression, or Zellner's method, estimates the parameters of the system, accounting for heteroskedasticity and contemporaneous correlation in the errors across equations.

### III.6. Impulse Responses

An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

## IV. EMPIRICAL FINDINGS

We used the Im-Pesaran-Shin (IPS) test (2003) in order to find out order of the integration of all three series used in the study. The Appendix Table 1 reports these results. The  $t$ -value of Employment to GDP ratio (EMP/GDP) is  $-3.67$  at level with zero lag, FDI and GDP ratio (FDI/GDP) is  $-4.94$  at level with zero lag and GDP growth is  $-3.66$  at level with zero lag. Therefore each variable was seen to have a unit root at level so we could investigate cointegration of the series at level.

After knowing the order of integration we applied the test of cointegration given by Pedroni (1999). Results are given in Appendix Table 2. The result shows that first panel statistic is positive ( $\nu = 0.5$ ) and rest of three panel statistics is negative ( $\rho = -1.15$ ,  $PP = -2.22$  and  $ADF = -2.24$ ). On the basis of Pedroni test we can conclude that series are cointegrated and have a long run relationship.

Then we used Pooled Estimation of Seemingly Unrelated Regression (SUR) approach described in Agosin and Mayer (2000). In this model we used one lag for estimating the equation. The optimum lag length is found through Schwarz Information Criteria (SIC). Our result suggests that only GDP has a significant impact upon level of employment in all of the three countries. Results are reported in Appendix Table-3. In addition, FDI does not have any impact upon the creation of employment in Pakistan, India and China.

We also used standard techniques for estimating the impulse response shocks of employment to the only significant variable including in our model i.e. GDP growth. The results are prescribed in Appendix Graph A. We found that GDP shocks explain 0.75 percent change in employment during the second year then it gradually bottom out.

## **V. CONCLUDING REMARKS AND POLICY RECOMMENDATIONS**

Our results are similar to those of Ndikumana and Verick (2008). The policy implication is that whatever other benefits may accrue from FDI it should not be expected to create employment opportunity in any of the three countries directly and FDI enhancement policies must be supplemented by the other measure to stimulate employment growth. Our estimation of the impulse response shows that the growth elasticity of employment on average in the three countries is extremely low and employment enhancing policies must be priorities. Employment growth will not occur in these three countries as a spontaneous consequence of growth in GDP. As rising formal sector unemployment especially of technical and professional manpower is becoming and increasingly important problem in all three countries.

However some important limitations of the research must be noted. We did not explicitly differentiate between direct and indirect impact of DFI growth as was done by Altzinger and Bellak (1999). Had we done so, their results might have been modified? Also it is likely that employment impact of FDI might vary from industry to industry and the over all insignificant relationship between FDI and employment growth might reflect a canceling out of positive and negative impact of FDI flows on employment in different industries. Therefore disaggregating the data at least at an ISIC 3-digit level might also identified significant relationship between manufacturing employment and FDI flows in a group of industrial branches. We did not find impact of FDI on employment opportunities in Pakistan, India and China. It may be due to time lag because FDI can also have impact on employment through economic growth.

Appendix Table 1

*Im, Pesaran and Shin Test of Unit Root*

| Variable   | Test for Unit Root in | Lag Length |
|------------|-----------------------|------------|
| Employment | Level                 | 0          |
| FDI        | Level                 | 0          |
| GDP        | Level                 | 0          |

Appendix Table 2

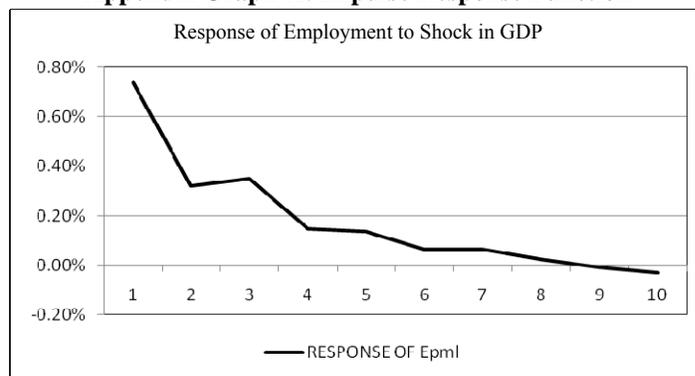
*Pedroni Residual Cointegration Test*

|                     | Statistic |
|---------------------|-----------|
| Panel v-Statistic   | 0.57      |
| Panel rho-Statistic | -1.15     |
| Panel PP-Statistic  | -2.22     |
| Panel ADF-Statistic | -2.24     |

Appendix Table 3

*Seemingly Unrelated Regression*

|                 |                    | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------------|--------------------|-------------|------------|-------------|-------|
| <b>Pakistan</b> | Intercept          | 0.860       | 0.039      | 21.947      | 0.000 |
|                 | GDP <sub>t</sub>   | -0.017      | 0.007      | -2.237      | 0.027 |
|                 | GDP <sub>t-1</sub> | -0.010      | 0.006      | -1.681      | 0.095 |
|                 | FDI <sub>t</sub>   | 0.002       | 0.004      | 0.664       | 0.508 |
|                 | FDI <sub>t-1</sub> | 0.000       | 0.004      | 0.108       | 0.915 |
| <b>India</b>    | Intercept          | 0.854       | 0.039      | 22.150      | 0.000 |
|                 | GDP <sub>t</sub>   | -0.009      | 0.005      | -1.620      | 0.107 |
|                 | GDP <sub>t-1</sub> | -0.017      | 0.005      | -3.072      | 0.002 |
|                 | FDI <sub>t</sub>   | 0.001       | 0.003      | 0.457       | 0.648 |
|                 | FDI <sub>t-1</sub> | 0.001       | 0.003      | 0.473       | 0.637 |
| <b>China</b>    | Intercept          | 0.853       | 0.039      | 21.874      | 0.000 |
|                 | GDP <sub>t</sub>   | -0.003      | 0.006      | -0.564      | 0.574 |
|                 | GDP <sub>t-1</sub> | -0.022      | 0.007      | -2.976      | 0.003 |
|                 | FDI <sub>t</sub>   | 0.000       | 0.003      | 0.145       | 0.885 |
|                 | FDI <sub>t-1</sub> | 0.002       | 0.004      | 0.427       | 0.670 |

**Appendix Graph-A. Impulse Response Function****REFERENCES**

- Aaron, C. (1999) *The Contribution of FDI to Poverty Alleviation*. Washington, DC: Foreign Investment Advisory Service.
- Agrawal, Pradeep (2000) Economic Impact of Foreign Direct Investment in South Asia. Indira Gandhi Institute of Development Research, India. (Working Paper).
- Ahmad, N. and H. Jamal (1986) Regional Accounts of Sindh. Applied Economics Research Centre, University of Karachi, Karachi. (Research Report No. 52).
- Ahmed, Mohsin Hasnain, Z. Atique, and Usman (2004) The Impact of FDI on Economic Growth Under Foreign Trade Regimes: A Case Study of Pakistan. *The Pakistan Development Review* 43:4, 707–718.
- Ahmed, Mohsin Hasnain, Shaista Alam, and Mohammad Sabihuddin But (2003) Foreign Direct Investment, Exports, and Domestic Output in Pakistan. *The Pakistan Development Review* 42: 4, 715–723.
- Aitken, Brian, Ann Harrison, and Robert E. Lipsey (1996) Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States. *Journal of International Economics* 40:3-4, 345–371.
- Ajaga and Nunnenkamp (2008) Inward FDI, Value Added and Employment in US States: A Panel Cointegration Approach. (Kiel Working Paper).
- Akbari, S. A. H. and R. Riazuddin (1993) Growth of Manufacturing Employment in Pakistan: A Comparative Analysis of Punjab and Sindh (Preliminary Results). *The Pakistan Development Review* 32:4.
- Altzinger, W. and R. Winklhofer (1998) General Patterns of Austria's FDI in Central and Eastern Europe and a Case Study. *Journal of International Relations and Development* 1:1-2, 65–83.
- Altzinger, W. and C. Bellak (1999) Direct versus Indirect FDI: Impact on Domestic Exports and Employment. Vienna University of Economics and Business Administration (WU). (Working Paper No. 09).
- Arellano, M. and S. Bond (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economics Studies* 58:2, 277–97.
- Bengali, K. (1988) The Economy of Karachi: Growth and Structural Change. Applied Economics Research Centre, University of Karachi, Karachi. (Research Report No. 62).

- Blomström, M., G. Fors, and R. E. Lipsey (1997) Foreign Direct Investment and Employment: Home Country Experience in the United States and Sweden. *The Economic Journal* 107 (November), 1787–1797.
- Bloom, M. (1992) Technological Change in the Korean Electronics Industry. OECD, Paris.
- Bosworth, Barry P. and Susan M. Collins (1999) Capital Flows to Developing Economies: Implications for Saving and Investment. Brookings Institution. *Brookings Papers on Economic Activity* 1, 143–69.
- Buffie (1993) Direct Foreign Investment, Crowding Out, and Underemployment in the Dualistic Economy. *Oxford Economic Papers* 45:4, 639–67.
- Bulcke, Daniel Van Den (1987) Deregulation of Foreign Direct Investment in Developing Countries. Paper presented at the EDI-Conference in Amsterdam, the Netherlands, September.
- Engle and C. Granger (1987) Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica* 55, 251–76.
- Federico and Alfredo (2007) Outward FDI and Local Employment Growth in Italy. Bank of Italy, Economic Research Department Temi di discussione (Economic Working Papers 613).
- Glass, A. J. and K. Saggi (2002) Multinational Firms and Technology Transfer. *Scandinavian Journal of Economics* 104:4, 495–513.
- Granger, C. W. J. (1969) Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica* 37:3, 424–438.
- Granger, C. W. J. (1981) Some Properties of Time Series Data and Their Use in Econometric Model Specification. *Journal of Econometrics* 16, 121–130.
- Granger, C. W. J. (1986) Developments in the Study of the Cointegrated Economic Variables. *Oxford Bulletin of Economics and Statistics* 48, 201–212.
- Granger, C. W. J. (1988) Some Recent Developments in a Concept of Causality. *Journal of Econometrics* 39, 199–211.
- Granger, C. W. J. and A. A. Weiss (1983) Time Series Analysis of Error Correction Models. In S. Karlin, T. Amemiya and L. A. Goodman (eds.) *Studies in Econometrics: Time Series and Multivariate Statistics*. New York: Academic Press. 255–278.
- Gunnar, Fors and Robert E. Lipsey (1997) Foreign Direct Investment and Employment: Home Country Experience in the United States and Sweden. *Economic Journal* 107:45, 1987–1997.
- Hill, H. and P. Athukorala (1998) Foreign Investment in East Asia. *Asain-Pacific Economic Literature* 12:2.
- Im, K., M. H. Pesaran and Y. Shin (2003) Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics* 115:1, 53–74.
- Iyanda, O. (1999) The Impact of Multinational Enterprises on Employment, Training and Regional Development in Namibia and Zimbabwe: A Preliminary Assessment Multinational Enterprises Programme, International Labour Office. (Working Paper No. 84).
- Johansen and Juselius (1990) Maximum Likelihood Estimation and Inference on Cointegration with Applications the Demand for Money. *Oxford Bulletin of Economics and Statistics* 52:2, 169–210.

- Johansen, S. (1988) Statistical Analysis of Cointegrating Vectors. *Journal of Economics Dynamics and Control* 12:2, 231–54.
- Khan, Ashfaq H. and Yun-Hwan Kim (1999) EDRS Report Series No. 66.
- Kinoshita (1998) and Sjöholm (1999) as quoted in Lensink, Robert and Morrissey.
- Lensink, Robert and Oliver Morrissey (2001) Foreign Direct Investment: Flows, Volatility and Growth. Paper was presented at the Development Economics Study Group Conference, University of Nottingham, 5–7 April.
- Lipsey, R. E. (2001) Foreign Direct Investment and the Operations of Multinational Firms: Concepts, History and Data. (NBER Working Paper 8665).
- Lipsey, R. E. (2002) *Home and Host Country Effects of FDI*. Cambridge, MA: National Bureau of Economic Research. (NBER Working Paper 9293).
- Mackinnon, J. G. (1991) Critical Values for Cointegration Tests. In R. F. Engle and C. W. J. Granger (eds.) *Long-Run Economic Relationships: Readings in Cointegration*. Oxford University Press. Chapter 13.
- Maddala, G. S. and S. Wu (1999) A Comparative Study of Unit Root Tests with Panel Data and A New Simple Test. *Oxford Bulletin of Economics and Statistics*, Special Issue.
- Michalet, Charles-Albert (1994) Transnational Corporations and the Changing International Economic System, UNCTAD, Geneva.
- Nishat, M. and A. Aqeel (1998) The Empirical Determinants of Foreign Direct Investment in Pakistan. *Saving and Development* 24:4.
- Nishat, M. and A. Aqeel (2004) The Determinants of Foreign Direct Investment in Pakistan. *The Pakistan Development Review* 43:4, 651–664.
- Nunnenkamp, Bremont, and Waldkirch (2007) *FDI in Mexico: An Empirical Assessment of Employment Effects*. (Kiel Working Paper No. 1328).
- Pedroni, P. (1999) Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics* 61 (Supplement 1): 653–670.
- Perkins, Dwight (2001) *Economics of Development*. New York: W.W. Norton and Company.
- Phillips, C. B. and B. E. Hansen (1990) Statistical Inference in Instrumental Variables Regression With I(1) Processes. *Review of Economic Studies* 57, 99–125.
- Qazi, Masood and Mohsin (2002) Foreign Capital Inflows and Domestic Saving in Pakistan: Cointegration Techniques and Error Correction Modeling. *The Pakistan Development Review* 41:4, 825–836.
- Ramachandran, Tyler Biggs and Manju Kedia Shah (1998) Enterprise Growth in the Manufacturing Sector: Is Africa Really Different? Regional Programme on Enterprise Development, The World Bank, July. (Working Paper).
- Shah, Zakir and Qazi Masood (2003) The Determinants of Foreign Direct Investment in Pakistan: An Empirical Investigation. *The Pakistan Development Review* 42: 4, 697–714.
- Siddharthan (2006) Regional Differences in FDI Inflows: China—India Comparison.

## Effectiveness of Foreign Aid and Human Development

NASIM SHAH SHIRAZI, TURKHAN ALI ABDUL MANNAP, and MUHAMMAD ALI

### 1. INTRODUCTION

Foreign aid has been contributory towards fostering broad-based development and complementing national development initiatives in the recipient countries. Pakistan, like other capital-scarce nations, conspicuously relies on foreign aid to finance savings-investment gap and trade gap. The overarching aim of aid is to realise the national development strategy and prevail over the capacity gaps in effective public service delivery.

The development aid by the donors<sup>1</sup> to the developing world is expected to bring forth economic growth, reduced poverty and better living standards. Foreign aid is transferred to recipient countries in the form of programme loan, project aid, commodity aid, technical assistance, emergency relief etc.

Pakistan, since its inception, has been relying on foreign aid to support its development programmes. At the outset, the pivot of foreign assistance was on grants in order to rationalise fiscal strain and increase economic growth thereof. Down the road, however, the composition of aid changed from grants and grants-like-assistances to hard loans that leaned Pakistan's tax-to-GDP ratio alarmingly and led the country to a severe debt-servicing crisis.

Pakistan need foreign aid to meet its two-gaps, to meet the public expenditure, to get technical assistance and capacity building of institutions. It is also required for infrastructure development and for stimulating economic growth.<sup>2</sup>

The aid effectiveness literature in the context of growth is exhaustive and the researchers have explored the effects of foreign aid on economic growth or per capita income in great detail [see Papanek (1973); Chenery and Carter (1973); Boone (1996); Dollar and Easterly (1999); Knack (2000); Gounder (2001, 2002); Mosley and Hudson (2001) and Ishfaq (2004)]. It is believed that traditional income based measures of well-

Nasim Shah Shirazi <nasimss@iiu.edu.my> is Professor and Turkhan Ali Abdul Mannap <turkhan@iiu.edu.my> is Assistant Professor, Department of Economics, Faculty of Economics and Management Sciences, International Islamic University, Malaysia (IIUM). Muhammad Ali <madmg7@gmail.com>, District Management Group, Government of Pakistan.

*Authors' Note:* This paper is based on MPhil thesis of Muhammad Ali.

<sup>1</sup>Generally, the terms 'donors' and 'development partners' are used euphemistically for lenders.

<sup>2</sup>Taken from the official presentation by Economic Affairs Division, Pakistan (2008).

being such as per-capita-income mask the real impact of foreign aid on development outcomes and requires a broader measure. Until quite recently, the literature has not addressed the impact of aid on development and only a handful of researchers highlight the correlated impacts of aid on social indicators such as health, education, fertility, sanitation and poverty.

In the realm of history, the question of economic growth and social welfare has been addressed diversely. Most recently, the gamut of development was broadened by enveloping social indicators such as literacy, infant mortality, life expectancy, access to water and sanitation etc. The adoption of Millennium Development Goals<sup>3</sup> (MDGs) at the Development Summit of the United Nations in 2000<sup>4</sup> was an upshot to this agenda and furthered the scope of development.

With this broader perspective, MDGs outlined the eradication of extreme poverty and hunger; achievement of universal primary education; promotion of gender inequality and empowerment of women; reduction of child mortality; improvement of maternal health; combating HIV/AIDS, malaria, and other diseases; ensuring environmental sustainability; and development of global partnership.

Today, development effectiveness insinuates achieving these goals and economic literature has riveted focus on the expression in social context. With this object, the study analyses the question of effectiveness towards the achievement of goals in the special context of a set of social outcomes in Pakistan. More specifically, the paper will focus the core question that 'how' and 'how far' foreign aid has affected the 'health', 'education', and overall 'human development index' in Pakistan. The rest of the paper is organised as follow.

Section 2 reviews the selected literature on aid-development nexus, Section 3 discusses the methodology applied and data sources, Section 4 analysis the results while Section 5 concludes the paper.

## **2. REVIEW OF SELECTED AID-DEVELOPMENT LITERATURE**

The literature exposing the impact of foreign aid on growth through income based approach is prolific but aid-development relationship is still in embryo. The literature addresses the question of aid and growth in three generations. The 'first generation' maintains that aid increases savings directly and not through consumption or investment, which serves as an increment to the capital stock and, in effect, stimulates growth. The second generation, however, asserts that investment is the major 'direct' determinant of growth and aid and investment make positive contribution to growth. Finally, the third generation finds direct impact of foreign aid on economic growth.

<sup>3</sup>According to UN Statistics Division, Pakistan has to report on 51 out of 61 indicators for MDG. Unfortunately, we have no data on 9, little or no capacity to monitor 12, weak monitoring capacity for 16, reasonable capacity to monitor 5 indicators and good capacity to monitor 9 indicators. Pakistan has chosen 34 indicators to monitor for the Pakistan Millennium Development Goals Report. [Pakistan (2006)].

<sup>4</sup>MDGs were developed out of the eight chapters of the United Nations Millennium Declaration, signed in September 2000. The eight goals and 21 targets include (i) Eradicate extreme poverty and hunger, (ii) Achieve universal primary education, (iii) Promote gender equality and empower women, (iv) Reduce child mortality, (v) Improve maternal health, (vi) Combat HIV/AIDS, malaria, and other diseases, (vii) Ensure environmental sustainability, and (viii) Develop a global partnership for development.

Aid effectiveness has also been subjected to good economic policies. Like aid fungibility theory maintains that aid finances projects and programmes, which in the absence of aid, might have been financed by the partners themselves, thus freeing resources for other (perhaps less beneficial) purposes. According to the displacement theories, however, the increase in aid inflows is not necessarily proportionate to increase in investment, and therefore it may not lead to growth. This is because aid displaces domestic savings and/or crowds out private investment.

The dimensions and implications of aid-development bond examined in the literature provide a useful insight on the subject. The findings of some important studies analysing the social effects of aid are tabulated at Table 1.

Table 1

*Impact of Aid on Social Indicators*

| Researcher                      | Key Findings  |
|---------------------------------|---|
| Boone (1996)                    | Aid does not promote economic development for two reasons: poverty is not caused by capital shortage, and it is not optimal for politicians to adjust distortionary policies when they receive aid flows. |
| Pedersen (1996)                 | Foreign aid distorts development.   |
| Burnside and Dollar (1998)      | Aid reduces infant mortality under good economic management.  |
| Collier and Dollar (2000, 2001) | The impact of aid on poverty depends on its impact on per-capita income growth; and impact of per-capita income growth on poverty reduction.  |
| Mosley, <i>et al.</i> (2004)    | Foreign aid has an indirect impact on poverty and the well-being of recipient countries.  |
| Morrissey (2003)                | Aid has either a direct effect on welfare or increases welfare via an effect on growth. Public spending (on social services) does not appear to be effective (except perhaps in middle-income countries). |
| Feeny (2003)                    | Foreign aid has led to small increases in investment expenditures but to minor reductions in health and education expenditures.   |
| Gomanee (2003)                  | Aid contributes to development even if it does not add to economic growth.  |
| Ishfaq (2004)                   | Foreign Aid, though in a limited way, has helped in reducing the extent of poverty in Pakistan.   |
| Addison, <i>et al.</i> (2005)   | Aid increases pro-poor public expenditure and has positive impact on growth. Aid broadly works to reduce poverty, and poverty would be higher in the absence of aid.                                      |
| Fielding, <i>et al.</i> (2006)  | There is straightforwardly positive effect of aid on development outcomes.  |

Table 1 shows that aid-development relationship is also not well grounded and the findings are diverse. Some researchers maintain that aid has a significantly positive impact on development while some find it as an impediment to development outcomes. Most important, perhaps, are the findings by Gomanee (2003) and Ishfaq (2004) which have analysed the effect of aid on both 'growth' and 'development' thereby drawing a redline between them. They hold that "aid contributes towards development or poverty reduction without increasing economic growth".

Fielding, *et al.* (2006) explored a new avenue in aid effectiveness literature by assessing the impact of aid on diverse human development indicators, including 'measures of health, education and fertility'. They held that "these dimensions of wellbeing are likely to interact with each other". Nevertheless, study finds positive effects of aid on many development outcomes. In another study, Fielding, *et al.* (2005) established the link of foreign aid with Millennium Development Goals (MDG) targets including 'health, wealth and wisdom'. They explored the extent to which aid affects MDG related variables and provides substantial perspective on social aspect of aid. They concluded that aid can be expected to improve outcomes across a wide variety of development indicators, including sanitation and child health and basic household assets along with schooling. However, the size of the predicted effect varies across countries, across quintiles and across the indicators, but in almost all cases they found an improvement.

The impact of aid on human development index (HDI) has also been discussed in the literature, which contrast the findings of aid-growth literature. McGillivray, *et al.* (2004) examined the 'impact of foreign aid on HDI and found that both conflict and aid are negatively associated with HDI levels'. Besides, aid does not offset the negative impact of conflict on human development. He determined that aid effectiveness is neither more nor less, in terms of its impact on human development, in conflict scenarios.

Three recent cross-country econometric studies have looked at possible links between aid and HDI. Kosack (2003) looked at links between aid, democracy and HDI and reported a 'positive link between aid and HDI that could only be noticed via its interaction with various measures of democratisation. Otherwise, aid alone was typically judged to be negatively associated with HDI values'. He maintains that "both foreign aid (ODA) and Foreign Direct Investment (FDI) have played a significant role in the economic growth and human development in developing countries. Aid, he asserts, is less effective in development *vis-à-vis* foreign direct investment as it ends up largely substituting for government spending that would have occurred anyway".

Gomanee, *et al.* (2003a) looked at links between aid, pro-poor government expenditure and HDI. Both studies found that aid was associated with higher levels of HDI via positive association with pro-poor government expenditure. Gomanee, *et al.* (2003b) found that 'this link was stronger in countries with low HDI values'. Moreover, Feeny (2003) evaluated the 'impact of foreign aid on HDI in Papua New Guinea during the 1990s'.<sup>5</sup> He analysed the 'sectoral allocation and geographic distribution of aid and held that owing to huge grant for budgetary support, the isolated impact of aid on social sector is hard to ascertain'. Moreover, a "fiscal response model for Papua New Guinea

<sup>5</sup>Feeny (2003) followed the conceptual framework of Le and Winters (2001) who evaluated the impact of aid policies on poverty in Viet Nam.

indicates that foreign aid has led to small increases in investment expenditures but to minor reductions in health and education expenditures”.

Some other studies Mosley and Hudson (2001); Verschoor and Kalwij (2002) and Gomanee and Morrissey (2002) who used cross country data with the head count index, the Human Development Index (HDI) and infant mortality as measure of poverty and well-being, have found evidence of indirect impact of foreign aid on poverty and well-being through its impact on pro-poor expenditures of recipient countries.

The general picture that emerges from the above studies is that impact of aid on growth and development is not conclusive. However, aid effects growth with some degree and also effects development directly and indirectly. The literature showing link between aid and *education index, human development index and economic growth* is not much discussed with respect to Pakistan, therefore this study is devoted for the purpose.

### 3. METHODOLOGY AND DATA SOURCES

#### 3.1. Methodology

The vector error correction model is employed to infer cointegration (that is long run relationship between the variables involved) among the series. According to the ‘Granger Representation Theorem’ not only does cointegration imply the existence of an error correction model but also the converse applies, that is, the existence of an error correction model implies cointegration of the variables. Recent developments in cointegration and error correction model as pointed by Pesavento (2004) suggest that the Johansen’s test for cointegration has low power in both large and small sample compared to the error correction model. In fact, Kremers, *et al.* (1992) have argued that the standard *t*-ratio for the coefficient on the error-correction term in the dynamic equation is a more powerful test for cointegration. Banerjee, *et al.* (1986) and Kremers, *et al.* (1992) show that standard asymptotic theory can be used when conducting the test in the context of an error correction model; specifically, the *t*-statistics on the error correction term coefficients have the usual distribution.

Since our task is to determine the causal direction between the two variables in question, we estimate the following vector error correction model and for a two variable case, we specify the following bi-variate vector error correction models (VECM) as.<sup>6</sup>

$$\Delta y_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta x_{t-i} + \sum_{j=1}^p \beta_j \Delta y_{t-j} + y_1 ecm_{t-1} + \varepsilon_{1t} \quad \dots \quad \dots \quad (1)$$

where  $ecm_{t-1}$  is the lagged residual from the cointegration between  $y_t$  (say, ODA) and  $x_t$  (EI) in level. Granger (1988) points out that based on Equation (1), the null hypothesis that  $x_t$  does not *Granger* cause  $y_t$  is rejected not only if the coefficients on the  $x_{t-j}$ , are jointly significantly different from zero, but also if the coefficient on  $ecm_{t-1}$  is significant. The VECM also provides for the finding that  $x_{t-j}$  *Granger* cause  $y_t$ , if  $ecm_{t-1}$  is significant even though the coefficients on  $x_{t-j}$  are not jointly significantly different from zero. Furthermore, the importance of  $\alpha$ 's and  $\beta$ 's and represent the short-run causal impact,

<sup>6</sup>We do recognise that model with only two variables may suffer from model misspecification. However, given limited data, we want reserve for degree of freedom rather than complicate the model. Multivariate model will be undertaken in the future research.

while  $\gamma$ 's gives the long-run impact. In determining whether  $y_t$  Granger cause  $x_t$ , the same principle applies with respect to Equation (2). Above all, the significance of the error correction term indicates cointegration, and the negative value for  $\gamma$ 's suggest that the model is stable and any deviation from equilibrium will be corrected in the long-run. Given the nature of the data under investigation, we do not expect the coefficients of the  $x_{t-j}$  are jointly significantly differently from zero. This is because it takes time for the aid to show any effect if there is any.

### 3.2. Data and Source of Data

The analysis in the study is based on five annual time-series. The missing value for GDP per capita for year 2006 was computed using moving average method. Other data are obtained from various resources, including: (1) Economic Survey of Pakistan, various issues, (2) Annual Statistical Books of Federal Bureau of Statistics, various issues. (3) World Development Indicators, 2007, the World Bank, (4) UNESCO institute of Statistics (Online database), and (5) UNESCAP (United Nations Economic and Social Commission for Asia and Pacific) Online Data Centre etc.

It includes the yearly net flows to Pakistan over a thirty-one-year period from 1975 to 2006 in US \$ billions and then converted into the percentage of GDP. ODA consists of concessional loans and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in recipient countries and territories. ODA is included in the model to capture the influence of aid on social indicators and to see whether it affects the above four endogenous well-being variables. The implicit assumption in the model is that aid affects Human Development, Life Expectancy Index, Education Index and GDP Index<sup>7</sup> either directly, through projects by affecting the allocation of government spending or indirectly through growth. It is also possible that ODA may increase the non-income welfare especially health and education, but may not have any impact on growth or vice-versa.

ODA accelerates development process through "Financial-Gap-Filling Process" i.e., it generates additional domestic savings as a result of the higher growth rates. Secondly, ODA affects the level of human development through "Labour-Gap-Filling Process" i.e., technical assistance in the form of high-level worker transfer and institutional capacity building to ensure effective utilisation of aid and generate economic growth.

In this regard, reference is invited to Fielding, *et al.* (2006) who assessed the impact of aid on diverse human development indicators, including measures of health, education and fertility. Besides, McGillivray, *et al.* (2004) examines the impact of foreign aid on HDI finding that aid is negatively associated with HDI levels. Gomanee, *et al.* (2003a, 2003b) found that aid is associated with higher levels of the HDI via a positive association with pro-poor government expenditure.

<sup>7</sup>The calculations were done in Microsoft Excel using the following formulas:

$$\text{HDI} = [(\text{Life expectancy index} + \text{Education Index} + \text{GDP Index})/3];$$

$$\text{Where Life expectancy index} = (\text{Life expectancy at birth} - 25) / (85 - 25);$$

$$\text{Education Index} = [2/3(\text{Adult literacy rate}/100) + [1/3(\text{Combined gross enrolment ratio})/100];$$

$$\text{GDP Index} = [\text{Log}(\text{GDP per capita at PPP US\$}) - \text{Log}(100)] / (\text{Log}(40000) - \text{Log}(100)].$$

#### 4. EMPIRICAL RESULTS AND DISCUSSIONS

Before testing for causality test bases on Equations (1) and (2), it is essential to determine the order of integration for each of the variables under consideration. In literature, standard tests for unit root such as the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests proposed by Dickey and Fuller (1979) and, Phillips and Perron (1988), respectively are generally used. Following this practice, we use both test to conduct the unit root test. The test results are shown in Table 2. Table 2 shown that all the variables are not stationary in levels but it turn to be stationary at the difference.

Table 2

##### *Unit Root Test*

|      | ADF Test |            | PP test |            |
|------|----------|------------|---------|------------|
|      | Level    | Difference | Level   | Difference |
| EI   | 0.956    | -4.165**   | 0.898   | -4.615**   |
| GI   | -2.212   | -2.11**    | -3.599  | 2.507      |
| LODA | -2.182   | -6.018**   | -1.865  | -2.028     |
| HDI  | -1.051   | -5.338**   | -1.496  | -5.657**   |
| LEI  | -1.262   | -1.255     | -1.659  | -12.308**  |

Having determined all the variables under consideration are integrated of order one, that is they are  $I(1)$ . We proceed for the testing of *Granger* causality by using the vector error correction framework. As we discussed in the previous section, according to Pesavento (2004) that the Johansen's test for cointegration has low power in both large and small sample compared to the error correction model. In fact, Kremers, *et al.* (1992) have argued that the standard  $t$ -ratio for the coefficient on the error-correction term in the dynamic equation is a more powerful test for cointegration. Banerjee, *et al.* (1986) and Kremers, *et al.* (1992) show that standard asymptotic theory can be used when conducting the test in the context of an error correction model; specifically, the  $t$ -statistics on the error correction term coefficients have the usual distribution. Therefore, our results are based on the testing the significance of *ecm* terms of Equation 1.

Table 3 presents the results of estimating of Equation (1). In our study, we can also determine whether two variables are related in the long run and when these variables are related or exhibit lon-run relationship, we would expect the estimated parameters of the error correction terms of Equation (1) are statistically significant from zero. From the VECM results in Table 3, we presented the  $t$ -statistics of error corrections term,  $ecm_{t-1}$ , where we can infer the long run granger causality between the variables. The significant (at least one) of error correction term implies cointegration or exhibit long-run relationship between two variables.

Table 3

*Results of Long Run Causality from the VECM Models (VAR=2)*

|             | Dependent Variable | t-statistics of ECM Term from VECM Model ( $Ecm_{t-1}$ ) | Implication of Direction of Granger Causality |
|-------------|--------------------|--|---|
| ODA vs. GI  | $\Delta GI$        | -2.68**  | ODA=>GI                                       |
|             | $\Delta ODA$       | -2.19**  | GI=>ODA                                       |
| ODA vs. EI  | $\Delta EI$        | -0.361   | ODA $\neq$ >EI                                |
|             | $\Delta ODA$       | -2.0*  | EI=>ODA                                       |
| ODA vs. LEI | $\Delta LEI$       | -2.61**  | ODA=>LEI                                      |
|             | $\Delta ODA$       | -1.36  | LEI $\neq$ >ODA                               |
| ODA vs. HDI | $\Delta HDI$       | -2.10**  | ODA=>HDI                                      |
|             | $\Delta ODA$       | 0.351  | HDI $\neq$ >ODA                               |

Notes: Asterisk \* and \*\* denotes 10 percent and 5 percent level of significance. The symbol denotes Granger cause direction.

Generally, results in Table 3 indicate that there are cointegration between ODA and all other variables under consideration. That means that there is at least one way Granger causality between ODA and other variables. More specifically, there is feedback Granger causality between GI and ODA. That is, Economic growth induces ODA and ODA Granger cause economic growth. As far as Education index, Human development index and life expectancy index concerned, there are only unidirectional Granger causality from ODA to Education index, Human development index and life expectancy index. This is consistent with other literature that ODA contribute to human development. See for Gomanee, *et al.* (2003a, 2003b) and Feeny (2003).

## 5. CONCLUSION

It is claimed that foreign aid has been contributory towards fostering broad-based development and complementing national development initiatives in the recipient countries. Pakistan, like other capital-scarce nations, conspicuously relies on foreign aid to finance savings-investment gap and trade gap. The overarching aim of aid is to realise the national development strategy and prevail over the capacity gaps in effective public service delivery.

To empirically assess the above statement, this paper empirically tests the above hypothesis using vector error correction approach. Our result shows that there is feedback Granger causality between GI and ODA. That is, Economic growth induces ODA and ODA Granger cause economic growth. As far as Education index, Human development index and life expectancy index concerned, there are only unidirectional Granger causality from ODA to Education index, Human development index and life expectancy index. This is consistent with other literature that ODA contribute to human development.

Our results have important policy implications. A proper management of foreign aid under the aegis of Paris Declaration on Aid Effectiveness and Harmonisation, 2005 and Accra Agenda will contribute to the human development in the case of Pakistan. In this regard, Pakistan should consolidate its negotiation skills and develop mechanism for exchange-rate forecasting so as to improve aid predictability and donors should be

obligated to align their priorities in accordance with country's national priorities. The existing monitoring and evaluation mechanism is insufficient to ensure periodical reviews of all the projects/programmes and requires capacity building. The debt swaps in social sector should be extended in order to improve human development indicators and government-led partnership through Sector Wide Approach (SWAp). Finally, Pakistan should focus take effective measures to get out of debt-trap through a sustainable debt-reduction strategy.

### REFERENCES

- Addison, T., G. Mavrotas, and M. McGillivray (2005) Development Assistance and Development Finance: Evidence and Global Policy Agendas. *Journal of International Development* 17: 819–36.
- Banerjee, A., J. J. Dolado, D. F. Hendry, and G. W. Smith (1986) Exploring Equilibrium Relationship in Econometric Through Static Models: Monte Carlo Evidence. *Oxford Bulletin of Economics and Statistics* 48, 253–277.
- Boone, Peter (1996) Politics and the Effectiveness of Foreign Aid. *European Economic Review*
- Burnside, Craig and David Dollar (1998) Aid, the Incentive Regime, and Poverty Reduction. The World Bank. (Policy Research Working Paper No. 1937).
- Chenery, H. B. and N. G. Carter (1973) Foreign Assistance and Development Performance, 1960-1970. *American Economic Review* 63:2.
- Collier, Paul and David Dollar (2000) Can the World Cut Poverty in Half? How Policy Reform and Effective Aid can Meet International Development Goals. The World Bank. (Policy Research Working Paper Series 2403).
- Collier, Paul and David Dollar (2001) Can the World Cut Poverty in Half? How Policy Reform and Effective Aid can Meet International Development Goals. *World Development* 29:11, 1787–1802.
- Dollar, David R. and William Easterly (1999) The Search for the Key: Aid, Investment and Policies in Africa. *Journal of African Economies* 8:4.
- Pakistan, Government of (Various Issues) *Economic Survey of Pakistan*. Islamabad: Finance Division.
- Federal Bureau of Statistics (Various Issues) *50 Years of Pakistan; Pakistan Demographic and Health Survey (PDHS) 1990-91* and *Pakistan Statistical Year Books*. Islamabad.
- Feeny, Simon (2003) The Impact of Foreign Aid on Poverty and Human Well-being in Papua New Guinea. *Asia-Pacific Development Journal* 10: 2.
- Fielding, David, *et al.* (2006) A Wider Approach to Aid Effectiveness: Correlated Impacts on Health, Wealth, Fertility and Education. The World Institute for Development Economics Research (WIDER) established by the United Nations University (UNU).
- Fielding, McGillivray, and Torres (2005) Achieving Health, Wealth and Wisdom: Links Between Aid and the Millennium Development Goals. World Institute for Development Economics Research of the United Nations University (UNU-WIDER).
- Franco-Rodriguez, S., M. McGillivray, and O. Morrissey (1998) Aid and The Public Sector in Pakistan: Evidence with Endogenous Aid. *World Development* 26, 241–1250.

- Gomanee, K., O. Morrissey, P. Mosley, and A. Verschoor (2003a) Aid, Pro-poor Government Spending and Welfare. Centre for Research in Economic Development and International Trade, University of Nottingham, Nottingham. (CREDIT Research Paper 03/01)
- Gomanee, K., S. Girma, and O. Morrissey (2003b) Aid, Public Spending and Human Welfare, Evidence from Quintile Regressions. Centre for Research in Economic Development and International Trade, University of Nottingham, Nottingham. (CREDIT Research Paper 03/13).
- Gomanee, K., S. Girma, and O. Morrissey (2003) Searching for Aid Threshold Effects: Aid, Growth and the Welfare of the Poor. Paper presented at a Seminar at CASE. Oxford, 28 January.
- Gomanee, K. and O. Morrissey (2002) Evaluating Aid Effectiveness Against a Poverty Reduction Criterion. DESG Conference paper, Nottingham, April.
- Gounder, R. (2001) Aid-Growth Nexus: Empirical Evidence from Fiji. *Applied Economics* 33: 8.
- Gounder, R. (2002) Empirical Evidence of Foreign Aid and Economic Growth Relationship: The Case of the Solomon Islands. In Mak Arvin (ed.) *Allocation of Foreign Aid and Economic Development New Theoretical and Empirical Perspective*. Westport, Connecticut: Praeger, 141–69.
- Ishfaq, Mohammad (2004) Aid Effectiveness, Debt Capacity and Debt Management in the Economy of Pakistan. A dissertation submitted for PhD degree to Quad-i-Azam University, Islamabad.
- Knack, Stephen (2000) Aid Dependence and Quality of Governance: A Cross-country Empirical Analysis. The World Bank (Policy Research Working Paper Series 2396).
- Kremers, J. M., N. R. Ericsson, and J. J. Dolado (1992) The Power of Cointegration Test. *Oxford Bulletin of Economics and Statistics* 54:325–348.
- Le, T. H. and P. Winters (2001) Aid Policies and Poverty Alleviation: The Case of Viet Nam. *Asia-Pacific Development Journal* 8:2, 27–44.
- McGillivray, Mark and Farhad Noor Bakhsh (2004) Aid, Conflict and Human Development. Paper presented at Conference, Making Peace Work, World Institute for Development Economic Research, United Nations University, Helsinki, June 4-5.
- Mosley, P., J. Hudson, and A. Verschoor (2004) Aid, Poverty Reduction and the ‘New’ Conditionality. *Economic Journal* 114:496, F217–F243.
- Papanek, Gustave (1972) The Effects of Aid and Other Resource Transfers on Saving and Growth in Less Developed Countries. *Economic Journal* 82, September.
- Pedersen, Karl R. (1996) Aid, Investment and Incentives. *Scandinavian Journal of Economics* 98:3, 423–438.
- Pesavento, E. (2004) Analytical Evaluation of the Power of Tests for the Absence of Cointegration. *Journal of Econometrics* 122, 349–394.
- Verschoor, A. and A. Kalwij (2002) Aid, Social Policies and Pro-poor Growth. Department of Economics, University of Sheffield, Research Programme on Risk, Labour Markets and Pro-poor Growth. (Occasional Paper 4).

## **Comments**

The authors have used 2/2 model and there is a likelihood of spurious regression in such estimations as it does not explain the impact of missing variables or inclusion of another variable in the model. Secondly, the econometricians are unsure whether Grangers Causality is a test of causation or correlation. The paper establishes a long-run equilibrium and does not discuss the short-run relationship of variables. The reason for unidirectional relationship in case of fourth variable has not been mentioned and the economic interpretation of variables is also missing.

Quaid-i-Azam University,  
Islamabad.

**Wasim Shahid Malik**

## Investment, Inflation and Economic Growth Nexus

NASIR IQBAL and SAIMA NAWAZ

### 1. INTRODUCTION

High and sustainable economic growth and low inflation are the two main objectives of policy-makers and the central bank. It is generally believed that inflation has negative and significant impact on economic growth in medium- and long-run [Khan and Senhadji (2001)]. However, the existence and nature of relationship between inflation and economic growth and the channels through which it affects real economic activities has been the subject of considerable interest and debate due to inconclusive results. Recent literature on this issue has uncovered some important findings.

Empirical literature on inflation growth nexus is divided into two main strands. One strand of literature has found negative and significant relationship between inflation and economic growth [Fisher (1993); Barro (1995); Bullard and Keating (1995); Malla (1997); Bruno and Easterly (1998) and Faria and Carneiro (2001)] while other has confirmed positive and significant association between inflation and economic growth [Lucas (1973); Mallik and Chowdhury (2001) and Gillman and Nakov (2004)]. These strands of literature highlight the possibility of non-linear relationship between inflation and economic growth. Several recent empirical studies have explored that the relationship between inflation and economic growth is in fact nonlinear. They are trying to support the hypothesis that low and stable inflation promotes economic growth and vice versa.

Fischer (1993) explored this possibility and noted the existence of nonlinear relationship between inflation and economic growth. He found that there was a positive association between inflation and economic growth at low rate of inflation, and a negative one as inflation rose. Findings of Fischer (1993) generate new debate among the economists to determine precisely the level of inflation that promotes economic growth.

Nasir Iqbal <nasir@pide.org.pk> is Staff Economist at the Pakistan Institute of Development Economics, Islamabad. Saima Nawaz <saimanawaz-2006@yahoo.com> is PhD Student at the Pakistan Institute of Development Economics, Islamabad.

*Authors' Note:* The authors thank to Dr Musleh ud Din Joint Director at the Pakistan Institute of Development Economics, Islamabad for their valuable suggestions and Muhammad Javid Staff Economist at the Pakistan Institute of Development Economics, Islamabad for help in estimation. The authors also wish to thank Dr Mohsin S. Khan, Dr Waqar Masood Khan and Dr Wasim Shahid Malik for their useful comments on an earlier version.

In this context, various empirical studies are conducted. Sarel (1996) found that before 1970s inflation rates were modest in most countries and empirical studies during this period show the evidence of a positive relationship between inflation and economic growth while after 1970s inflation rates started to be high and a negative relationship between these variables, beyond that time period, was observed. Bruno and Easterly (1998) examine the determinants of economic growth using annual CPI inflation of 26 countries which experienced inflation crises during the period between 1961 and 1992. Their empirical analysis predicts that inflation rate of 40 percent and over is considered as the threshold level of inflation.

Khan and Senhadji (2001) explored the inflation and growth relationship separately for industrial and developing countries and re-examined the issue of the existence of “Threshold” effects. Their results show that the threshold rate of inflation is 1–3 percent for industrial countries and 7–11 percent for developing countries. Lee and Wong (2005) estimated the threshold levels of inflation for Taiwan and Japan using quarterly data set from the period between 1965–2002 for Taiwan and 1970–2001 for Japan. Their estimation of the threshold models suggests that an inflation rate beyond 7.3 percent is detrimental for the economic growth of Taiwan. On the other hand, they found two threshold levels for Japan, which are 2.5 percent and 9.7 percent. They suggest that inflation rate below the estimated level of 9.7 percent is favourable to economic growth and beyond this threshold value it is harmful for the economic growth in Japan. Munir and Mansur (2009) investigate the non linear relationship between inflation rate and economic growth during the period of 1970-2005 for Malaysia. They found that threshold level of inflation is 3.9 percent and support the view that the relationship between inflation rate and economic growth is nonlinear. Inflation rate above the threshold level significantly retards growth rate of GDP and below the threshold level, it promote economic growth significantly. Sergii (2009) investigate the growth-inflation interaction for CIS countries for the period of 2001-2008 and found that when inflation level is higher than 8 percent economic growth is slowed down, otherwise, it is promoted.

How then inflation affect growth and more particularly, what do gives rise to the so-called threshold effect in the relationship? What is the channel through inflation can affect growth in nonlinear settings? Recent literature highlights that investment might be consider as an important channel through which the impact of inflation is transmitted nonlinearly in economic growth. Investment, inflation and economic growth non linear nexus can be explained by using financial market development. Nonlinearity between inflation and financial development is well documented in literature [Boyd and Smith (1998); Huybens and Smith (1998, 1999); Boyd, *et al.* (2001); Khan, *et al.* (2001)]. A predictable increase in the rate of inflation can slow down financial market development. Inflation, a tax on real balance, reduces real returns to savings which in turn causes an informational friction afflicting the financial system. These financial market frictions results in credit rationing and thus limit the availability of investment and finally this reduction in investment adversely impacts economic growth. In endogenous growth literature, economic growth is dependent on rate of return and inflation decreases rate of return [Nelson (1976); Fama and Schwert (1977); Gultekin (1983) and Boyd, *et al.* (1996)], which leads to reduction in capital accumulation and hence decrease the growth rate. Inflation creates uncertainty in the financial market and increases the risk associated

with the investment which translated into reduction in economic activities [Hellerstein (1997)]. Inflation can discourage investors by reducing their confidence in investments that take a long time to mature in stock market. There are few studies that explored the investment inflation relationship and hence its impact on growth. According to Barro (1995) reduction in economic growth is occurred due to reduction in the propensity to investment that is outcome of inflation. He further shows that an increase in average inflation by 10 percentage points per year cause reduction in the ratio of investment to GDP by 0.4-0.6 percentage points and this reduction in investment reduces the real per capita GDP by 0.2-0.3 percentage points per year. Therefore, inflation reduces the level of investment and hence reduction in investment adversely affects economic growth. Li (2006) estimates relationship between inflation and investment for 27 developed and 90 developing countries over the period 1961–2004 and found that relationship is nonlinear for both developed and developing countries.

Pakistan's economy has lost significant momentum in last few years. Deteriorated economic growth coupled with high inflation and low investment is major problems of Pakistan's economy. The growth rate of real GDP has gone down to 1.2 percent in 2008-09 from 9 percent in 2005-05. Investment is a key determinant of growth and its fluctuation reflects the intensification of economic activities. The total investment has declined from 22.5 percent of GDP in 2006-07 to 19.7 percent of GDP in 2008-09 and private sector investment was decelerating persistently since 2004-05 and its ratio to GDP has declined from 15.7 percent in 2004-05 to 13.2 percent in 2008-09. The inflation rate, measured as Consumer Price Index (CPI), has climbed to 22.3 percent during 2008-09 over the corresponding increase of 10.3 percent [Pakistan (2010)].

These statistics reveals that it is important to investigate the nexus among inflation, investment and economic growth. Few studies, in Pakistan, envisage the existence of non linear relationship between inflation and economic growth [Mallik and Chowdhury (2001); Mubarik (2005) and Hussain (2005)]. Mubarik (2005) estimates the threshold level of inflation for Pakistan using an annual data set from the period between 1973 and 2000. He found that an inflation rate beyond 9-percent is detrimental for the economic growth while inflation rate below this level is favourable for the economic growth. Hussain (2005) empirically estimates the threshold level of inflation using standard econometric technique used for estimations of threshold effect for the period of 1973–2005 in Pakistan. He found no threshold level of inflation for Pakistan. These results are in sharp contrast to the findings of Mubarik (2005) where threshold level for Pakistan is at 9 percent. He suggests that targeting inflation exceeding a range of 4–6 percent will be a deterrent to economic growth and this range of inflation is tolerable for Pakistan.

Our study is different in three respects from other studies that have been conducted for Pakistan. First, we focus on a more recent and long time series (1961 to 2008). Secondly, these studies focus on the existence of only one threshold level between these two variables by ignoring the possibility of second threshold in the relationship of inflation and growth. Thirdly, these studies have not examined the role of investment as a channel through which inflation affects economic growth.

The paper has twofold objectives. Firstly, the impact of the inflation rate on economic growth with the possibility of two threshold levels for Pakistan using annual

data from 1961 to 2008 is examined and secondly, nonlinear relationship between inflation and investment has been investigated. Following questions are analysed in this context:

- (1) Does a second threshold level exist in the inflation-growth relationship?
- (2) What is the relationship between inflation and investment? Does the effect of inflation on investment show a similar pattern to that inflation on economic growth?

The remainder of paper is organised as follows: Model specification is discussed in Section 2. Data and descriptive statistics are explained in Section 3. Results are presented in Section 4 while conclusion and policy recommendation are in last section.

## 2. THE MODEL SPECIFICATION

The relationship between inflation and economic growth can be derived using the standard growth equation [Barro (1991) and Sala-i-Martin (1997)]:

$$d \log Y = X\beta + \varepsilon \quad \dots \quad (1)$$

Where  $Y$  is real output,  $X$  is a set of explanatory variables,  $\beta$  is slope coefficients attached with explanatory variables and  $\varepsilon$  is the error term. This basic growth equation is extended to captures the link between inflation and economic growth by using following equation:

$$d \log Y = \alpha_0 + \alpha_1 Inf + X\beta + \varepsilon \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where  $d \log Y$  is growth rate of real GDP,  $Inf$  is growth rate of CPI and  $X$  is matrix of other explanatory variables,  $\beta$  matrix of slope coefficients and  $\varepsilon$  is the error term.

Neoclassical growth model uses investment and population growth in the growth analysis. Increase in investment together with a decrease in population growth rate promotes economic growth. International trade theory proposes to include openness of the economy in the growth regression which is positively related to growth. Money supply is important indicator for financial development. Development in financial sector is positively linked with economic growth. Finally, our empirical analysis uses the following explanatory variables: investment, population growth, M2 and openness of the economy. Choice of variables is consistent with the choice made by other researchers [Khan and Senhadji (2001); Drukker, *et al.* (2005); Mubarik (2005); Hussain (2005); Li (2006) and Sergii (2009)].

So, our final regression model is as follow:

$$d \log Y = \alpha_0 + \alpha_1(Inf) + \beta_1(P) + \beta_2(INV) + \beta_3(F) + \beta_4(O) + \varepsilon \quad \dots \quad \dots \quad (3)$$

Where  $d \log Y$  is growth rate of real GDP,  $Inf$  is growth rate of CPI and  $P$  is population growth rate,  $INV$  is investment to GDP ratio,  $F$  is M2 to GDP ratio,  $O$  is openness ((Export + Import)/GDP) and  $\varepsilon$  is the error term.

Theoretical as well as empirical debate predicts that threshold effects are associated with a rate of inflation exceeding some "critical value" or below some "critical value". Threshold Model was developed by Khan and Senhadji (2001) for the analysis of

threshold level of inflation for industrialised and developing countries. Mubarik (2005) and Hussain (2005) use the same model for the estimation of threshold level of inflation in Pakistan. In this model only one threshold level was captured. We extend this model with the possibility of two threshold level in inflation growth nexus. By introducing two threshold level of inflation; following final regression model is designed:

$$d \log Y = \alpha_1 + \alpha_2(Inf) * I(Inf < \pi_1) + \alpha_3(Inf) * I(\pi_1 \leq Inf \leq \pi_2) \\ + \alpha_4(Inf) * I(Inf > \pi_2) + \beta_1(P) + \beta_2(INV) + \beta_3(F) + \beta_4(O) + \varepsilon \quad \dots \quad (4)$$

Where dependant variable and the control variable are defined as the same as in Equation 3 while  $\pi_1$  and  $\pi_2$  are two threshold level of inflation.  $I(Inf < \pi_1)$ ,  $I(\pi_1 \leq Inf \leq \pi_2)$  and  $I(Inf > \pi_2)$  are indicators functions which take the value of one if the term between parentheses is true and are zero otherwise. This model specifies the effects of inflation with three coefficients:  $\alpha_2$ ,  $\alpha_3$ , and  $\alpha_4$ .  $\alpha_2$  denotes the effect of inflation below the first threshold level  $\pi_1$ ,  $\alpha_3$  denotes the effect of inflation on economic growth between  $\pi_1$  and  $\pi_2$ , and  $\alpha_4$  denotes the effect of inflation on economic growth exceeding the second threshold level  $\pi_2$ .

Identification of threshold is based on the methodology defined by Khan and Senhadji (2001). Regression equation is estimated for different values of threshold which is chosen in an ascending order (i.e., 1, 2 and so on), the optimal value threshold is obtained by finding the value that maximises the  $R^2$  from the respective regressions. This also implies that the optimal threshold level is that which minimises the residual sum of squares (RSS). This procedure has become widely accepted in the literature on this topic. Search of optimal threshold for wider range of threshold is very tedious. Moreover, Hansen (2000) proposed to search optimal value only in the region where do expect the threshold should be.

Theoretical literature indicates that investment might be the channel through which inflation hits economic growth. Following linear model specification is used to measure the relationship between investment and inflation:

$$INV = \delta_0 + \delta_1 Inf + \delta_2 INV_{t-1} + \varepsilon \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Where  $INV$  is the gross fixed capital accumulation as share of GDP and first lag of  $INV$  is included to control the economic conditions in the last period. With the possibility of two thresholds in investment inflation nexus, following model is designed:

$$INV = \delta_1 + \delta_2(Inf) * I(Inf < \pi_1) + \delta_3(Inf) * I(\pi_1 \leq Inf \leq \pi_2) \\ + \delta_4(Inf) * I(Inf > \pi_2) + \delta_5(INV_{t-1}) + \varepsilon \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Selection of threshold level is based on the similar procedure explained for inflation and economic growth

### 3. DATA AND DESCRIPTIVE STATISTICS

The data are taken from *Economic Survey of Pakistan* (Various Editions) and *Fifty Year Economy of Pakistan* (SBP). Data are ranging from 1961 to 2008. Following variables are used in analysis. Growth of real GDP is measured as annual percentage growth rate of GDP at constant prices based on 2000 prices. Inflation is measured as

annual percent change of average consumer price index. Data for inflation are averages for the year and index is based on 2000=100. Growth rate of population is measured as annual population growth rate. Investment is measured as gross capital formation as percent of GDP. Openness of the economy is measured as share of export plus import in GDP.

Descriptive statistics of sample data shows that the average value of growth rate of output is 5.5 percent, and growth rate of population has the average value of 2.7 percent, investment has average value 18.1 percent and openness of the economy has average value 35.4 percent. Inflation has mean 7.8 percent while M2 as share of GDP has average value of 34.7 (Table 1).

Table 1

*Descriptive Statistics*

| Variables                 | N  | Mean  | SD   | Min   | Max   |
|---------------------------|----|-------|------|-------|-------|
| GDP Growth Rate           | 48 | 5.48  | 2.09 | 1.20  | 9.80  |
| Investment as % of GDP    | 48 | 18.08 | 2.15 | 12.93 | 22.95 |
| Inflation                 | 48 | 7.81  | 5.29 | -0.52 | 26.66 |
| Growth Rate of Population | 48 | 2.67  | 0.33 | 1.78  | 3.19  |
| M2 as % of GDP            | 48 | 34.76 | 4.89 | 24.28 | 46.69 |
| Openness                  | 48 | 35.39 | 3.19 | 28.85 | 42.62 |

The stationarity of the series is confirmed by applying Augmented Dickey-Fuller (ADF) test. Table 2 gives the result of ADF for all series. Real GDP growth rate and openness are stationary at level while Investment to GDP ratio, Inflation, Population Growth rate and M2 as percent of GDP are non stationary at level and become stationary at first difference.

Table 2

*Test for Non-stationarity of Variables*

| Variables                 | Level    |            |                | First Difference |            |            |
|---------------------------|----------|------------|----------------|------------------|------------|------------|
|                           | No Trend | With Trend | Result         | No Trend         | With Trend | Result     |
| GDP Growth Rate           | -5.73    | -6.01      | Stationary     | -                | -          | -          |
| Investment as % of GDP    | -2.12    | -2.39      | Non-stationary | -6.98            | -6.99      | Stationary |
| Inflation                 | -2.15    | -2.86      | Non-stationary | -4.60            | -3.89      | Stationary |
| Growth Rate of Population | -0.25    | -2.44      | Non-stationary | -3.77            | -4.28      | Stationary |
| M2 as % of GDP            | -0.73    | -1.44      | Non-stationary | -5.92            | -3.75      | Stationary |
| Openness                  | -3.62    | -3.76      | Stationary     | -                | -          | -          |

Note: 5 percent critical value is -2.87 for the case of no-trend, and -3.42 when a trend is included. AIC is used for lag selection.

## 4. MODEL ESTIMATION

### 4.1. Inflation and Economic Growth Nexus

The simple linear model of economic growth and inflation as defined in Equation 3 has been estimated. The basic purpose of simple linear regression is to reveal the shape of the growth function relating the inflation with economic growth. Result indicates that

inflation has significant negative impact on economic growth at second lag.<sup>1</sup> One percent increases in inflation causes 0.2 percent reduction in growth rate of GDP. Investment has positive and significant impact on economic growth while population growth also has positive and significant impact on economic growth (Table 3). The coefficient of investment / GDP ratio is 0.65 which indicates that a 1 percentage point increase in investment will cause a 0.65 percentage point increase in growth. Other variable like M2 to GDP ratio and openness was also used in the regression equation and finally both variables were drop due to their insignificant relationship with economic growth.

Table 3

*Linear Estimation Results (Dependant Variable is GDP Growth Rate)*

| Variable   | Coefficient | t-Statistic |
|------------|-------------|-------------|
| Constant   | -14.35769   | -2.368223   |
| Inflation  | -0.198856   | -3.274821   |
| Investment | 0.651056    | 3.573079    |
| Population | 0.036202    | 2.696865    |

R-Squared = 0.31; DW = 2.12; Jarque-Bera = 0.12; Ramsey RESET Test (1, 41) = 1.11 [0.30].

Nonlinear model has been estimated using Equation 4. For estimation of  $\pi_1$  and  $\pi_2$ , we apply the methodology given in Section 2. First, we estimate the Equation 3 with one threshold level. With the possibility of one threshold level, we reformulate Equation 3 as follow:

$$d \log Y = \alpha_1 + \alpha_2(\text{Inf}) * I(\text{Inf} \leq \pi_1) + \alpha_3(\text{Inf}) * I(\text{Inf} > \pi_1) + \beta_1(P) + \beta_2(I) + \varepsilon \quad (7)$$

We apply a range of threshold level ranging from 1 to 8 and choose the value that minimises the error sum of square as mention by Hansen (2000). Finally, result indicates that the value of  $\pi_1$  is 6 and inflation below 6 percent has positive but insignificant impact on economic growth (Appendix Table 1-A and Table 1-B). Then, we carry out a significant test of no threshold against one threshold  $\pi_1$ . The null hypothesis is  $H_0 = \alpha_2 = \alpha_3$  against the alternative of  $H_0 = \alpha_2 \neq \alpha_3$ . The result indicates that null hypothesis is rejected at 5 percent level of significance which confirms the existence of one threshold level in inflation data.

The existence of second threshold in the relationship between growth and inflation is tested by using Equation 4. By using same process we find the second threshold level which is 11 (Table 4). Then, we carry out a significant test of one threshold against two thresholds. The null hypothesis is existence of only one threshold against the alternative of existence of two thresholds. The result supports the existence of two thresholds against one at 5 percent level of significance.

Our findings show that for the low inflation below the fist threshold level, the coefficient of inflation (0.18) is positive which implies that 1 percentage increase in inflation will cause a 0.18 percentage point increase in economic growth. However, this positive impact is not significant. This indicates that, in Pakistan, low inflation upto 6 is

<sup>1</sup>Mubarik (2005) and Hussain (2005) also found that inflation effect economic growth at second lag.

not harmful for the country.<sup>2</sup> In the middle range of inflation i.e. between two threshold level (inflation between 6 and 12), the coefficient of inflation ( $-0.32$ ) is negative and significant at one percent level. Results show that an increase in one percentage point inflation per year is associated with a reduction of the growth rate of real GDP by 0.32 percentage point. When inflation rate is exceeding the 11 percentage point i.e. above the second threshold level, the coefficient of inflation ( $-0.06$ ) is still negative and significant. However, this negative effect is smaller than that when inflation is in the range of 6 to 11. A one percentage increase in inflation, when inflation rate is more than eleven percentage point, a reduction of 0.06 percentage point is occur in real GDP growth rate.

Table 4

*Estimation with Thresholds Effect (Dependant Variable is GDP Growth Rate)*

| Variable                         | Coefficient | t-Statistic |
|----------------------------------|-------------|-------------|
| Constant                         | -10.16507   | -1.596767   |
| Inflation <6                     | 0.183643    | 0.517296    |
| Inflation >=6 and Inflation <=11 | -0.322854   | -2.611079   |
| Inflation > 11                   | -0.056985   | -3.827330   |
| Investment                       | 3.449236    | 2.593879    |
| Population                       | 0.512724    | 2.622883    |

R-Squared = 0.37; DW = 2.02; Jarque-Bera = 0.09; Ramsey RESET Test (1, 39) = 0.34 [0.56].

The existence of two threshold levels implies that inflation can be divided into three parts. As inflation rises from zero to six percentage point, the effect on economic growth is negligible or even positive. As inflation crosses the low threshold level, it has significant and negative impact on the GDP up to a certain level. When inflation crosses second threshold level, the marginal adverse impact of inflation on growth diminishes. The smaller negative coefficient illustrate that the inflation growth relationship flattens when the economy has high inflation. Intuitively, we can say that once inflation exceeds a threshold level, all of the damage to the financial system has already been done, and then perfect foresight dynamics comes into being. When these occur, further increases in inflation have no additional detrimental effects on economic growth.<sup>3</sup>

#### 4.2. Inflation and Investment Nexus

Theoretical literature has suggested that investment might be the channel that link inflation to economic growth. The linear model is estimated by using Equation 5 to uncover the relationship between inflation and investment. Results indicate that inflation has significant and negative impact on investment/GDP ratio. The coefficient of inflation ( $-0.08$ ) shows that a 1 percentage point increase in inflation will cause a 0.08 percentage point reduction in investment. The first lag of investment is used to control the economic conditions in the last period which has significant and positive impact on current investment (Table 5). This linear analysis confirms the inflation-investment/GDP nexus like inflation and GDP growth. A dummy variable ranging from 1973 to 1981 is used to make data stable and normal.

<sup>2</sup>Mubarik (2005) found that in Pakistan, inflation up to 9 percent is not harmful while Hussain (2005) found that inflation between 4 percent to 6 percent is feasible.

<sup>3</sup>Li (2006) also found a similar result for developing countries.

Table 5

*Linear Estimation Results (Dependant Variable is Investment/GDP Ratio)*

| Variable                | Coefficient | t-Statistic |
|-------------------------|-------------|-------------|
| Constant                | 7.682031    | 3.179267    |
| Inflation               | -0.084268   | -1.940828   |
| Lag of Investment       | 0.589304    | 4.515194    |
| Dummy from 1973 to 1981 | -0.945999   | -1.699239   |

R-Squared = 0.55; DW = 1.80; Jarque-Bera = 0.08; Ramsey RESET Test (1, 40) = 1.13 [0.32].

Nonlinear model of investment and inflation is estimated using Equation 6. By applying same process as given for inflation and growth, a single threshold at 7 percent is estimated because we cannot reject the null hypothesis of one threshold against 2 thresholds. Table 6 presents the estimation results of the inflation-investment relationship with threshold effects. The coefficient of inflation (0.05) is positive but insignificant when inflation is below the threshold level. However, as inflation rates exceed the threshold level, the effect of inflation on the level of investment is negative and significant. The coefficient of inflation (-0.07) shows that a 1 percentage point increase in inflation will cause a 0.07 percentage point reduction in investment as inflation rose from threshold level. These evidences suggest that during a period of high inflation, the level of investment be adversely affected by inflation.

Table 6

*Estimation with Thresholds Effect (Dependant Variable is Investment/GDP Ratio)*

| Variable                | Coefficient | t-Statistic |
|-------------------------|-------------|-------------|
| Constant                | 7.878550    | 3.277259    |
| Inflation <7            | 0.047665    | 0.608740    |
| Inflation >=7           | -0.067759   | -1.949206   |
| Lag of Investment       | 0.579052    | 4.459827    |
| Dummy from 1973 to 1981 | -0.991533   | -1.795522   |

R-Squared = 0.57; DW = 1.81; Jarque-Bera = 0.06; Ramsey RESET Test (1, 40) = 0.11 [0.74].

## 5. CONCLUSION AND POLICY OPTIONS

The objective of the present study has been twofold. Firstly, the impact of the inflation rate on economic growth with the possibility of two threshold level for Pakistan using annual data from 1961 to 2008 has been examined and secondly, nonlinear relationship between inflation and investment is also explored.

Inflation and growth models support the existence of a nonlinear relationship with two thresholds. Existence of a double threshold divides the inflation into three categories i.e. low inflation, moderate inflation and high inflation. Inflation, below the first threshold (6 percent), affects economic growth positively but insignificantly; at moderate rates of inflation, between the two threshold levels (between 6 percent and 11 percent), the effect of inflation is negative and significant; and at high rates of inflation, above the second threshold (above 11 percent), the marginal impact of additional inflation on economic growth diminishes but it is still negative and significant.

The second objective of the study is to explore the mechanism through which inflation affects long-run economic growth in nonlinear settings. Investment is one of the possible channels through which inflation affects economic growth. The analysis indicates the nonlinear relationship between these two variables with only one threshold at 7 percent. Rate of inflation below the threshold level has a positive but insignificant impact on investment, while above the threshold it has strong negative and significant impact on the investment.

These findings provide some important policy implications. The analysis shows that it is desirable to keep the inflation below than 6 percent and therefore central bank should concentrate on those policies which keep the inflation rate below the first threshold because it may be helpful for the achievement of robust economic growth. Higher inflation than the threshold would have adverse consequences for growth. Monetary policy must be designed to stabilise the prices and curb inflation. Low inflation is also helpful for minimising the uncertainties in the financial market which in turn boost investment in the country. Better coordination between monetary and fiscal polices is required to achieve both objectives, i.e., high and sustain economic growth and low inflation.

### Appendices

Appendix Table 1-A

*Estimation of One Threshold Level (Dependant Variable is GDP Growth Rate)*

| Variable      | Coefficient | t-Statistic |
|---------------|-------------|-------------|
| Constant      | -13.94929   | -2.110006   |
| Inflation <6  | 0.240981    | 0.924573    |
| Inflation >=6 | -0.203435   | -3.087819   |
| Investment    | 0.639304    | 3.232172    |
| Population    | 0.035727    | 2.572852    |

R-Squared = 0.32; DW = 2.14; Jarque-Bera = 0.11; Ramsey RESET Test (1, 40) = 1.19 [0.28].

Appendix Table 1-B

*Estimation of One Threshold Level (Dependant Variable is GDP Growth Rate)*

| Variable      | Coefficient | t-Statistic |
|---------------|-------------|-------------|
| Constant      | -10.90925   | -1.748677   |
| Inflation <=6 | -0.561443   | -2.596820   |
| Inflation > 6 | -0.249473   | -3.786838   |
| Investment    | 0.515003    | 2.651303    |
| Population    | 0.035711    | 2.725498    |

R-Squared = 0.36; DW = 2.01; Jarque-Bera = 0.08; Ramsey RESET Test (1, 40) = 1.08 [0.30].

### REFERENCES

- Barro, R. (1991) Economic Growth in a Cross-section of Countries. *Quarterly Journal of Economics* 106:2, 407–443.
- Barro, R. J. (1995) Inflation and Economic Growth. National Bureau of Economic Research. (Working Paper, No. 5326).

- Boyd, J. H. and B. D. Smith (1998) Capital Market Imperfections in a Monetary Growth Model. *Economic Theory* 11, 241–273.
- Boyd, J. H., R. E. Levine, and B. D. Smith (1996) Inflation and Financial Market Performance. Federal Reserve Bank of Cleveland. (Working Paper 9617).
- Boyd, J. H., R. Levine, and B. D. Smith (2001) The Impact of Inflation on Financial Sector Performance. *Journal of Monetary Economics* 47, 221–248.
- Bruno, M. and W. Easterly (1998) Inflation Crises and Long-run Growth. *Journal of Monetary Economics* 41:1, 3–26.
- Bullard, J. and J. Keating (1995) The Long-run Relationship between Inflation and Output in Post-war Economies. *Journal of Monetary Economics* 36, 477–496.
- Drukker, D., P. Gomis-Porqueras, and P. Hernandez-Verme (2005) Threshold Effects in the Relationship between Inflation and Growth: A New Panel-Data Approach. (IMF Staff Papers).
- Fama, E., and G. Schwert (1977) Asset Returns and Inflation. *Journal of Financial Economics* 5, 115–146.
- Faria, J. and F. Carneiro (2001) Does High Inflation Affect Growth in the Long and Short Run? *Journal of Applied Economics* 1.
- Fisher, S. (1993) The Role of Macroeconomic Factors in Growth. *Journal of Monetary Economics* 32, 485–512.
- Gillman, M. and A. Nakov (2004) Granger Causality of the Inflation-Growth Mirror in Accession Countries. *Economics of Transition* 12:4, 653–681.
- Gultekin, N. (1983) Stock Market Returns and Inflation: Evidence from Other Countries. *Journal of Finance* 38, 49–65.
- Hansen, B. (2000) Sample Splitting and Threshold Estimation. *Econometrica* 68:3, 575–603.
- Hellerstein, R. (1997) The Impact of Inflation. *Regional Review* 7:1.
- Hussain, M. (2005) Inflation and Growth: Estimation of Threshold Point for Pakistan. *Pakistan Business Review* 7:3.
- Huybens, E. and B. Smith (1998) Financial Market Frictions, Monetary Policy, and Capital Accumulation in a Small Open Economy. *Journal of Economic Theory* 81, 353–400.
- Huybens, E. and B. Smith (1999) Inflation, Financial Markets, and Long-run Real Activity. *Journal of Monetary Economics* 43, 283–315.
- Khan, M. S., A. S. Senhadji, and B. D. Smith (2001) Inflation and Financial Depth. (IMF Working Paper, WP/01/44).
- Khan, M. S. and S. A. Senhadji (2001) Threshold Effects in the Relationship between Inflation and Growth. *IMF Staff Papers* 48:1, 1–21.
- Lee, C. C. and S. Y. Wong (2005) Inflationary Threshold Effects in the Relationship between Financial Development and Economic Growth: Evidence from Taiwan and Japan. *Journal of Economic Development* 30, 49–69.
- Li, M. (2006) Inflation and Economic Growth: Threshold Effects and Transmission Mechanisms. University of Alberta. (Working Papers).
- Lucas, R. (1973) Some International Evidence on Output-Inflation Tradeoffs. *American Economic Review* 63, 326–334.

- Malla, S. (1997) Inflation and Economic Growth: Evidence from a Growth Equation. Department of Economics, University of Hawai'i at Monoa. (Mimeographed.).
- Mallik, G. and A. Chowdhury (2001) Inflation and Economic Growth: Evidence from South Asian Countries. *Asian Pacific Development Journal* 8:1, 123–135.
- Mubarik, Y. A. (2005) Inflation and Growth: An Estimate of the Threshold Level of Inflation in Pakistan. *State Bank of Pakistan Research Bulletin* 1:1, 35–44.
- Munir, Q. and K. Mansur (2009) Non-linearity between Inflation Rate and GDP Growth in Malaysia. *Economics Bulletin* 29:3, 1555–1569.
- Nelson, C. (1976) Inflation and Rates of Return on Common Stocks. *Journal of Finance* 31, 471–483.
- Pakistan, Government of (2010) *Pakistan Economic Survey (2009-10)*. Islamabad: Economic Advisor's Wing, Ministry of Finance.
- Sala-i-Martin, X. (1997) I Just Ran Two Million Regressions. *American Economic Review* 87, 178–183.
- Sarel, M. (1996) Nonlinear Effects of Inflation on Economic Growth. *IMF Staff Papers* 43, 199–215.
- Sergii, P. (2009) Inflation and Economic Growth: The Non-Linear Relationship. Evidence from CIS Countries. MA Thesis in Economics, Kyiv School of Economics.

## **Sector Level Analysis of FDI-Growth Nexus: A Case Study of Pakistan**

SOMIA IRAM and MUHAMMAD NISHAT

### **I. INTRODUCTION**

The most stable nature of Foreign Direct Investment (FDI) among the all capital inflows has provoked its importance especially in case of capital scarce developing economies. Economic growth is the indicator of the health of economy and capital is one of the prerequisites to maintain and enhance the momentum of growth. In the current scenario, growth of Pakistan economy has gone considerable changes and regarding these changes, Pakistan has adopted different policies concerning different sectors of economy.

Currently, the services sector share to GDP has improved considerably against the dismal performance of manufacturing sector over the last ten years. In order to enhance the economic growth effectively and efficiently, government has taken several steps to attract foreign capital. One of these measures is the adaptation of highly liberalised policies to attract most needed financial capital along with its spillovers. Even after suffering from obnoxious economic ailments, Pakistan in current decade is able to attract massive capital inflow perhaps highest in the history. However, the massive inflow of FDI is directed towards services sector.

Even after conducting a handful empirical research, the impact of FDI on growth is countervailing. Some early studies [Singer (1950); Griffin (1970)] recognised the negative impact of FDI on economic growth in developing countries. Aitkin and Harrison's (1999) in case of Venezuela, Jhon and Athanasios (2004) in case of US and Western European countries, and Katerina, *et al.* (2004) in case of transition countries found that FDI do not significantly affect economic growth. However, Blomstrom, *et al.* (1992), Caves (1974) and Kokko (1994) showed a positive effect of FDI inflows on economic growth. Findlay (1978) highlighted the positive effect through technology spillovers, which has the strongest potential to enhance economic growth in the host country.

Borensztein, *et al.* (1998), Xu (2000) and Alfaro, *et al.* (2003) suggested the positive impact of FDI in presence of the sound educational level, development of local financial markets, and other necessary conditions to absorb spillovers. Blomstrom and Kokko (2003) explained that positive effects of FDI are not automatic but the local conditions influence firms' adoption of foreign technologies and skills. Borensztein (1995, 1998) explained the growth enhancing effect of FDI through the channel of

Somia Iram <somia\_iram@yahoo.com> is MPhil Student at Applied Economics Research Centre (AERC), University of Karachi, Karachi. Muhammad Nishat <mnishat@iba.edu.pk> is Professor of Business and Finance at Institute of Business Administration (IBA), Karachi.

technology. Borensztein (1995, 1998) emphasised the presence of at least threshold level of initial human capital for the diffusion of technology spillovers. Romar (1986, 1990), Helpman and Grossman (1990) emphasised the importance of knowledge capital, coming through research and development in the long run economic growth.

According to Chudnovsky and Lopez (1998), FDI may boost economic growth through the improvement of manufacturing export and improved balance of payment. However, in the long run, due to the control of foreigners over the local production resources, profit outflow deteriorate the balance of payment condition. In case of developing countries, FDI mostly work through the channel of externalities. However, there is no definite conclusion related to spillovers of FDI. Benefits and cost associated with FDI is not disseminated homogenously across all countries and even across all sectors. Therefore, different countries, regions and even sectors react differently to same FDI inflow.

Alfardo (2003) examined the effect of FDI on growth in the primary, manufacturing and services sectors. The author suggested that total FDI exerts an ambiguous effect on economic growth. FDI in the primary sector tends to have a negative effect on growth. However, investment in manufacturing tends to have a positive effect on growth. Moreover, evidence from the service sector is ambiguous. Zaman, *et al.* (2008) investigated the factors effecting FDI in case of Pakistan using data over the period of 1971–2003, and found that variables used for market size and trade balance are significant, whereas, variable used for service sector has negative effect on the growth of economy. Importance of FDI can not be denied, especially in case of developing economies. FDI not only allows overcoming the financing and liquidity constraints, but also provide new capital, allowing additional investment in both human and physical capital, which can be very beneficial for developing countries.

To the best of my knowledge, in case of Pakistan only few studies have investigated FDI-growth nexus. FDI-growth nexus is not being investigated with respect to services sector and manufacturing sector. Overall, the impact of FDI on growth can be misleading. This study is first attempt to investigate the impact of manufacturing sector and services sector FDI on growth in the presence of macroeconomic instability and privatisation regime in case of Pakistan.

The main objective of the study is to investigate the impact of services and manufacturing Foreign Direct Investment (FDI) on economic growth over period of 1972 to 2008. We decompose the FDI into services sector and manufacturing sector and examine their impact on economic growth. To further evaluate the role of FDI on growth in presence of privatisation policy, interaction terms of services as well as manufacturing FDI with privatisation dummy is introduced.

This paper is organised in to following sections: Section II regards the data, model and methodology; Section III contains results and conclusion, whereas, last section includes conclusion and policy recommendation.

## II. MODEL SPECIFICATION AND DATA SOURCES

To estimate the relationship between FDI and economic growth at sector level, we estimate the following model:

$$Y_t = \delta_0 + \lambda_1 MFDI_t + \delta_2 SFDI_t + \delta_3 INV_t + \delta_4 INF_t + \delta_5 MFDI_t * DUM_t + \delta_6 SFDI_t * DUM_t + \mu \quad \dots \quad (1)$$

Where  $Y$  represents the real GDP per capita, MFDI and SPFDI represent FDI in manufacturing and service sectors respectively, INV represents public sector investment and INF represents Inflation rate proxied for macroeconomic instability and  $t$  represents time period (1972–2008). The Dummy of privatisation is also included in this model due to its significance

Data used in this paper is obtained from the electronic database of International Financial Statistics (IFS), Annual report state bank of Pakistan. The FDI of selective sectors is chosen for the sample because of the unavailability of data in case of Pakistan. Data on services and manufacturing FDI is obtained from foreign liabilities and assets and investment in Pakistan (Various Issues).

Before estimating the long run and short run results, ADF and PP unit root tests in order to check the unit root of all variables. We use the robust technique Autoregressive Distributed Lag model (ARDL) introduced by Pesaran, Pesaran, and Smith (1998), Pesaran and Shin (1999) and Pesaran, *et al.* (2001).

The error correction version of ARDL model is given below:

$$\begin{aligned} \Delta Y_t = & \alpha + \alpha_1 \sum_{i=1}^p \Delta Y_{t-i} + \alpha_2 \sum_{i=0}^p \Delta MFDI_{t-i} + \alpha_3 \sum_{i=0}^p \Delta SINV_{t-i} + \alpha_4 \sum_{i=0}^p \Delta INV_{t-i} + \\ & \alpha_5 \sum_{i=0}^p \Delta INF_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 MFDI_{t-1} + \lambda_3 SFDI_{t-1} \\ & + \lambda_4 INV_{t-1} + \lambda_5 INF_{t-1} + \mu_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2) \end{aligned}$$

Where  $\beta_0$  component and  $\mu$  trend is the error term. The term with summation sign represent the short run dynamics. While, the second part of the equation represent the long run dynamics.

In order to estimate the long run coefficients, the following long-run model is estimated:

$$\begin{aligned} Y_t = & \alpha + \beta_1 \sum_{i=1}^p Y_{t-i} + \beta_2 \sum_{i=0}^p MFDI_{t-i} + \beta_3 \sum_{i=0}^p SFDI_{t-i} + \beta_4 \sum_{i=0}^p INV_{t-i} \\ & + \beta_5 \sum_{i=0}^p INF_{t-i} + \mu_t \quad \dots \quad (3) \end{aligned}$$

After finding the long run relation we use the following equation to estimate the short run coefficients:

$$\begin{aligned} \Delta Y_t = & \alpha + \beta_1 \sum_{i=1}^p \Delta Y_{t-i} + \beta_2 \sum_{i=0}^p \Delta MFDI_{t-i} + \beta_3 \sum_{i=1}^p \Delta SFDI_{t-i} \\ & + \beta_3 \sum_{i=1}^p \Delta INV_{t-i} + \beta_1 \sum_{i=1}^p \Delta INF_{t-i} + \eta EC_{t-i} \quad \dots \quad \dots \quad \dots \quad \dots \quad (4) \end{aligned}$$

$\eta$  is the error correction term in the model indicates the pace of adjustment reverse to long.

### III. ESTIMATION RESULTS

#### III.1. Testing of the Unit Root Hypothesis

We applied ADF test and PP unit root test in order to check the unit root of all variables. The results suggest that all variables are having mix order of integration. A summary of the results of ADF and PP unit root tests is given in Table 1.

Table 1

#### *Unit Root Results*

| Variables | ADF (Drift and Trend) |          | P- P (Drift and Trend) |          |
|-----------|-----------------------|----------|------------------------|----------|
|           | Level                 | 1st diff | Level                  | 1st diff |
| Y         | -2.08***              | -3.45**  | -2.19***               | -3.08**  |
| MFDI      | -0.98                 | -2.92*   | -1.15                  | -3.12*   |
| SFDI      | -1.08                 | -2.98**  | -1.44                  | -3.17**  |
| INV       | -2.89**               | -3.76*   | -2.78***               | -3.94**  |
| INF       | -1.79                 | -4.58*   | -2.01                  | -4.35*   |

Notes: (\*\*\*) Shows significance at 1 percent (5 percent) level.

From the results of unit root tests, it is apparent that the variables have different order of integration. In the next step, we proceed to apply the ARDL approach.

#### III.2. Autoregressive Distributed Lag Model (ARDL) Lag Selection

The first step of bound testing approach is to select the order of the lag length. On the basis of lag length, we found the  $F$ -statistics value. The estimated  $F$ -value selected on the basis of lag length is given below:

Table 2

#### *Lag Length Selection and Bound Testing for Co-integration*

| Lags | Order | AIC    | HQ    | SBC    | $F$ -test Statistics |
|------|-------|--------|-------|--------|----------------------|
| 1    |       | 12.27  | 11.45 | 12.54  | 2.34                 |
| 2    |       | 12.04* | 11.21 | 12.37* | 4.95**               |

#### **Short-run Diagnostic Test-Statistics**

Serial Correlation LM,  $F = 0.78$  (0.19) Heteroscedasticity Test  $F = 1.92$  (0.21)

Ramsey RESET Test  $F = 0.65$  (0.35) Normality J-B Value = 25.03 (0.07)

\* Significant at 5 percent level according to Pesaran, *et al.* (2001) and Narayan (2005).<sup>1</sup>

We found that the optimum lag length is two, which is selected by using Akaike Information Criterion (AIC) as shown in Table 2. At lag length two, the  $F$ -statistics is significant at 5 percent level. The significant  $F$ -value indicates that there is co integration among the variables. After finding a long run relationship we estimated the long run and short run parameters. The results of long run coefficients are given in Table 3.

<sup>1</sup> Critical values are obtained from Pesaran, *et al.* (2001) and Narayan (2005).

Table 3

*The Long run Results*

| Dependent Variable Y | ARDL (1, 1,2, 2, 2)            |
|----------------------|--------------------------------|
| <b>Variables</b>     | <b>Coefficients</b>            |
| MFDI                 | 0.28 (0.02)                    |
| SFDI                 | 0.74 (0.03)                    |
| INF                  | -0.45 (0.06)                   |
| INV                  | 0.18 (0.04)                    |
| MFDI*DUM             | 0.28 (0.08)                    |
| SFDI*DUM             | 0.47 (0.04)                    |
|                      | R <sup>2</sup> = 0.97          |
|                      | Adjusted R <sup>2</sup> = 0.95 |
|                      | F-statistics = 35.04 (0.00)    |
|                      | Dh Stat = 1.97                 |

The values in the parenthesis are the probability values.

The results of the Table 3 show that all variables are significant and have expected signs. The positive coefficient of FDI shows that real GDP per capita is largely depends on inward flow of FDI. However, it is apparent from the results that FDI inflow contributes to economic growth mainly when the economy practices the privatisation. The results show that FDI inflow in the service sector accelerates economic growth by a high speed. FDI inflow in the manufacturing sector significantly affects economic growth. However, the magnitude of SFDI is much greater than MFDI. Moreover, it is apparent from the results that FDI inflow contributes to economic growth mainly when the economy practices the privatisation. The reason behind this result is that privatisation policy in most countries has proved to be investor's friendly. Privatisation reduces the management bottlenecks. It enhances the efficiency by introducing new and advance management practices. The coefficient of private investment (excluding foreign investment) is positive and significant at 5 percent level of significance, which is depicting the positive effect of private sector participation.

In case of Pakistan both services as well as manufacturing sectors are contributing but services sector is contributing much more than manufacturing sector. In the current decade major surge of FDI was towards the telecommunication sector that has strengthened the infrastructure as well as increased job potential and in return caused increased contribution to economic growth.

The error correction version of ARDL is presented in Table 4.

Table 4

*Error Correction Representation of ARDL Model*

| Dependent Variable $\Delta Y$ | ARDL (1, 1,2, 2, 2)            |
|-------------------------------|--------------------------------|
| <b>Variables</b>              | <b>Coefficients</b>            |
| $\Delta MFDI$                 | 0.16 (0.17)                    |
| $\Delta SFDI$                 | 0.36 (0.13)                    |
| $\Delta INV$                  | 0.42 (0.07)                    |
| $\Delta INF$                  | 0.24 (0.18)                    |
| EC(-1)                        | -0.42 (0.09)                   |
|                               | Adjusted R <sup>2</sup> = 0.89 |
|                               | F-statistics = 20.03 (0.01)    |

The values in the parenthesis are the probability values.

The sign of estimated lagged error correction term  $ECT_{t-1}$  is negative and significant at 9 percent level of significance. There is 42 percent speed of adjustment towards long run equilibrium. In the short run, MFDI and SFDI do not significantly affect economic growth. In the case of developing countries FDI is important because of its spillover effects that are not instantaneous rather time consuming that's why FDI do not contribute the growth in the short run but it takes time to influence the growth patterns of economy. The short run results show that inflation and investment significantly affect economic growth. The sign of inflation is positive in the short run. This is due to the fact that an increase in the prices increases the profit margin of the producers in the short run. However, in the long run due to decreased real income of the general masses, economic growth hampers.

#### **IV. CONCLUSION AND POLICY RECOMMENDATIONS**

This study empirically investigated the impact of services and manufacturing Foreign Direct Investment (FDI) on economic growth in the presence of macroeconomic instability and privatisation over period of 1972 to 2008. In order to find out the order of integration, we used ADF and PP unit root tests. Autoregressive distributed lag model (ARDL) is used for the robustness of long-run relationship between the variables.

We found that in the long run MFDI and SFDI significantly affect economic growth. However, in the short run, both MFDI and SFDI do not significantly affect economic growth. Moreover, the magnitude of services sector FDI is greater than manufacturing sector FDI. Whereas, the variable of macroeconomic instability significantly affect economic growth both in long run as well as in short run.

The coefficient of inflation is positive in the short run. This is due to the fact that an increase in the prices increases the profit margin of the producers in the short run. However, in the long run due to decreased real income of the general masses, it hampers economic growth. Private investment is also helping to boost the economic growth. The results also show that in the presence of privatisation policy, FDI contribute to economic growth. However, this contribution is more in services sector as compared to manufacturing sector.

As regards the policy recommendation, proper attention should be paid proper to strengthen manufacturing sector that is real sector of economy. In case of services sector government should attract FDI toward infrastructure base services sector so that it may help to contribute the growth of manufacturing sector in the long run. FDI should be encouraged to amplify economic growth, to amplify benefit of innovative technology to curtail poverty and unemployment, to lift up living standards but at the mean time proper attention should also be paid to save sovereignty and profit outflow of the country. In order to enhance growth, policies should device to attract export oriented FDI instead of domestic demand oriented.

## Appendix

## Appendix

*Data Description and Sources*

| S.N. | Variables                       | Expected Sign in |   |
|------|---------------------------------|------------------|---|
|      |                                 | Literature       | Data Sources and Description  |
| 1.   | Market Growth (GDP)             | +                | GDP growth is used as dependent variable. Data is obtained from SBP annual report.  |
| 2.   | Investment (INV)                | +/-              | Investment is proxied as GFCF. Data is obtained from hand book on statistics on Pakistan economy (Various issues).  |
| 3.   | Macroeconomic Instability (INF) | -                | Macroeconomic instability is proxied by inflation variable. Data on inflation is taken from WDI (2008) electronic database.   |
| 4.   | Manufacturing FDI (MFDI)        | +                | Manufacturing FDI is calculated by adding the FDI coming towards all the manufacturing units.<br><i>Source:</i> Foreign liabilities and assets and investment in Pakistan (Various Issues). |
| 5.   | Services FDI (SFDI)             | -                | Services FDI is including FDI in infrastructure based services sector.<br><i>Source:</i> Foreign liabilities and assets and investment in Pakistan (Various Issues).                        |
| 6.   | Privatisation (Dummy)           | +                | Privatisation is taken as dummy .1 for years privatisation was taken, 0 otherwise.  |

## REFERENCES

- Aitken, B. and A. E. Harrison (1999) Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. *American Economic Review* 89:3, 605–618.
- Alfaro, L. (2003) Foreign Direct Investment and Growth: Does the Sector Matter? Harvard Business School, Boston, MA. (Mimeographed).
- Atique, Z., M. H. Ahmad, and U. Azhar (2004) The Impact of FDI on Economic Growth under Foreign Trade Regimes: A Case Study of Pakistan. *The Pakistan Development Review* 43:4.
- Bengoa, M. and B. Sanchez-Robles (2003) Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America. *European Journal of Political Economy* 19:3, 529–543.
- Blomström, M. and A. Kokko (2003) Human Capital and Inward FDI. The European Institute of Japanese Studies. (EIJ Working Paper Series. No. 167).
- Blomström, M., R. E. Lipsey, and M. Zejan (1994) What Explains Developing Country Growth? (NBER Working Paper No. 4132).
- Borensztein, E., J. De Gregorio, and J. W. Lee (1998) How Does Foreign Direct Investment Affect Economic Growth? *Journal of International Economics* 1:45, 115–135.
- Caves, R. (1974) Multinational Firms, Competition and Productivity in Host-Country Markets. *Economica* 41:162, 176–93.
- Enderwick, P. and M. Akoorie (1996) *Fast Forward: New Zealand Business in World Markets*. Longman Paul, Auckland.

- Findlay, R. (1978) Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: A Simple Dynamic Model. *Quarterly Journal of Economics* 62:1, 1–16.
- Griffin, K. B. (1970) Foreign Capital, Domestic Savings and Development. *Oxford Bulletin of Economics and Statistics* 32, 99–112.
- Grossman, G. and E. Helpman (1990) *Innovation and Growth in the Global Economy*. Cambridge, MA.: MIT Press.
- Hunya, G. (1998) Integration of CEEC Manufacturing into the European Corporate Structures by Direct Investments. (MOSTMOCT, No. 1).
- Hunya, G. (1998) Relationship between FDI, Privatisation and Structural Change in CEECS. Paper prepared for the Conference on Privatisation, Corporate Governance and the Emergence of Markets in Central Eastern Europe, FIT, Berlin, May 22-23. (Mimeographed).
- Katherina, L., P. Jhon, and V. Athanasios (2004) *Foreign Direct Investment and Economic Growth in Transition Economies*. 1, 97–110.
- Khan, A. H. (1997) FDI in Pakistan: Policies and Trends. *The Pakistan Development Review* 36:4, 959–985.
- Kokko, A. (1994) Technology, Market Characteristics and Spillovers. *Journal of Development Economics* 43, 279–93.
- Ozturk, I. and H. Kalyoncu (2007) Foreign Direct Investment and Growth: An Empirical Investigation Based on Cross Country Comparison. *Economia Internazionale* 60:1.
- Pesaran, H. M. (1997) The Role of Economic Theory in Modeling the Long-run. *Economic Journal* 107, 178–191.
- Pesaran, H. M. and Y. Shin (1995) Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. Department of Economics, University of Cambridge. (DAE Working Paper Series, No. 9514).
- Pesaran, H. M. and Y. Shin (1998) An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. In S. Storm (ed.) *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press.
- Pesaran, M. H., Y. Shin, and R. Smith (1996) Testing for the Existence of a Long-run Relationship. Department of Applied Economics, University of Cambridge. (DAE Working Papers 9622).
- Pesaran, M. H., Y. Shin, and R. Smith (2001) Bound Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics* 16, 289–326.
- Romer, P. (1986) Increasing Returns and Long-run Growth. *Journal of Political Economy* 94, 1002–1037.
- Singer, H. W. (1950) The Distribution of Gains between Investing and Borrowing Countries. *American Economic Review* 40, 473–485.
- UNCTAD (Various Issues) *World Investment Report*. New York: UNCTAD.
- Xu, B. (2000) Multinational Enterprises, Technology Diffusion, and Host Country Productivity Growth. *Journal of Development Economics* 62, 477–493.

## **A Dynamic Analysis of the Relationship among Human Development, Exports and Economic Growth in Pakistan**

MUHAMMAD AFZAL, A. RAUF BUTT, HAFEEZ UR REHMAN, and ISHRAT BEGUM

### **I. INTRODUCTION**

Human Development (HD), being the ultimate objective of each and every human activity, plays a vital role in producing high skilled manpower that leads to economic growth and hence economic development. “HD denotes both the processes of widening people’s choices and level of their achieved well being” [UNDP (1990), p.10]. HD is the enlargement of people’s choices to live more prosperous lives. Economists consider HD as one of the most important ingredients of economic growth. Two periods regarding growth theories are very important in economic literature. In the first period, i.e. in late 1950s and 1960s, physical capital (PC) was given too much role in explaining economic growth but long run economic growth can be explained only by assuming an exogenous technological progress. In the second period, i.e., late 1980s and early 1990s, economic growth models were extended by inclusion of human capital (HC) and thereby endogenous growth theories emerged [Romer (1986, 1987, 1990); Lucas (1988); Grossman and Helpman (1991); Rebelo (1991)]. Human capital is endogenous here and growth rate may continue to rise because returns on investments in human capital do not necessarily exhibit diminishing marginal returns. Human capital accumulations as an endogenous factor proved to be the main contributor in explaining sustainable long run economic growth. There are two main approaches through which human capital is likely to affect the long-run economic growth. The first approach known as ‘Lucasian’ [Lucas (1988)] incorporates human capital into growth model as one of the factor of production. The second approach called ‘Romerian’ [Romer (1990)] depends upon the idea that human capital promotes technological advancement. According to Romerian approach, high level of human capital results in more innovation and more efficiency of the work force that, in turn, leads to more growth in aggregate income. This paper utilises Lucasian approach. While explaining endogenous growth theory, Lucas (1988), Romer (1990) and Grossman and Helpman (1991) have argued that either human capital or trade is main

Muhammad Afzal <muhammad\_afzalch@yahoo.com> is Lecturer, Department of Economics, University of the Punjab, Lahore. A. Rauf Butt <drarbutt@yahoo.com> is Professor, School of Business and Economics, University of Management and Technology, Lahore. Hafeez ur Rehman <dehrehmankhan@gmail.com> is Associate Professor/Chairman, Department of Economics, University of the Punjab, Lahore. Ishrat Begum <ask4ishratbegum@gmail.com> is Lecturer in Political Science, Queen Mary College, Lahore.

source of economic growth. Exports, being the important part of trade, are considered as important ingredient of progress and prosperity of both developed and developing nations.

A number of studies in literature are available that have examined the 'export-led economic growth hypothesis' and 'growth-driven exports hypothesis' [e.g. Shan and Sun (1998); Ahmad (2001); and see Afzal, Rehman and Rehman (2008), for reference of more recent studies). There also exists a vast literature on the linkage between human capital and economic growth. Economic growth and hence economic development cannot be sustained unless and until preceded by improvements in HD. If HC is a prerequisite for sustainable economic growth, the government as well as private funding must be allocated in such a way that help move a nation above a threshold level of HD. 'Export-led growth hypothesis' postulates that exports actively lead to economic growth in the following manner. Firstly, export promotion incentives and schemes directly encourage the exporters to produce more exportables. This, in turn, leads to specialisation and to get fruits of the economies of scale and country's comparative advantage. Secondly, increased exports may help the country to import high value inputs, products and technologies that, further, may have a positive impact on economy's overall productive capacity. 'Growth-driven export hypothesis' postulates that growth leads to exports. Economic growth itself promotes trade flows. It also leads to specialisation and creates comparative advantage in a certain areas that further facilitates exports. So there may or may not exist a bidirectional linkages between economic growth and exports.

Bivariate causality framework between economic growth and exports excludes some other most relevant economic and non-economic variables (such as financial development, macroeconomic stability, energy resources, trade openness, debt, imports, expenditures on R&D, investment share in GDP, FDI, exchange rate, political stability, labour and labour productivity etc.) that may have significant impacts on the two main variables being studied. In spite of a clear conceptual link among HC, economic growth and exports, there exist a few empirical studies like Chuang (2000) for Taiwan and Narayan and Smyth (2004) for China that have examined the causal linkage among economic growth, HD and exports in a multivariate framework. There is hardly any study on Pakistan that examines the linkages among human capital, economic growth and exports. The present study is an attempt to examine both the SR and LR dynamic analysis of the relationship and causality among economic growth, HD and exports using Pakistan's data.

The main objectives of this study are:

- To empirically examine both the short-run and long-run dynamic relationships among economic growth, human development and exports in Pakistan.
- To examine the validity of human capital based endogenous growth theory, growth driven export and export-led growth hypotheses.
- To check the causal link among the variables being studied.

This study confines to Pakistan's economy on the dynamic relationships and causal nexus among economic growth, human development and exports. The HDI that is used as a composite measure of HD has been improving since 1970-71. The estimated HDI was 0.24 or 24 percent in 1970-71. This number increased to 0.34, 0.44, 0.51 and 0.56 in 1980-81, 1990-91, 2000-01 and 2008-09, respectively. This means that the HD

has improved more than double from 1970-71 to 2008-09 in Pakistan. The average annual increase in HDI remained at 2.25 percent from 1970-71 to 2008-09 that needs to be further improved in the coming years to cope with the requirement of latest technology used in Production. The growth of real exports in Pakistan has also been much rapid. It increased from Rs 74000 millions in 1970-71 to Rs 329086.1 millions and Rs 871956.9 millions in 1990-91 and 2007-08, respectively. The per annum average increase in real exports has been 6.89 percent from 1970-71 to 2007-08. The average annual export to GDP ratio has been below 10 percent from 1970-71 to 1989-90 in Pakistan. It fluctuated between 10 percent in 1990-91 to 13 percent in 2008-09. The average annual increase in Pakistan's real GDP has remained 5.25 percent from 1970-71 to 2008-09.

The remaining study is organised as under: Review of literature is presented in Section II. Section III includes specification of model, data sources and methodology. Empirical results are discussed in Section IV. Conclusion and recommendations have been given in Section V.

## II. REVIEW OF LITERATURE

Many empirical studies exist in literature that have examined the linkage between exports and economic growth either by using correlation analysis or by using a bivariate causality analysis. Testing causality in a bivariate framework may not be very well free of specification bias. An important variable or variables may be missing or omitted in a bivariate causality case. Empirical studies on 'Export-led economic growth hypothesis' have supported mixed results in a bivariate causality framework. Empirical support for the validity of 'export-led growth hypothesis' in both developing and developed countries was found considerably weak in recent era when analysed by using cointegration and augmented Granger causality analysis rather than earlier correlation based or simple causality analysis. A few empirical studies also exist that have included other relevant variables (e.g. financial development, trade openness, debt, imports, expenditures on R&D, share of investment in GDP, FDI, energy, exchange rate, labour stock and capital stock, etc.) for causality analysis and try to exert their influence on exports and economic growth. Afzal, Rehman, and Rehman (2008) tested the causality among economic growth, external debt servicing and exports in a bivariate and trivariate framework for Pakistan by applying Toda-Yamamoto Augmented Granger Causality analysis and found no support to 'export-led growth hypothesis'. Their study further supported the 'growth-driven export hypothesis'. The principal findings of the study by Shan and Sun (1998) do not support the validity of 'export-led growth hypothesis'. Awokuse (2003) tested the credibility of 'export-led growth hypothesis' for Canada and found it to be valid. Applying ARDL approach to cointegration and Toda-Yamamoto non-causality test, Omisakin (2009) found support for 'export-led growth hypothesis' for Nigeria. A comprehensive list of the studies that directly or indirectly have empirically examined the causality between economic growth and exports is given by Jung and Marshal (1985) for 37 developing countries and found one-way causality running from exports to growth for four countries only, Chow (1987) found causality running from exports to growth for only one country out of eight newly industrialised countries, Al-Yousif (1997) for Arab Gulf countries, Thornton (1996, 1997) for Mexico and Europe, Awokuse (2005) for Korea, Xu (1996) and Riezman, *et al.* (1996) for set of countries including Korea, Hong

Kong and Taiwan, Bahmani-Oskooee, *et al.* (1991) for 20 countries, Kwan and Cotsomitis (1991) for China, Marin (1992) for industrialised countries, Shan and Sun (1998) for China, Hetemi and Manucehr (2000) for Nordic economies, Ahmed and Kwan (1991) for 47 African countries and found no causality running from exports to growth, Lee and Pan (2000) for East Asian countries, Graves, *et al.* (1995) for Korea, Onchoke and In (1994) for selected South Pacific Island Nations, Mah (2005) for China, Hetemi (2003) for Japan, Demirhan, Erdal, and Akcay (2005) for selected MENA countries, Ahmad (2001), Kovacic and Djukic (1991) for Yugoslav economy, Jordaan and Eita (2007), Doganlar and Fisunoglu (1999) for Asian countries, Islam (1998), Baharumshah and Rashid (1999) for Malaysian economy, Khalid and Cheng (1997) for Singapore, Din (2004) for five largest economies of South Asia including Pakistan, Afzal (2006) for Pakistan, Ahmed, *et al.* (2000) for South and South-East Asian countries, Wernerheim (2000) for Canada, Reppas and Christopoulos (2005) for African and Asian countries, Amoateng and Adu (1996) for African Countries, Hsiao (1987) for newly Industrialised Asian economies, Ahmad and Harnhirun (1995) for Asian countries, Chuang (2000) for Taiwan, Narayan and Smyth (2004) for China, Liu, *et al.* (1997) for China, Shan and Tian (1998) for Shanghai (China), Konya (2006) for OECD countries, Shirazi and Manap (2004) for Pakistan and Afzal, Rehman, and Rehman (2008) for Pakistan.

Doganlar and Fisunoglu (1999) examined the causal linkage for seven Asian countries including Pakistan and found unidirectional causality running from economic growth to export growth in Pakistan. Vohra (2001) investigated linkage between export and economic growth for Pakistan, Philippines, Malaysia, Thailand and India, and found that exports positively affected the economic growth. Din (2004) explored the 'export-led growth hypothesis' for five South Asian countries including Pakistan and found cointegration among exports, imports, and output for Pakistan. Afzal (2006) found feedback causality between manufactured exports and GDP. Amoateng and Adu (1996) and Chen (2007) supported both the 'growth-driven exports' and 'Export-led economic growth hypotheses' in trivariate and tetravariate causality analysis respectively.

The linkages between (i) economic growth (EGr) and human capital (HC), (ii) HC and trade, and (iii) EGr and trade, have been studied and discussed by Narayan and Smyth (2004). A strong linkage was found between EGr and HD (Ranis, Stewart and Ramitez, 2000). Narayan and Smith (2004) tested Granger causality between HC and real income in a cointegrated VAR processes for China and found unidirectional Granger causality running from HC to real income in the LR while in SR, one-way Granger causality running from real income to HC. On one side, EGr supply the resources to improve HD and on the other side, HD in the form of improvements in quantity and quality of labour force contributes and accelerates EGr. Judson (2002) states that even though conventional wisdom does support a positive correlation between output growth and HC, the empirical results are mixed, i.e., the positive correlation between growth and HC has been found exceptionally rather than as a rule. So, examining the causality between HD and EGr for Pakistan is the need of hour.

The contribution of EGr to HD is mainly through activities of households, government, NGOs and other civil society. The same level of income can contribute differently to HD. This depends upon the allocation of the income among households,

government activities and on the behaviour and priorities of these sectors and institutions. Household disposable income directly contributes to the promotion of HD by making more expenditure on basic food, health and education. Poor households and female's control over cash income households are found to make more expenditures out of their income on HD related items than those with high income group and of male's control over cash income groups. Poor families and poor households are seen to spend less on education item of HD.

Birdsall (1985), Behrman and Wolfe (1987a, 1987b), King and Lillard (1987), Deolalikar (1993) and Alderman, Behrman Khan, Ross and Sabot (1996a, 1996b) have empirically proved for many countries including India and Pakistan that family earnings changes exerted a positive impact on child's schooling. On the other hand, improvements in HD depend upon government's expenditure on social sector and how much of the total public expenditure goes to HD related items especially on basic education and health. On the other hand, NGOs do contribute to HD by deriving resources from both domestic as well as foreign private and government donations. The effectiveness of NGOs varies from country to country. In some regions of the world, their role is just supplementary, but in other few countries (e.g. BRAC and Grameen Bank in Bangladesh, The Harambee School in Kenya and Peru's Comedores Populares), NGOs appeared as a major factor in the improvement and enhancement of HD (Riddell, Robinson, deConinck, Muir and White, 1995). Ghazali Education Trust (GET), Beaconhouse education system and Zindagi seem to improve and enhance HD in Pakistan.

High level of HD (in the form of improved health, nutrition and quality education) can contribute more to EGr. High level of HD affects the EGr by enhancing people's choices, capabilities, creativity and hence productivity. Better health and quality labour force education are the main determinants of exports and output growth. They also help in the proper and better utilisation of foreign borrowed technology very effectively. On one hand, quality secondary and tertiary education proved it to facilitate the acquisition of skills and managerial capabilities and on other hand, its contribution towards technological capability and technical change in industries is obvious and very important. The role of better health and quality education cannot be overlooked in the exports growth that affects the EGr. So there exists a positive significant correlation between EGr and exports. Ranis, Stewart and Ramirez (1997) explored the linkage between HD and EGr for the time period 1970-92. Their finding implied that, although both EGr and HD should be promoted jointly, but HD be given sequential priority.

According to Narayan and Smyth (2004), exports can promote HC accumulation in developing countries through three main channels. Firstly, exports, being the important component of trade help in facilitating transmission of technology to developing countries from developed countries. Transfer of technology is biased in favour of skilled labour and induces investment in HC [Pissarides (1997)]. Secondly, export is a source of learning by doing. Thirdly, the diffusion of soft and hard technologies including marketing, production and management expertise can be promoted by exports which in turn accelerate the productivity of factors of production such as labour and capital [Grossman and Helpman (1991); Kim (1998)]. Improvements in HC can Granger cause exports. Improvements in HC stock can increase the quality of workforce that, in turn, raises the labour productivity and accelerates further exports and hence EGr [Chuang

(2000)]. Gould and Ruffin (1995), Hanson and Harison (1995) and Stokey (1996) conducted studies for different countries and for different time periods and suggested that HC accumulation was accelerated and promoted by trade and *vice versa*.

Expansion in exports can increase growth through a variety of channels. 'Export-led growth hypothesis' is one of them. 'Export-led growth hypothesis' postulates that exports expansion is vital to EGr. It raises investment and employment opportunities, production efficiency, technological advancement, and hence EGr. On the other way, EGr can also increase exports [see Ahmed (2001); Afzal, Rehman, and Rehman (2008)]. Jung and Marshall (1985) found that the internally generated economic growth better explained exports growth. New trade theories also support growth causing exports hypothesis [e.g. see Helpman and Krugman (1990)]. It is concluded from the above discussion that high exports economies also perform well in their growth rate of GDP. Such type of linkages between EGr and exports induce the researchers to examine the causality between the two.

Empirical analysis based on bivariate causality framework on both the hypotheses has provided the diverse results. However, a few studies have been found in literature that tested causality between the HD and EGr. The studies that tested the bivariate causality between HD and EGr include De Meulemester and Rochat (1995) for six developed countries including Sweden, UK, Japan, France, Italy and Australia, In and Doucouliagos (1997) for US, and Asteriou and Agiomirgianakis (2001) for Greece. All the studies conducted for developed countries provide mix results about unidirectional and bidirectional causality. Lee and Lee (1995) utilised secondary school achievement test score as a direct measures of HC for 17 developed and developing countries including India, Iran and found that the higher initial HC stock per worker led to higher economic growth per worker. A few studies have been carried out for the developing countries. A study conducted for Pakistan by Khan, *et al.* (1991) found one-way Granger causality running from literacy to productivity for Pakistan. Narayan and Smyth (2004) tested temporal bivariate causality between real income and HC in a co-integrated VAR processed for China for the time period 1960 to 1999 and found the evidence of log run Granger causality running from HC to real income while the short run one way causality running from real income to HC was observed.

A few studies also exist in literature that has tested the causal link between exports and EGr by including HD as a third variable in a multivariate framework. Chuang (2000) tested the casual linkages among exports, HC and EGr for Taiwan for the period 1952-95. He found the bidirectional casualty between exports and HC accumulation. HC based endogenous growth theory and export-led growth hypothesis were found valid in case of Taiwan. Narayan and Smyth (2004) employed co-integration and error correction techniques to test the casualty among real income, real exports and HC stock for China using annual data over the period 1960 to 1999 and found evidence of co-integration among real income, real exports and HC when real exports served as dependent variable and HC and real income are taken as independent variables. They found (i) the evidence of short run bi-directional Granger causality between HC and real exports, (ii) unidirectional Granger causality running from real income to HC and (iii) no evidence of Granger causality between real exports and real income. Furthermore their results do not support the 'export-led growth hypothesis'.

In the present study, the validity of ‘growth-driven exports’ and ‘export-led growth hypotheses’ are examined in case of Pakistan by including HD as a third variable. In addition, the validity of human-based endogenous growth theory is also tested for Pakistan.

### III. MODEL SPECIFICATION, METHODOLOGY AND DATA SOURCES

This study employs annual time series of real gross domestic product (*RGDP*), real exports (*RX*), physical capital (*PC*) and human development (*HD*) in Pakistan for the period 1970-71 to 2008-09, drawn from various issues of Pakistan Economic Survey and Annual Reports of State Bank of Pakistan. A time series for HDI for the period 1970-71 to 2008-09 has been constructed by using UNDP methodology developed in 1999-2000. The variables GDP and exports have been converted into real terms by GDP deflator and export prices, respectively. Where as physical capital (*PC*) has been measured by the real fixed capital formation.

Keeping in view the theoretical postulates of the relationship among *RGDP*, *PC*, *RX* and *HD* the following models have been specified as:

$$\ln RGDP = f(\ln PC, \ln RX, \ln HD) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

$$\ln RX = f(\ln PC, \ln RGDP, \ln HD) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

$$\ln HD = f(\ln PC, \ln RGDP, \ln RX) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Where  $\ln$  stands for natural logarithm, and

*RGDP* = Real GDP; a measure of economic growth: current GDP at market prices is deflated by GDP deflator.

*PC* = Since time series data on capital stock is not directly available for Pakistan. Physical capital is proxied by real value of gross fixed capital formation. GFCF deflated by GDP deflator; a proxy used to measure real physical capital. “Fixed capital formation measures both private and public national investment” [Balasubramanyam, Salisu and Sapsford (1996); Hansen and Rand (2006)]. This proxy for real PC has been used by Kohpaiboon (2004) and Mansouri (2005).

*RX* = Real exports; an important component of trade and is considered as important ingredient of progress and prosperity of a nation. Here exports are converted into real exports by using unit value indexes of exports.

*HD* = HDI; a composite measure of human development.

The Model 1 is a kind of production function augmented by *RX* and *HD*. The relationship among variables under consideration is expected to be positive.

In literature human capital development was measured by using different proxy variables like labour force employment, average years of schooling, educational attainments, the number of employed workforce with tertiary education, public expenditures on education and health, R&D expenditures, secondary school achievement test scores and literary rates etc., however, these proxy variables cannot fully capture the notion of HD and has been questioned and criticised [e.g. see Judson (2002)]. In order to

capture the effect of HD on EGr, a direct and more reliable measure of HD is needed. In this study, a composite measure of HD known as HDI is constructed by using UNDP latest methodology for the period 1970-71 to 2008-09.

Several methods such as residual based Engle-Granger (1987) test, Johansen (1988), Johansen-Juselius (1990), Gregory and Hansen (1996), Saikkonen and Lutkepohl (2000), and ARDL approach to cointegration are available in literature. Since this study aims at detecting SR and LR linkages between EGr, HD and exports, it uses a relatively new estimation technique known as Bounds Testing Approach to Cointegration within ARDL framework. A brief description of ARDL approach is given below:

#### **Autoregressive Distributive Lag (Ardl) Approach to Cointegration**

The Proposed ARDL approach to cointegration is developed by Pesaran and Pesaran (1997), Pesaran and Shin (1995 and 1998) and further advanced by Pesaran, *et al.* (2001). It is a unification of autoregressive models and distributed lag models. In an ARDL model, a time series is a function of its lagged values and current and lagged values of one or more explanatory variables. There are several benefits for the use of ARDL approach to cointegration. Bivariate cointegration test and multivariate cointegration techniques given by Stock and Watson (1988), Johansen (1988, 1991) and Johansen and Juselius (1990) perform better for large samples. However, ARDL technique to cointegration is more appropriate for small samples (30 to 80 values). ARDL technique to cointegration not only can distinguish dependent and explanatory variables (i.e. it avoids the problem of endogeneity) but also ARDL method can simultaneously estimate the LR and SR components of the model. This technique also removes the problems related to omitted variables and autocorrelation. The parameter estimates obtained from the ARDL approach are unbiased and efficient because they avoid the problems that may arise due to serial correlation and endogeneity [Pesaran, Shin, and Smith (2001)].

A dynamic error correction model (ECM) through linear transformation can be derived from ARDL [Banerjee, *et al.* (1993)] that permits to draw inference for LR estimates that is not available in other alternative cointegration procedures [Sezgin and Yildirim (2002)].

ARDL approach to cointegration has some superiority over Engle and Granger (1987) single equation cointegration technique. The ARDL method to cointegration can be applied irrespective of whether the regressors are of  $I(0)$ ,  $I(1)$  or mutually integrated but it is still prerequisite that the dependent variable is of  $I(1)$  in levels and none of the explanatory variables is  $I(2)$  or higher order. In ARDL procedures to cointegration, different variables may have diverse optimal number of lags, which in other standard cointegration techniques like Johansen type approaches, is not possible. Apart from the superiority of ARDL model over other cointegration techniques, this study preferred to apply ARDL approaches to cointegration because of the following two main reasons:

- (i) Bounds test procedure's results are robust in case of small or finite samples (i.e. 30 to 80 observations as is the case in this study).
- (ii) Real income and real exports variables are of  $I(1)$ , while HDI is  $I(0)$  or fractionally integrated.

All these justify the application of ARDL model to determine the relationship among EGr, HD and exports in Pakistan.

**Bounds Testing Approach to Cointegration**

The 2nd stage procedure of this paper involves the testing of the existence of short-run (SR) and long-run (LR) relationship between real gross domestic product (RGDP), real exports (RX), physical capital (PC) and human capital (HD) within a multivariate framework. To examine the existence of SR and LR relationship the error-correction version of ARDL model of Equations 1, 2, and 3 by following Pesaran and Pesaran (1997: 397-9) and Pesaran and Shin (1999), can be used as:

$$\begin{aligned} \Delta \ln (Y) = & a_{0Y} + \sum_{i=1}^n b_{iY} \Delta \ln (Y)_{t-i} + \sum_{i=0}^n c_{iY} \Delta \ln (PC)_{t-i} + \sum_{i=0}^n d_{iY} \Delta \ln (RX)_{t-i} \\ & + \sum_{i=0}^n e_{iY} \Delta \ln (HD)_{t-i} + \delta_{1Y} \ln Y_{t-1} + \delta_{2Y} \ln PC_{t-1} + \delta_{3Y} \ln RX_{t-1} \\ & + \delta_{4Y} \ln (HD_{t-1}) \quad \dots \end{aligned} \tag{4}$$

$$\begin{aligned} \Delta \ln (RX) = & a_{0RX} + \sum_{i=1}^n b_{iRX} \Delta \ln (RX)_{t-i} + \sum_{i=1}^n c_{iRX} \Delta \ln (PC)_{t-i} + \\ & \sum_{i=0}^n d_{iRX} \Delta \ln (Y)_{t-i} + \sum_{i=0}^n e_{iRX} \Delta \ln (HD)_{t-i} + \delta_{1RX} \ln RX_{t-1} + \\ & \delta_{2RX} \ln PC_{t-1} + \delta_{3RX} \ln Y_{t-1} + \delta_{4RX} \ln HD_{t-1} \quad \dots \quad \dots \quad \dots \end{aligned} \tag{5}$$

$$\begin{aligned} \Delta \ln (HD) = & a_{0HD} + \sum_{i=1}^n b_{iHD} \Delta \ln (HD)_{t-i} + \sum_{i=1}^n c_{iHD} \Delta \ln (PC)_{t-i} + \\ & \sum_{i=0}^n d_{iHD} \Delta \ln (Y)_{t-i} + \sum_{i=0}^n e_{iHD} \Delta \ln (RX)_{t-i} + \delta_{1HD} \ln HD_{t-1} + \\ & \delta_{2HD} \ln PC_{t-1} + \delta_{3HD} \ln Y_{t-1} + \delta_{4HD} \ln RX_{t-1} \quad \dots \quad \dots \quad \dots \end{aligned} \tag{6}$$

The coefficients (*a, b, c, d, e*) of part first of Equations (4, 5 and 6) measure the SR dynamics of the model whereas *δs* represent the LR relationships.

ARDL model uses a three-step procedure:

- (a) Dynamic analysis.
- (b) Long-run relationship.
- (c) ECM analysis.

The 1st step in the ARDL approach to cointegration is to examine LR relationship among the variables by carrying out familiar F-test on the differenced variables components of Unrestricted Error Correction Mechanism (UECM) model for the joint significance of the coefficients of lagged level of the variables. In this first step, the regression equation estimated for the dependent variable RGDP (*Y*) is defined as

$$\begin{aligned} \Delta \ln(Y) = & a_{0Y} + \sum_{i=1}^n b_{iY} \Delta \ln(Y)_{t-i} + \sum_{i=1}^n c_{iY} \Delta \ln(PC)_{t-i} + \sum_{i=0}^n d_{iY} \Delta \ln(RX)_{t-i} \\ & + \sum_{i=0}^n e_{iY} \Delta \ln(HD)_{t-i} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (7) \end{aligned}$$

To create error correction mechanism in this step, the first lag of the level of each variable is added to the Equation (7) and a variable Addition Test is conducted by calculating F-test on the joint significance of all the added lagged level variables.

$$\begin{aligned} \Delta \ln(Y) = & a_{0Y} + \sum_{i=1}^n b_{iY} \Delta \ln(Y)_{t-i} + \sum_{i=0}^n c_{iY} \Delta \ln(PC)_{t-i} + \sum_{i=0}^n d_{iY} \Delta \ln(RX)_{t-i} \\ & + \sum_{i=0}^n e_{iY} \Delta \ln(HD)_{t-i} + \delta_{1Y} \ln Y_{t-1} + \delta_{2Y} \ln PC_{t-1} + \delta_{3Y} \ln RX_{t-1} \\ & + \delta_{4Y} \ln(HD)_{t-1} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (8) \end{aligned}$$

The null hypothesis of no cointegration for RGDP against alternative hypothesis is tested by taking into account the UECM model as:

$$\begin{aligned} H_0: & \delta_{1Y} = \delta_{2Y} = \delta_{3Y} = \delta_{4Y} = 0 \\ H_1: & \text{None of the coefficients } (\delta_{1Y}, \delta_{2Y}, \delta_{3Y}, \delta_{4Y}) = 0 \end{aligned}$$

This is denoted as  $F_Y(Y|PC, RX, \text{and } HD)$ .

In Equation (2) where exports is the regress and, the null hypothesis of no cointegration for exports against alternative hypothesis of cointegration is as under:

$$\begin{aligned} H_0: & \delta_{1RX} = \delta_{2RX} = \delta_{3RX} = \delta_{4RX} = 0 \\ H_1: & \text{None of the coefficients } (\delta_{1RX}, \delta_{2RX}, \delta_{3RX}, \delta_{4RX}) = 0 \end{aligned}$$

and is denoted as  $F_{RX}(RX|Y, PC, HD)$

In Equation (3), where HC is the dependent variable, the null hypothesis of no cointegration against alternative hypothesis of cointegration is as under:

$$\begin{aligned} H_0: & \delta_{1HD} = \delta_{2HD} = \delta_{3HD} = \delta_{4HD} = 0 \\ H_1: & \text{None of the coefficients } (\delta_{1HD}, \delta_{2HD}, \delta_{3HD}, \delta_{4HD}) = 0 \end{aligned}$$

and is denoted as  $F_{HD}(HD|Y, PC, RX)$

The above hypotheses can be tested by applying standard F-statistic. However, the asymptotic distribution of this F-statistic is non-standard irrespective of whether the variables included in the model are I(0) or I(1). The value of F depends upon (i) number of explanatory variables, (ii) intercept and/or a trend of ARDL, and (iii) sample size. Pesaran, *et al.* (2001) have “tabulated two sets of appropriate critical values. One set assumes all variables are I(1) and another assumes that they are all I(0). This provides a band covering all possible classifications of the variables into I(1) or I(0) or even fractionally integrated.” Critical values of Pesaran, *et al.* (2001) are valid for large sample while Narayan (2005) and Tuener (2006) have provided two sets of critical values for small sample size (30 to 80 observations).

The value of F-statistic found from the data is then compared to the non-standard two sets of critical bound values developed by Pesaran, *et al.* (2001). This comparison is

made as follows. If the calculated value of F-statistic lies outside the critical bounds then a conclusive decision about cointegration can be made having no knowledge of order of integration of the regressors. If the calculated value of F-statistic is bigger than the asymptotically upper bound value, cointegration will establish. On the other hand, cointegration is not established if the calculated value of F-statistic is smaller than the critical lower bound value. The F-test becomes inconclusive about cointegration if the value of F-statistic lies between the critical lower and upper bounds values. In such cases, the order of integration of the variables under consideration is checked by following the procedure developed by Johansen and Juselius (1990) for detection of cointegration. When the order of integration of the variables under consideration is known already and the variables are of  $I(1)$  upper bounds are used to make the decision. The decision of optimum lag length can be made by using either Akaike Information Criteria or Schwartz-Bayesian criteria or R-bar criteria or Human-Quinn criteria. In case of inclusive situation, use of ECM version of ARDL model is regarded as the efficient way of establishing cointegration by Kremers, *et al.* (1992) and Bannerjee, *et al.* (1998). Cointegration is established if the ECM coefficient is negative and highly significant.

Stability of the model is checked as the second step in ARDL bounds testing procedure. After establishing cointegration, the model based on Equation (4) to Equation (6) is estimated by using an appropriate lag criterion such as Akaike Information Criterion or Schwarz Bayesian criteria. Completion of second stage gives estimates of LR elasticities as well as enables the use of CUSUM and CUSUM Sum of Squares tests to the residuals of Equation (4) to Equation (6) for testing the stability of LR elasticities along with SR dynamics.

To establish the stability of SR estimated coefficients of the first differenced variables as well as LR parameters, CUSUM and CUSUM Sum of Squares tests proposed by Brown, *et al.* (1975) were employed by Pesaran and Pesaran (1977). The statistics of CUSUM and CUSUM Sum of Squares are updated recursively and are plotted against the break points after breaking the sample period. The coefficient estimates are called stable if the plot of CUSUM and CUSUM Sum of Squares stay within 5 percent significance level (portrayed by two straight lines based on equations developed by Brown, *et al.* (1975).

Though the existence of LR relationship among the variables is of very interest, it may be even more relevant to examine the SR dynamics. So the *next step* of the analysis is the formulation of ECM, as has been done previously in the 2nd stage procedure of the paper. ECM best describes the SR dynamics consistently with the LR relationship. The coefficient of  $ECM(-1)$  term known as *adjustment parameter* indicates speed of adjustment and the negative sign and its highly statistical significant confirms cointegration and determines the LR causal effect. The negative sign of the adjustment parameter also ensures stability of the model. The negative and statistical significant sign of the coefficient of  $ECM_{t-1}$  also implies that the series are non-explosive and LR equilibrium is attained.

#### IV. EMPIRICAL RESULTS AND ANALYSIS

##### Unit Root Tests

Using the ARDL technique avoids the classification of variables into  $I(1)$  or  $I(0)$  or mutually integrated and there is no need for unit root pre-testing unlike other

standard cointegration tests [Pesaran, *et al.* (2001)]. Sezgin and Yildirim (2002) and Ouattara (2004) reported that the calculated F-statistic provided by Pesaran, *et al.* (2001) becomes invalid in the existence of  $I(2)$  variables. Therefore, testing the unit root in the ARDL procedures is necessary to avoid the possibility of spurious regression and to ensure that not a single variable is of  $I(2)$  or above. For this purpose, the order of integration of the variables under study was tested using Augmented Dickey-Fuller (ADF), Phillip-Perron (PP), Dickey-Fuller Generalised Least Square (DF-GLS) and Ng-Perron tests. Phillip-Perron test has the extra merit over the ADF test, i.e. it has been adjusted to capture serial correlation. This study also employed the Ng-Perron (2001) modified unit root test because it is considered more suitable for small samples than the traditional tests. Applying the Ng-Perron unit root test, the null hypothesis of unit root is not over rejected [Ng-Perron (2001); Sinha Dipendra (2007); Omisakin (2008)]. Different unit root tests results for the variables under consideration are reported in Tables 1, 2 and 3. The results reveal that the log of real GDP, PC and RX series are not stationary in their level but are stationary at their first difference at 1 percent level of significance in PP, DF-GLS and ADF unit roots tests, while log of real GDP is stationary at its first difference at 10 percent level of significance according to Ng-Perron test. Table 1 also indicates that log of HDI series is stationary at its level form at 2 percent and 1 percent level of significance according to ADF and PP unit root tests but Tables 2 and 3 reveal that HDI is stationary at its first difference with constant and intercept according to both DF-GLS and Ng-Perron unit root criteria. Therefore, it is concluded that log of real GDP, PC, RX are integrated of order 1, i.e.  $I(1)$ , while log of HDI series is integrated of order 0 with constant, i.e.  $I(0)$  in both ADF and PP unit roots tests. HDI series is of  $I(1)$  at both Ng-Perron and DF-GLS criteria. All the unit root tests ensure that none of the variables is  $I(2)$  or higher order.

Table 1

*Unit Root Analysis: ADF and PP*

| Variables      | Augmented Dickey-Fuller Test (ADF) |                     | Phillips-Perron Test (PP) |                     |
|----------------|------------------------------------|---------------------|---------------------------|---------------------|
|                | Intercept                          | Intercept and Trend | Intercept                 | Intercept and Trend |
| ln Y           | -2.4430 (0.1373)                   | -1.3875 (0.8486)    | -2.2227 (0.2019)          | -1.4682 (0.8230)    |
| $\Delta$ ln Y  | -4.8816 (0.0003)                   |                     | -4.8786 (0.0003)          |                     |
| ln PC          | -0.8267 (0.7999)                   | -2.2951 (0.4263)    | -1.1908 (0.6685)          | -2.0294 (0.5670)    |
| $\Delta$ ln PC | -4.8394 (0.0004)                   |                     | -5.4943 (0.0001)          |                     |
| ln RX          | -0.8830 (0.7828)                   | -2.7279 (0.2318)    | -0.8756 (0.7851)          | -2.7882 (0.2101)    |
| $\Delta$ ln RX | -6.4063 (0.0000)                   |                     | -6.4077 (0.0000)          |                     |
| ln HD          | -3.3506 (0.0198)                   |                     | -4.3180 (0.0015)          |                     |

Values in parentheses are p-values.

Table 2

*Unit Root Analysis: DF-GLS*

| Variables      | Dickey-Fuller Generalised Least Square Test Statistic (DF-GLS) |                     |
|----------------|--|---------------------|
|                | Intercept  | Intercept and Trend |
| ln Y           | 0.8684   | -0.9883             |
| $\Delta$ ln Y  | -2.8392*   |                     |
| ln PC          | 1.0012   | -2.2889             |
| $\Delta$ ln PC | -4.4047*   |                     |
| ln RX          | 0.3168   | -2.88330            |
| $\Delta$ ln RX | -4.4432*   |                     |
| ln HD          | 0.1771   | -2.3291             |
| $\Delta$ ln HD | -0.4329  | -8.4393*            |

\*, \*\*, \*\*\* Indicate 1 percent, 5 percent and 10 percent level of significance.

Table 3

*Unit Root Analysis: Ng-Perron*

| Variables   | Mza       | MZt     | MSB    | MPT     |
|---|-----------|---------|--------|---------|
| ln Y with constant                                  | 0.8892    | 0.6426  | 0.7227 | 38.7505 |
| ln Y with constant and trend                        | -2.8280   | -1.0754 | 0.3802 | 28.9286 |
| $\Delta$ ln Y with constant                         | -7.6100   | -1.8656 | 0.2451 | 3.5259  |
| ln PC with constant                                 | 1.5305    | 1.7467  | 1.1412 | 97.8290 |
| ln PC with constant and trend                       | -8.0820   | -2.0026 | 0.2478 | 11.2968 |
| $\Delta$ ln PC with constant                        | -17.99927 | -2.9481 | 0.1638 | 1.5470  |
| ln RX with constant                                 | 0.8025    | 0.7912  | 0.9860 | 65.0975 |
| ln RX with constant and trend                       | -11.9087  | -2.3020 | 0.1933 | 8.3644  |
| $\Delta$ ln RX with constant                        | -15.3935  | -2.7060 | 0.1713 | 1.9340  |
| ln HD with constant                                 | 0.9562    | 0.9936  | 1.0391 | 73.8157 |
| ln HD with constant and trend                       | -6.4746   | -1.6499 | 0.2549 | 14.0830 |
| $\Delta$ ln HD with constant                        | -1.0385   | -0.6010 | 0.5789 | 18.4891 |
| $\Delta$ ln HD with constant and trend              | -15.0962  | -2.7472 | 0.1820 | 6.0374  |
| 1% Level of Significance (with constant)            | -13.8000  | -2.5800 | 0.1740 | 1.7800  |
| 5% Level of Significance (with constant)            | -8.1000   | -1.9800 | 0.2330 | 3.1700  |
| 10% Level of Significance (with constant)           | -5.7000   | -1.6200 | 0.2750 | 4.4500  |
| 1% Level of Significance (with constant and trend)  | -23.8     | -3.42   | 0.143  | 4.03    |
| 5% Level of Significance (with constant and trend)  | -17.3     | -2.9    | 0.168  | 5.48    |
| 10% Level of Significance (with constant and trend) | -14.20    | -2.62   | 0.185  | 6.67    |

Since the results presented in Tables 1, 2 and 3 indicate that all the variables except HD are of I(1). According to ADF and PP tests, HD is integrated of order 0, while according to DF-GLS and Ng-Perron Unit Roots HD is integrated of order 1. None of the variables is of I(2). So this study applied the ARDL procedure with such mixed integrated result (i.e. of I(1) or I(0) or fractionally integrated).

Bahmani-Oskooee and Nasir (2004) have argued that the first step in any cointegration technique is “to determine the degree of integration of each variable in the model”, but different unit root tests yield different results. For example, while applying the traditional ADF and PP tests one may mistakenly conclude that a unit root is present in a series that is actually stationary around a 1-time structural break [for further details, please consult Perron (1989); Perron (1997)]. This study uses ARDL procedures to avoid this unit root related problem.

### Cointegration

Following the first step in the ARDL approach to cointegration, this study examines LR relationship between the variables by conducting partial F-test. This test is sensitive to the number of lags used on each first differenced variable [Bahmani-Oskooee and Brooks (1999)]. In this study lags up to four periods have been imposed on each first differenced variable. The estimated F-statistic for RGDP, RX and HD of Models 1, 2 and 3 are reported in Table 4.

Table 4

|                                       | Lag Length |       |      |       | Outcome          |
|---------------------------------------|------------|-------|------|-------|------------------|
|                                       | 1          | 2     | 3    | 4     |                  |
| $\Delta Y \{F_Y (Y PC, RX, HD)\}$     | 0.53       | 0.45  | 0.70 | 0.60  | No Cointegration |
| $\Delta RX \{F_{RX} (RX PC, Y, HD)\}$ | 2.27       | 3.17  | 1.56 | 2.94  | No Cointegration |
| $\Delta HD \{F_{HD} (HD PC, Y, RX)\}$ | 4.48       | 10.17 | 6.37 | 12.35 | Cointegration    |

Lower and upper Critical values for bounds testing ARDL for 1 percent, 5 percent and 10 percent significance levels are 3.65-4.66, 2.79-3.67 and 2.37-3.20 respectively.

It is at least one F-value that is higher than the upper critical value, supporting cointegration among RGDP, RX, PC and HD when HD is the dependent variable. The null hypothesis of no cointegration is not rejected when real GDP and RX are serving as dependent variables in Models 1 and 2 respectively because at least one F-value is not higher than the upper critical bounds value. However, the results at this stage are considered preliminary and this study seeks for more evidence of cointegration in the second stage of the analysis when an appropriate lag selection criterion is employed. Once cointegration among the variables of interest is established, then models 1, 2, and 3 were estimated by using ARDL approach.

By using ARDL approach, Equation (4) was estimated with and without HD variable in addition to PC and RX. The estimated results are presented in Table 5. The results of estimated dynamic ARDL models presented in Table 5 clearly support the fact that the RX is not significant in explaining the real GDP in Pakistan. This also seems to refute the 'export-led growth hypothesis' in Pakistan.

The stability of the LR coefficients together with SR dynamics was tested by plot of cumulative sum of recursive residuals (CUSUM) and by plot of cumulative sum of squares of recursive residuals (CUSUM SQUARE) tests. The results of CUSUM and CUSUM SQUARE tests proposed by Brown, Durbin and Evans (1975) reside within a 5 percent level of significance (portrayed by two straight lines). This reveals the significant and stable relation among the variables. This also indicates that there is no evidence of any significant structural instability (Figures 1 and 2).

Table 5

Dynamic ARDL Model Based on Schwarz Bayesian Criterion (SBC)  
 (Dependent Variable = ln Real GDP (Y))

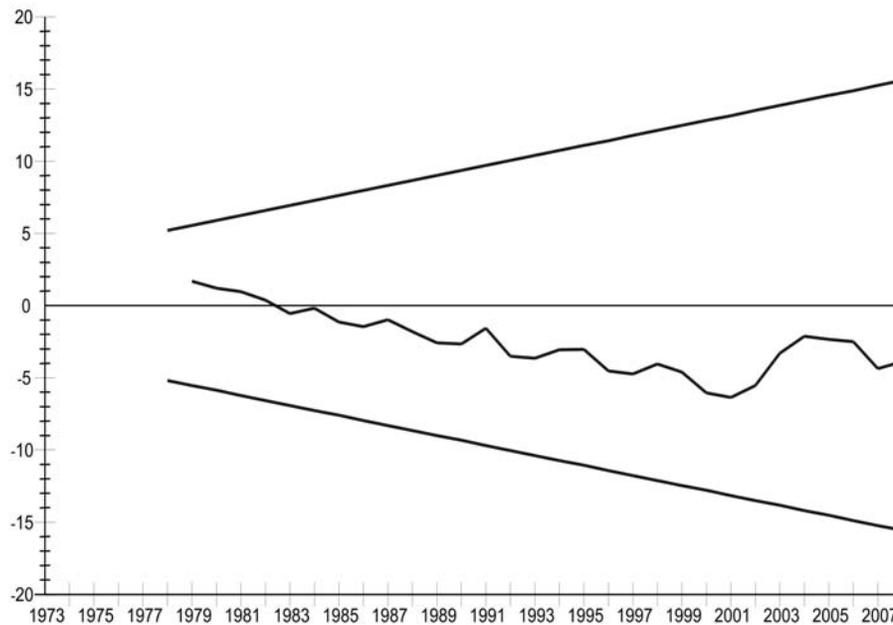
| Regressor | ARDL (1, 0, 1) without HD |                   | ARDL (1, 2, 0, 1) with HD |                   |
|-----------|---------------------------|-------------------|---------------------------|-------------------|
|           | Coefficient               | t-ratio (P-value) | Coefficient               | t-ratio (P-value) |
| ln Y(-1)  | 0.94303                   | 24.55531 (0.000)  | 0.77323                   | 10.6354 (0.000)   |
| ln PC     | 0.061905                  | 2.5331 (0.017)    | 0.10164                   | 2.7938 (0.009)    |
| ln PC(-1) |                           |                   | -0.093395                 | -2.1006 (0.045)   |
| ln PC(-2) |                           |                   | 0.086539                  | 2.5535 (0.016)    |
| ln RX     | 0.041970                  | 1.5403 (0.134)    | 0.021026                  | 0.82891 (0.414)   |
| ln RX(-1) | -0.06058                  | -2.3030 (0.028)   |                           |                   |
| ln HD     |                           |                   | 0.082867                  | 0.22360 (0.825)   |
| ln HD(-1) |                           |                   | 0.17102                   | 2.1854 (0.037)    |
| Constant  | 0.32259                   | 1.5260 (0.137)    | 2.0780                    | 2.6518 (0.013)    |

$\bar{R}^2 = 0.99900$ , F-stat = 8734.1 (0.000), SBC = 90.36, Serial Correlation (LM) = 0.0015 (0.969), Ramsey's Reset Test = 0.8314 (0.362), Heteroscedasticity (LM) = 0.3986 (0.528), Normality (LM) = 0.4875 (0.784)

$\bar{R}^2 = 0.99915$ , F-stat = 5853.6 (0.000), SBC = 89.69, Serial Correlation (LM) = 0.0435 (0.801), Ramsey's Reset Test = 1.6939 (0.1963), Heteroscedasticity (LM) = 0.02886 (0.591), Normality (LM) = 0.9489 (0.622)

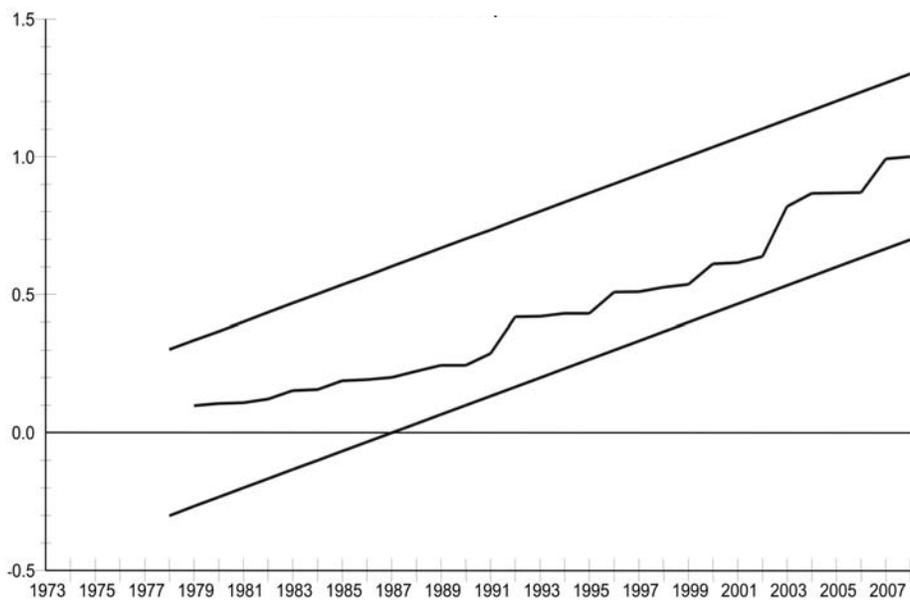
The figures in parentheses are P-values.

Fig. 1(a). Plot of Cumulative Sum of Recursive Residuals



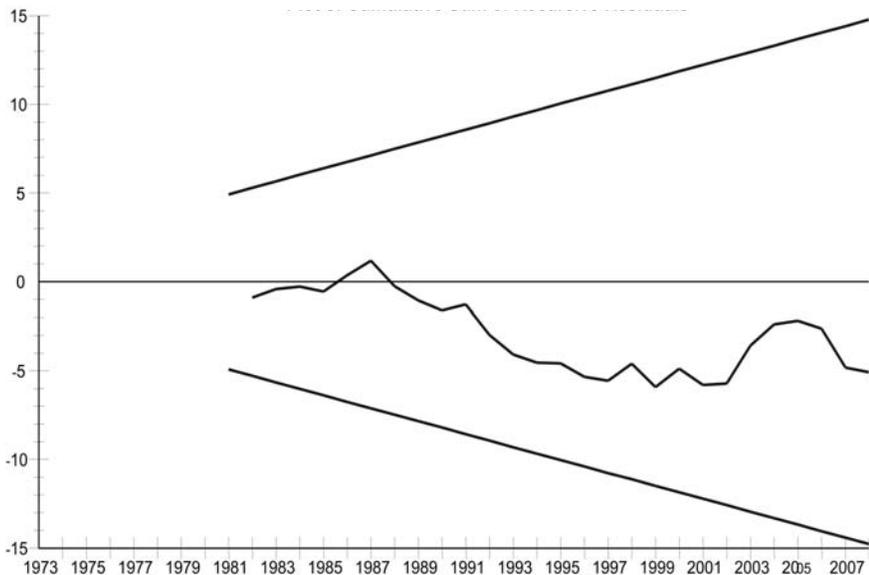
The straight lines represent critical bounds at 5 percent significance level.

**Fig. 1(b). Plot of Cumulative Sum of Squares of Recursive Residuals**



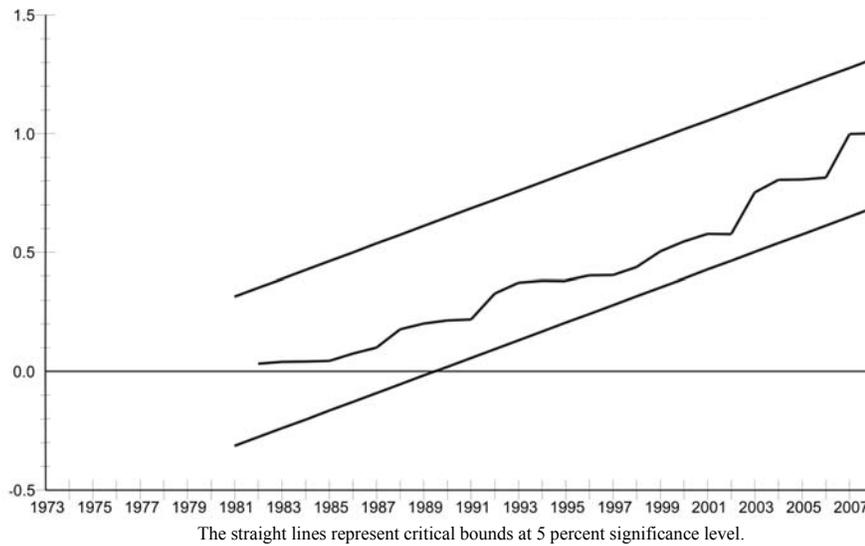
The straight lines represent critical bounds at 5 percent significance level.

**Fig. 2(a). Plot of Cumulative Sum of Recursive Residuals**



The straight lines represent critical bounds at 5 percent significance level.

**Fig. 2(b). Plot of Cumulative Sum of Squares of Recursive Residuals**



Once the stability and LR relationship have been established, the results of LR coefficients using ARDL approach are presented in Table 6.

Table 6

*Estimated Long-run Coefficients Using the ARDL Approach and SBC  
(Dependent Variable = ln Real GDP (Y))*

| Regressor    | ARDL (1, 0, 1) without HD |                   | ARDL (1, 2, 0, 1) with HD |                       |
|--------------|---------------------------|-------------------|---------------------------|-----------------------|
|              | Coefficient               | t-ratio (P-value) | Coefficient               | t-ratio (P-value)     |
| ln PC        | 1.0867                    | 1.7069 (0.098)    | 0.4179                    | 3.3753 (0.002)        |
| ln RX        | -0.3267                   | -0.5416 (0.592)   | 0.0927                    | 0.9940 (0.329)        |
| <b>ln HD</b> |                           |                   | <b>0.8462</b>             | <b>2.8523 (0.008)</b> |
| Constant     | 5.66624                   | 4.5700 (0.000)    | 9.1634                    | 6.6331 (0.000)        |

The LR elasticity coefficients of PC and HD in ARDL (1, 2, 0, 1) model are positive and statistically significant, indicating that both PC and HD are enhancing economic growth in the LR. HD has the highest positive and significance effect among other explanatory variables on EGr in the LR. This is consistent with the findings of Emadzadeh, *et al.* (2000), Nili and Nafisi (2003), Mohamadi (2006), Dargahi and Gadiiri (2003), and Komijani and Memernejad (2004). RX have positive but insignificant effect on EGr in the LR.

The next stage of analysis is based on error correction model (ECM). After examining LR relationships among variables, the SR dynamics of these variables can be determined by error correction representation of ARDL model based on Equation (4). ECM specification for ARDL (1, 2, 0, 1) model is reported in Table 7.

Table 7

ECM Representation for Selected ARDL Model Based on SBC  
(Dependent Variable =  $\Delta \ln$  Real GDP (Y))

| Variable                          | ARDL (1, 0, 1) without HD   |   |   | ARDL (1, 2, 0, 1) with HD  |   |   |
|-----------------------------------|---|---|---|--|---|---|
|                                   | Lag Order   |   |   | Lag Order  |   |   |
|                                   | 0   | 1 | 2 | 0  | 1 | 2 |
| $\Delta \ln$ PC                   | 0.0619<br>(0.016)**   |   |   | 0.1016<br>(0.009)*   |   |   |
| $\Delta \ln$ PC(-1)               |   |   |   | -0.0865<br>(0.016)**   |   |   |
| $\Delta \ln$ RX                   | 0.0419<br>(0.133)   |   |   | 0.0210<br>(0.414)  |   |   |
| <b><math>\Delta \ln</math> HD</b> |   |   |   | <b>0.0209</b><br><b>(0.825)</b>  |   |   |
|                                   | ECM(-1): -0.05697<br>t-ratio = -1.4833 (0.148)<br>ECM = $\ln Y - 1.0867 \ln(PC) - 0.3267 \ln RX - 5.6624$<br>$\bar{R}^2 = 0.25$ , F = 5.21 (0.005)<br>DW-statistic = 1.99 |   |   | ECM(-1): -0.2268<br>t-ratio = -3.1190 (0.004)<br>ECM = $\ln Y - 0.4179 \ln(PC) - 0.0927 \ln RX - 0.8462 \ln HD - 9.1634$<br>$\bar{R}^2 = 0.36$ , F = 5.34 (0.001)<br>DW-statistic = 1.90 |   |   |

Values in parentheses are P-values, and \*, \*\*, \*\*\* indicate 1 percent, 5 percent and 10 percent level of significance respectively.

The coefficient of lagged error correction term reveals how much rapidly variable returns to equilibrium and it must be statistically significant with negative sign. The absolute value of ECM(-1) indicates speed of adjustment to return to equilibrium and the negative sign shows convergence in the SR dynamic model. The negative and highly significant sign of lagged error correction term (ECM(-1)) is also a more efficient way of establishing cointegration and LR causality. The coefficient of ECM(-1) for ARDL (1,2,0,1) in Table 7 is -0.227 and this means that in each period, 22.7 percent of shocks can be justified as a LR trend. 22.7 percent of the deviation from equilibrium is eliminated within one year. The small absolute value of coefficient of ECM(-1), i.e. 22.7 percent, implies that RGDP is not rapidly adjusted to changes in the LR equilibrium component. This coefficient of  $EC_{t-1}$  in this model is negative and significant at 99 percent level of confidence. It implies that, in Pakistan, EGr, PC, exports and HD are cointegrated, which is not in line of results presented in Table 4 for cointegration. Moreover, the results presented in Table 7 refute any SR significant of the RX and HD in explaining real GDP. The significant effect of PC on EGr is found in the both SR and LR. The effect of HC is more pivotal in explaining real GDP than both RX and PC in LR as had been

expected. So it is recommended that the Government of Pakistan should continue its quest for HC promotion policies. HC-based endogenous growth theory seems valid only in LR. The effect of RX on RGDP is positive both in the LR and SR but not statistically significant. This finding does not seem to support the validity of ‘export-led growth hypothesis’ in case of Pakistan. As a conclusion LR elasticity of PC, RX and HD on RGDP are found to be bigger and more significant than SR counterparts. Tables 5, 6 and 7 also reveal that with the inclusion of HDI as a measure of HD reduces the PC share in real GDP (i.e. from 109 percent to 42 percent in LR and from 6.2 percent to 1.5 percent in SR) and boosts up over all share of capital (both PC and HC) in determining real GDP in the LR (i.e. from 109 percent to 126.4 percent) whereas it improves the robustness of the regression model. The negative LR effect of RX on RGDP also became positive with the inclusion of HD variable. This finding justifies the inclusion of HD as a third variable in the model.

To assess Equation (5), concerning the effects of RGDP, HD, PC on RX, it was estimated by using ARDL approach. The results of dynamic ARDL (1, 1, 0, 0) of Model 2 are reported in Table 8.

Table 8

*Dynamic ARDL Model: ARDL (1, 1, 0, 0) Based on SBC*  
(Dependent Variable = *ln Real Exports (RX)*)

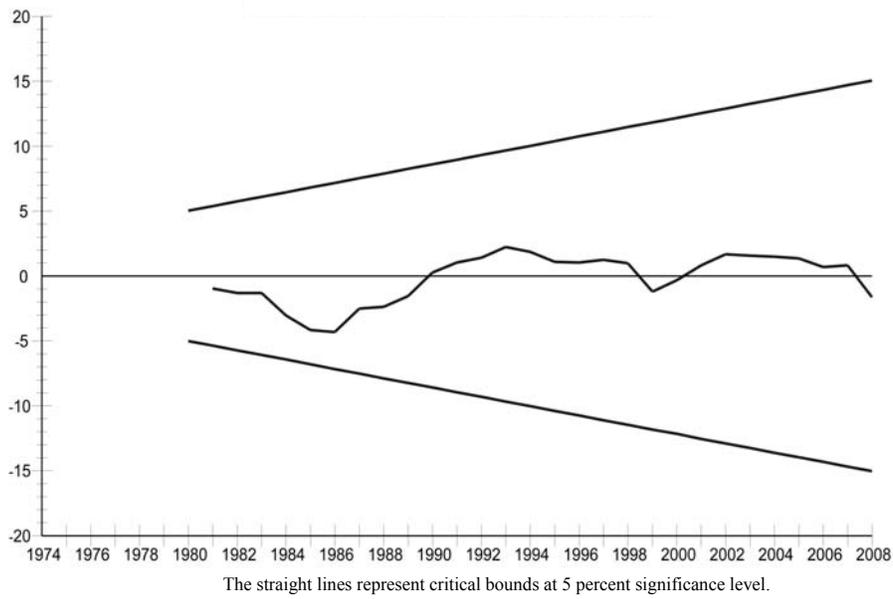
| Regressor  | Coefficient | t-ratio (P-value) |
|------------|-------------|-------------------|
| ln RX(-1)  | 0.55473     | 3.8810 (0.001)    |
| ln PC      | 0.50768     | 2.4015 (0.032)    |
| ln PC (-1) | -0.59512    | -3.1839 (0.003)   |
| ln Y       | 0.84767     | 2.0615 (0.048)    |
| ln HD      | -0.28173    | -0.48380 (0.632)  |
| Constant   | -6.0669     | -1.3403 (0.191)   |

$R^2 = 0.986$ , F-stat = 398.07 (0.000), SBC = 25.56, Serial Correlation (LM) = 0.4192 (0.517), Ramsey's Reset Test = 0.4214 (0.516), Heteroscedasticity (LM) = 0.093 (0.923), Normality (LM) = 1.5869 (0.452).

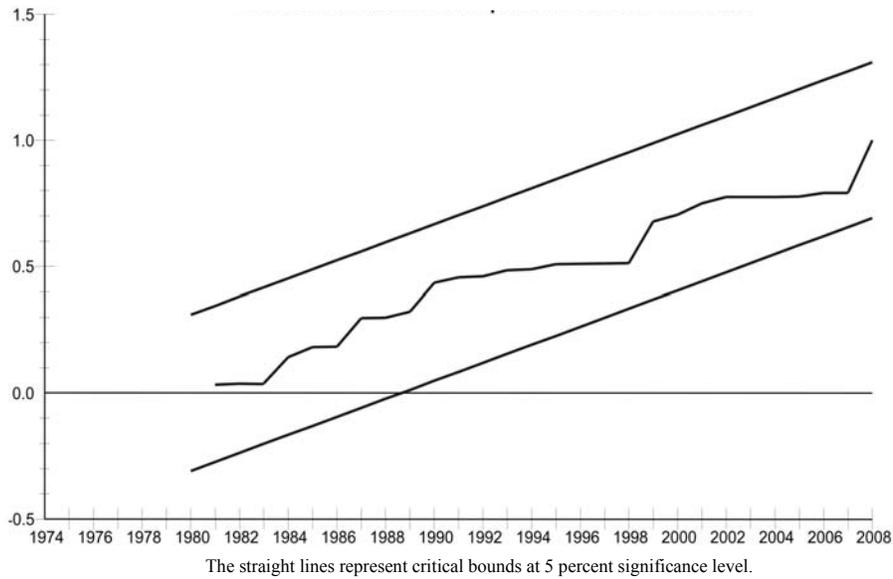
The figures in parentheses are P-values.

The results of the dynamic ARDL (1, 1, 0, 0) model for RX presented in Table 8 support the hypothesis that both PC and RGDP are significant in the explanation of RX in Pakistan. The results in Table 8 also seem to support the ‘growth-driven export hypothesis’ in case of Pakistan. The results of CUSUM and CUSUM SQUARE tests exist within a 5 percent level showing the significant and stable SR and LR relation among the variables (Figure 3).

**Fig. 3(a). Plot of Cumulative Sum of Recursive Residuals**



**Fig. 3(b). Plot of Cumulative Sum of Squares of Recursive Residuals**



After examining the stability and establishing LR relationship, the results of LR coefficients using ARDL Model 2 for the variable RX are presented in Table 9.

Table 9

*Estimated Long-run Coefficients Using the ARDL Approach and SBC*  
(Dependent Variable = *ln Real Exports (RX)*)

| Regressor | Coefficient | t-ratio (P-value) |
|-----------|-------------|-------------------|
| Ln PC     | -0.1964     | -0.4550 (0.652)   |
| ln Y      | 1.9037      | 2.4368 (0.021)    |
| ln HD     | -0.6327     | -0.5058 (0.617)   |
| Constant  | -13.6254    | -1.5543 (0.131)   |

The LR elasticity coefficient of RGDP in Table 9 is positive and statistically significant at 95 percent level of confidence, indicating that the RGDP will enhance RX in the LR. The LR elasticity coefficient of HD on RX is negative and highly insignificant. The SR dynamic coefficients of RGDP, PC and HD for RX can be determined by error correction representation of ARDL model based on Equation (5) by repeating the third stage of the model. Its results are reported in Table 10.

Table 10

*ECM Representation for Selected ARDL Model Based on SBC*  
(Dependent Variable =  $\Delta \ln$  Real Exports (RX))

| Variable        | Lag Order       |   |   |
|-----------------|-----------------|---|---|
|                 | 0               | 1 | 2 |
| $\Delta \ln$ PC | 0.5077 (0.023)  |   |   |
| $\Delta \ln$ Y  | 0.8477 (0.048)  |   |   |
| $\Delta \ln$ HD | -0.2817 (0.630) |   |   |

ECM(-1): -0.4453, t-ratio = -3.1152 (0.004).

ECM =  $\ln$  RX + 0.1964  $\ln$  (PC) - 1.9037  $\ln$  (Y) + 0.6327  $\ln$  HD + 13.6254.

$R^2$  = 0.45, F = 5.87 (0.001), DW-statistic = 1.67.

Values in parentheses are P-values.

From Table 10, it is obvious that the ECM(-1) has a correct sign, i.e. negative and its coefficient is statistically significant. It implies that, in Pakistan, RX, PC, HD and EGr are cointegrated when real exports served as dependent variable. This result is not in line with the results in Table 4 for cointegration. The absolute value of coefficient of ECM(-1) in Table 10 is 0.445 and this implies that in each period, about 44.5 percent of shocks can be justified as LR trends. It also implies that 44.5 percent of the previous year's disequilibrium in RX from its equilibrium path will be corrected in the recent year. The positive and significant effect of real GDP on exports is supported in both the LR and the SR at 95 percent level of confidence. This supports the validity of 'growth-driven exports hypothesis' in Pakistan. Furthermore, long run elasticity of real GDP on RX is found bigger than its SR counterpart. This implies that the impact of increasing real GDP on RX is higher in the LR than in the SR. The highly insignificant and negative effect of HD on exports is found both in LR and SR dynamic models. This might be the outcome that exiting stock of knowledge and skill do not match with desired technology for enhancing RX. This also might be the result that large portion of Pakistan's exports still constituted primary and semi-manufactured commodities.

To examine Equation (6), concerning the effect of RGDP, RX and PC on HD, it was estimated by using ARDL approach. The results of dynamic ARDL (3, 2, 0, 3) of model 3 are reported in Table 11.

Table 11

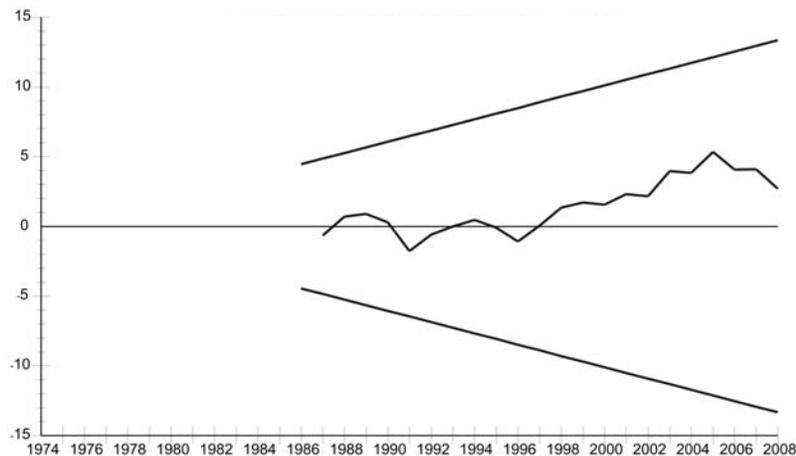
*Dynamic ARDL Model: ARDL (3, 2, 0, 3) Based on SBC*  
(Dependent Variable =  $\ln HD$ )

| Regressor     | Coefficient | t-ratio (P-value) |
|---------------|-------------|-------------------|
| $\ln HD (-1)$ | 0.2366      | 1.2969 (0.208)    |
| $\ln HD (-2)$ | -0.2671     | -1.7291 (0.097)   |
| $\ln HD (-3)$ | 0.4711      | 3.4134 (0.002)    |
| $\ln PC$      | -0.0864     | -2.0035 (0.057)   |
| $\ln Y$       | -0.2571     | -1.0225 (0.317)   |
| $\ln Y(-1)$   | 1.1483      | 3.1670 (0.004)    |
| $\ln Y(-2)$   | -0.6199     | -2.1844 (0.039)   |
| $\ln RX$      | 0.0368      | 1.0020 (0.327)    |
| $\ln RX (-1)$ | -0.0608     | -1.2286 (0.232)   |
| $\ln RX (-2)$ | -0.0970     | -1.9959 (0.052)   |
| $\ln RX (-3)$ | 0.1359      | 3.8987 (0.001)    |
| Constant      | -0.9487     | -1.1182 (0.275)   |

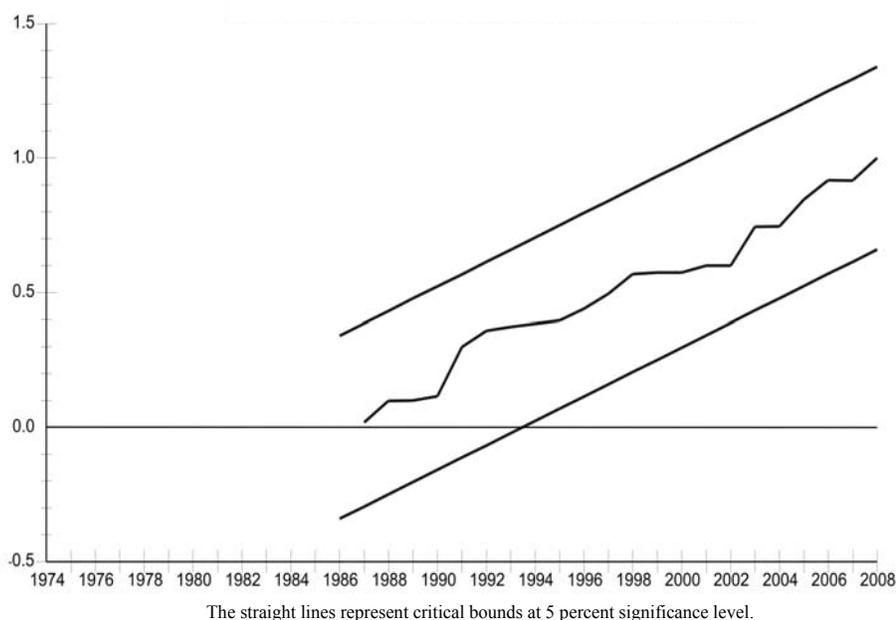
$R^2 = 0.993$ , F-stat = 293.45 (0.000), SBC = 74.09, Serial Correlation (LM) = 1.1458 (0.284), Ramsey's Reset Test = 0.0129 (0.910), Heteroscedasticity (LM) = 2.0053 (0.157), Normality (LM) = 0.5458 (0.761).  
The figures in parentheses are P-values.

The results of the estimated dynamic ARDL (3, 2, 0, 3) model for HD presented in Table 11 indicate that lagged values of HD itself, lagged values of RGDP and lagged values of RX are helpful and significant in the explanation of HD. Since the results of CUSUM and CUSUM SQUARE tests proposed by Brown, *et al.* (1975) exist within a 5 percent level show the significant and stable relation among the variables under consideration (Figure 4). There is ample evidence of structural stability in the model.

**Fig. 4(a). Plot of Cumulative Sum of Recursive Residuals**



The straight lines represent critical bounds at 5 percent significance level.

**Fig. 4(b). Plot of Cumulative Sum of Squares of Recursive Residuals**

After having tested the stability and LR relationship among variables, the results of LR coefficients using ARDL approach are presented in Table 12 below.

Table 12

*Estimated Long-run Coefficients Using the ARDL Approach Based on SBC  
(Dependent Variable = ln HD)*

| Regressor | Coefficient | t-ratio (P-value) |
|-----------|-------------|-------------------|
| ln PC     | -0.1545     | -1.66636 (0.110)  |
| ln Y      | 0.4849      | 4.2710 (0.000)    |
| ln RX     | 0.0267      | 0.2573 (0.799)    |
| Constant  | -1.6957     | -1.8653 (0.075)   |

The LR elasticity coefficient of RGDP is positive and highly statistically significant, indicating that RGDP will enhance HD in the LR. The elasticity coefficient of RX is positive and highly insignificant.

After examining LR relationship among HD, RX and RGDP, the SR dynamics of these variables can be determined by error correction representation of ARDL model based on Equation (6). The results are reported below in Table 13.

Table 13

ECM Representation for Selected ARDL Model Based on SBC  
(Dependent Variable =  $\Delta \ln HD$ )

| Variable        | Lag Order       |                 |                 |
|-----------------|-----------------|-----------------|-----------------|
|                 | 0               | 1               | 2               |
| $\Delta \ln HD$ |                 | -0.2039 (0.222) |                 |
| $\Delta \ln HD$ |                 |                 | -0.4711 (0.002) |
| $\Delta \ln PC$ | -0.0864 (0.056) |                 |                 |
| $\Delta \ln Y$  | -0.2571 (0.316) |                 |                 |
| $\Delta \ln Y$  |                 | 0.6199 (0.039)  |                 |
| $\Delta \ln RX$ | 0.0368 (0.326)  |                 |                 |
| $\Delta \ln RX$ |                 | -0.0389 (0.426) |                 |
| $\Delta \ln RX$ |                 |                 | -0.1359 (0.001) |

ECM(-1): -0.5594 (t-ratio = -2.4255, P-value = 0.023).

ECM =  $\ln HD + 0.1545 \ln PC - 0.4849 \ln Y - 0.0267 \ln RX + 1.6957$ .

$R^2 = 0.763$ ,  $F = 8.21$  (0.000), DW-statistic = 2.20.

Values in parentheses are P-values.

The absolute value of coefficient of ECM(-1) in Table 13 is 0.559, indicating a moderate speed of adjustment to equilibrium following SR shocks. This also means that 55.9 percent of the disequilibrium caused by previous period shocks, converges back to equilibrium and this also means that in each period, 55.9 percent of shocks can be justified as a LR trend. The coefficient of  $EC_{t-1}$  in the model is negative and significant at 97 percent level of confidence. It implies that, in Pakistan, exports, PC, EGr, and HC are cointegrated. This finding about cointegration among the variables, when HD is the dependent variable is in accordance with the results presented in Table 4 for cointegration. The positive and significant effect of real GDP on HD is supported both in LR (confidence at 99 percent) and SR (confidence at 96 percent). The effect of two period lagged RX on HD is negative and highly significant indicating the reverse trend and behaviour of both the labour force and exporters about improving their HC stock in the SR.

In short, the ARDL results indicate that (i) the inclusion of HD as an explanatory variable in addition to PC, RX in augmented growth function raises the robustness of the model; (ii) cointegration among real GDP, PC, RX and HD raises their significance when HD serves as a dependent variable; (iii) RX do not support and promote both the real GDP and HD both in SR and LR; (iv) HD promotes real GDP only in the LR and at the same time it does not explain RX in Pakistan; and (v) real GDP proves itself to be a significant source of explaining and promoting both the RX and HD both in SR and LR.

### Diagnostic Tests

Some other diagnostic tests were used for serial correlation, model specification, heteroskedasticity and conflict to normality that is based on a test of skewness and kurtosis of residuals. All the models satisfied and qualify all the above diagnostic tests.

### Toda-Yamamoto Augmented Granger Causality Test

The causal linkages among real GDP, PC, RX and HD are being investigated by following the Granger causality procedures adopted by Toda and Yamamoto (1995) and interpreted and further expanded by Rambaldi and Doran (1996) and Zapata and Rambaldi (1997). Zapata and Rambaldi (1997) argue that this test needs no prior knowledge of the cointegration among the variables and the usual lag selection scheme to the systems can still be applied in a case where there exists no cointegration or the rank conditions and stability are not satisfied “so long as the order of integration of the process does not exceed the true lag length of the model” [Toda and Yamamoto (1995), p. 225]. The attractiveness of applying Toda and Yamamoto (1995) technique to test Granger causality lies in its simplicity to apply and ability to overcome many a shortcomings of other alternative cumbersome econometric procedures such as developed by Toda and Phillips (1993) and Mosconi and Giannini (1992). Toda-Yamamoto Augmented Granger Causality Test applied Modified WALS test (MWALS) for restrictions on the parameters of a VAR(k), where k is the lag length in the system of equations. This test statistic follows a  $\chi^2$ -distribution when VAR ( $k + d_{max}$ ) is estimated. Here,  $d_{max}$  shows the maximum order of integration likely to happen in the system of equations. Here, we utilise Seemingly Unrelated Regression (SUR) because it has been proved by Rambaldi and Doran (1996) that MWALS test for testing Granger causality can be easily applied by using SUR. One of the advantages of utilising SUR is that it also takes care of the possible simultaneity bias in the system of equations. One of the characteristics of VAR model is that it permits the researcher to test the direction of causality. Use of VAR can also overcome the problem of simultaneity bias. In VAR, all the variables are taken as endogenous variables.

To examine the causality between real GDP, PC, RX and HD, this study utilised the Toda-Yamamoto Augmented Granger Causality Test. The following system of equations is being estimated to investigate the Augmented Granger causality test:

$$Y_t = \alpha_1 + \sum_{i=1}^3 \beta_{1i} Y_{t-i} + \sum_{i=1}^3 \gamma_{1i} PC_{t-i} + u_{1t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (9)$$

$$PC_t = \alpha_2 + \sum_{i=1}^3 \beta_{2i} Y_{t-i} + \sum_{i=1}^3 \gamma_{2i} PC_{t-i} + u_{2t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (10)$$

$$Y_t = \alpha_3 + \sum_{i=1}^3 \beta_{3i} Y_{t-i} + \sum_{i=1}^3 \gamma_{3i} RX_{t-i} + u_{3t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (11)$$

$$RX_t = \alpha_4 + \sum_{i=1}^3 \beta_{4i} Y_{t-i} + \sum_{i=1}^3 \gamma_{4i} RX_{t-i} + u_{4t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (12)$$

$$Y_t = \alpha_5 + \sum_{i=1}^3 \beta_{5i} Y_{t-i} + \sum_{i=1}^3 \gamma_{5i} HD_{t-i} + u_{5t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (13)$$

$$HD_t = \alpha_6 + \sum_{i=1}^3 \beta_{6i} Y_{t-i} + \sum_{i=1}^3 \gamma_{6i} HD_{t-i} + u_{6t} \quad \dots \quad \dots \quad \dots \quad \dots \quad (14)$$

The above three systems of two equations each is estimated by SUR method. To explore that PC does not Granger cause GDP, the null hypothesis will be  $H_0: \gamma_{1i} = 0$  where  $\gamma_{1i}$  are the coefficients of  $PC_{t-i}$ ,  $i = 1, 2, 3$  ( $H_0: \gamma_{11} = \gamma_{12} = \gamma_{13} = 0$ ) in the first equation of the system. Likewise the other null hypothesis for second equation is  $H_0: \beta_{2i} = 0$  where  $\beta_{2i}$  are the coefficients of  $GDP_{t-i}$ ,  $i = 1, 2, 3$  ( $H_0: \beta_{21} = \beta_{22} = \beta_{23} = 0$ ) that is the GDP does not Granger cause PC. This was carried out by means of a Wald test with the null hypothesis that the values of the estimated coefficients ( $\beta_{2i}$  and  $\gamma_{2i}$ ) are zero. The other hypothesis for remaining system of two equations was also formulated in the same manner. The results of the Toda-Yamamoto test of augmented Granger causality are given in Table 14.

Table 14

*Toda-Yamamoto Granger Causality Test*

| Equations   | Null Hypothesis                     | Value   | Test Statistic |  |
|---|-------------------------------------|---------|----------------|--|
|   |                                     |         | df             | Wald test ( $\chi^2$ -statistic)<br>Prob.  |
| <b><i>Bivariate-RGDP and Physical Capital</i></b>       |                                     |         |                |  |
| Equation 1  | PC does not Granger cause RGDP      | 8.7588  | 1              | [.003] <i>Reject H<sub>0</sub></i>         |
| Equation 2  | RGDP does not Granger cause PC      | 12.7208 | 1              | [0.000] <i>Reject H<sub>0</sub></i>        |
| <b><i>Bivariate-RGDP and Exports</i></b>                |                                     |         |                |  |
| Equation 3  | Exports does not Granger cause RGDP | .72878  | 1              | [.393] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 4  | RGDP does not Granger cause Exports | 26.5535 | 1              | [0.000] <i>Reject H<sub>0</sub></i>        |
| <b><i>Bivariate-RGDP and Human Development (HD)</i></b> |                                     |         |                |  |
| Equation 5  | HD does not Granger cause RGDP      | 1.4697  | 1              | [.225] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 6  | RGDP does not Granger cause HD      | 16.1701 | 1              | [0.000] <i>Reject H<sub>0</sub></i>        |
| <b><i>Trivariate-RGDP, Exports and HD</i></b>           |                                     |         |                |  |
| Equation 7  | Export does not Granger cause RGDP  | .034072 | 1              | [.854] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 7a   | HD does not Granger cause RGDP      | .73780  | 1              | [.390] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 8  | RGDP does not Granger cause Exports | 13.0664 | 1              | [.000] <i>Reject H<sub>0</sub></i>         |
| Equation 9  | RGDP does not Granger cause HD      | 1.4891  | 1              | [.222] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 8a   | HD does not Granger cause Exports   | 1.9722  | 1              | [.160] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 9a   | Exports does not Granger cause HD   | .53383  | 1              | [.465] <i>Cannot Reject H<sub>0</sub></i>  |
| <b><i>Tetravariate-RGDP, Exports, HD, and PC</i></b>    |                                     |         |                |  |
| Equation 10   | Export does not Granger cause RGDP  | .47336  | 1              | [.491] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 10a  | HD does not Granger cause RGDP      | .098718 | 1              | [.753] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 10b  | PC does not Granger cause RGDP      | 8.0928  | 1              | [.004] <i>Reject H<sub>0</sub></i>         |
| Equation 10c  | RGDP does not Granger cause Exports | 13.5116 | 1              | [0.000] <i>Reject H<sub>0</sub></i>        |
| Equation 11   | HD does not Granger cause Exports   | 1.4224  | 1              | [.233] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 11a  | PC does not Granger cause Exports   | .62814  | 1              | [.428] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 11b  | RGDP does not Granger cause HD      | 1.0588  | 1              | [.303] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 11c  | Exports does not Granger cause HD   | .31531  | 1              | [.574] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 12   | PC does not Granger cause HD        | .53811  | 1              | [.463] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 12a  | RGDP does not Granger cause PC      | .11842  | 1              | [.731] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 12b  | Exports does not Granger cause PC   | 1.7246  | 1              | [.189] <i>Cannot Reject H<sub>0</sub></i>  |
| Equation 12c  | HD does not Granger cause PC        | 1.9909  | 1              | [0.158] <i>Cannot Reject H<sub>0</sub></i> |

The statistical results of bivariate causality indicate that the null hypothesis of no Granger causality between PC and real GDP is rejected at 1 percent level of significance. Similar hypothesis regarding no Granger causality between real GDP and PC is rejected at 1 percent level of significance. These results support the presence of bidirectional causality between real GDP and PC. To test causality between real exports (RX) and real GDP (RGDP), the system of Equations (11) and (12) has been estimated by SUR. The null hypothesis that RX do not Granger cause RGDP cannot be rejected at 95 percent level of confidence. On the other hand, the hypothesis that RGDP does not Granger cause exports can be rejected at 95 percent level of confidence. It was found that there is one way causality running from RGDP to RX in a bivariate case. The causal flow from real output to real export is termed as ‘growth-driven exports’. Exports are thus not seen as the significant source of EGr in Pakistan. Similarly another bivariate analysis between RGDP and HD (Equations 13 and 14) also indicates a unidirectional causality running only from RGDP to HD. In conclusion, in case of bivariate analysis, ‘export-led growth hypothesis’ is not seen to be valid while bivariate results support the validity of ‘growth-driven hypothesis’. Human capital-based endogenous growth theory does not seem to be valid in case of bivariate causality analysis.

Now moving to trivariate system of equations (Equations (15), (16) and (17)) to analyse the Augmented Granger Causality for the variables RX, real GDP and HD. As found above in bivariate analysis, RX do not Granger cause RGDP at 95 percent level of confidence, whereas RGDP does Granger cause RX at 99 percent level of confidence in case of trivariate analysis. Similarly no Granger causality between HD and RGDP and between HD and RX was established in trivariate analysis. In conclusion, in case of trivariate analysis, ‘export-led growth hypothesis’ is not valid whereas ‘growth-driven exports hypothesis’ found valid. The ‘human based-endogenous growth theory’ still found not valid in case of trivariate analysis.

To test the tetravariate causality between RGDP, RX, HD and PC, again use of SUR was made. It was found that RGDP does Granger cause RX while exports do not Granger cause real GDP. It was also found that PC does Granger cause RGDP.

Regarding causality running from HD to real GDP in all cases (bivariate, trivariate and tetravariate analyses) the null hypothesis that HD does not Granger cause real GDP cannot be rejected. Thus, it can be concluded that ‘human capital based-endogenous growth theory’ is not valid in case of Pakistan. In sum, only ‘growth-driven exports hypothesis’ was found valid in case of Pakistan.

The statistical results also reveal that causality running from real GDP to HD does Granger cause only in bivariate analysis. This can be explained as: when people get richer because of EGr they prefer to send their children for higher education, knowledge and skills instead of sending them in the labour market. Similarly, because of increase in EGr, R&D expenditure will also grow. Finally, the statistical results do not support the presence of Granger causality between HD and RX. Thus, it could be the result of mismatch between existing HC stock and the required HC to produce exportables.

$$Y_t = \alpha_7 + \sum_{i=1}^3 \beta_{7i} Y_{t-i} + \sum_{i=1}^3 \lambda_{7i} HD_{t-i} + \sum_{i=1}^3 \gamma_{7i} RX_{t-i} + u_{7t} \quad \dots \quad (15)$$

$$RX_t = \alpha_8 + \sum_{i=1}^3 \beta_{8i} Y_{t-i} + \sum_{i=1}^3 \lambda_{8i} HD_{t-i} + \sum_{i=1}^3 \gamma_{8i} RX_{t-i} + u_{8t} \quad \dots \quad (16)$$

$$HD_t = \alpha_9 + \sum_{i=1}^3 \beta_{9i} Y_{t-i} + \sum_{i=1}^3 \lambda_{9i} HD_{t-i} + \sum_{i=1}^3 \gamma_{9i} RX_{t-i} + u_{9t} \quad \dots \quad \dots \quad (17)$$

$$Y_t = \alpha_{10} + \sum_{i=1}^3 \beta_{10i} Y_{t-i} + \sum_{i=1}^3 \gamma_{10i} PC_{t-i} + \sum_{i=1}^3 \lambda_{10i} HD_{t-i} + \sum_{i=1}^3 \delta_{10i} RX_{t-i} + u_{10t} \quad \dots \quad (18)$$

$$RX_t = \alpha_{11} + \sum_{i=1}^3 \beta_{11i} Y_{t-i} + \sum_{i=1}^3 \gamma_{11i} PC_{t-i} + \sum_{i=1}^3 \lambda_{11i} HD_{t-i} + \sum_{i=1}^3 \delta_{11i} RX_{t-i} + u_{11t} \quad \dots \quad (19)$$

$$HD_t = \alpha_{12} + \sum_{i=1}^3 \beta_{12i} Y_{t-i} + \sum_{i=1}^3 \gamma_{12i} PC_{t-i} + \sum_{i=1}^3 \lambda_{12i} HD_{t-i} + \sum_{i=1}^3 \delta_{12i} RX_{t-i} + u_{12t} \quad \dots \quad (20)$$

From the results of the ARDL models and Augmented Granger Causality tests, the qualitative results of the study are summarised in Table 15.

Table 15

*Comparison of Results of ARDL Approach and Augmented Granger Causality Tests Regarding Validity of Hypotheses of the Study*

| Validity of Hypotheses at 95 percent<br>Level of Confidence | ARDL Approach Results  | Toda-Yamamoto Granger Causality<br>Test Results |            |              | Overall |
|---|------------------------|---|------------|--------------|---------|
|   |                        | Bivariate                                       | Trivariate | Tetrivariate |         |
| Export-led Growth Hypothesis                                | No                     | No  | No         | No           | No      |
| Growth-driven Exports Hypothesis                            | Yes                    | Yes   | Yes        | Yes          | Yes     |
| Human Based Endo-genous<br>Growth Theory                    | Yes in LR,<br>No in SR | No  | No         | No           | No      |

‘Export-led growth hypothesis’ cannot be supported at 95 percent level of confidence in case of Pakistan. However, the sign of the regression coefficients of real GDP in all causality tests remained positive. This materialised situation could be the result of trade composition and trade policy of Pakistan. Although, Pakistan’s trade has significantly shifted from primary and semi-manufactured goods and services to manufactured goods, but exports share of the country in GDP remained almost the same. The results of this study are consistent with those of Akbar and Naqvi (2000), Ahmed, *et al.* (2000) and Afzal, Rehman, and Rehman (2008).

On the other hand, the null hypothesis that real GDP does not Granger cause RX is rejected in case of Pakistan. This finding is consistent with Doganlar and Fisunoglu (1999) and Afzal, Rehman and Rehman(2008). In addition, the ARDL results presented in Tables 8, 9 and 10 do support the ‘growth-driven export hypothesis’. Thus, it can be concluded that ‘growth-driven hypothesis’ is valid in case of Pakistan. This finding about growth-driven hypothesis is consistent with Afzal, Rehman, and Rehman (2008). According to ARDL model 1, HD promotes real GDP only in the LR but Granger causality analysis do not support the human capital-based endogenous growth theory in case of Pakistan. Thus, it can be concluded that ‘human capital-based endogenous growth theory’ is not valid in case of Pakistan.

## V. CONCLUSION AND RECOMMENDATIONS

The ARDL results indicate that the inclusion of human development as an explanatory variable in addition to physical capital, real exports in augmented growth function raises the robustness of the model. The ARDL Approach to Cointegration results show cointegration between economic growth, physical capital, real exports and human development when human development is taken as dependent variables. The statistical results and their analysis support the ‘growth-driven exports hypothesis’. However, the hypotheses of export-led growth and human capital based endogenous growth are not found valid for Pakistan. The invalidity of export-led growth is also supported by the existing data on exports to GDP ratio [*Pakistan Economic Survey* (2008-09), p. 61]. It might be because of the two main reasons: firstly, the result of brain drains of highly skilled labour force and, secondly, the outcome of mismatch between existing human capital stock and required human capital stock to produce and enhance real GDP. Real GDP is found to be a significant source of explaining and promoting both the real exports and human development both in short-run and long-run, while human capital accumulations and real exports do not seem to accelerate real GDP in the short-run. It is, therefore, recommended that Government of Pakistan should allocate more resources for the promotion of human capital. There is a need for serious effort on the part of the Government to revise its export promotion policies. The goal of export promotion can be achieved by restructuring export composition and by exploring new markets. The ‘export-led growth hypothesis’, ‘growth-driven exports hypothesis’ and ‘human capital-based endogenous growth theory’ may further be tested and generalised in case of Pakistan by including other economic and non-economic variables like foreign direct investment, terms of trade, imports, financial development, energy, debt and debt servicing and political turmoil etc.

## REFERENCES

- Afzal, Muhammad (2006) Causality between Exports, World Income and Economic Growth in Pakistan. *International Economic Journal* 20:1, 63–77.
- Afzal, Muhammad, Hafeez ur Rehman, and Jamshaid ur Rehman (2008) Causal Nexus between Economic Growth, Export and External Debt Servicing: The Case of Pakistan. Retrieved December 14, 2009 from <http://www.pide.org.pk/PSDE/pdf/32.pdf>.
- Ahmad, J. and S. Harnhirun (1995) Unit Roots and Cointegration in Estimating Causality between Exports and Economic Growth: Empirical Evidence from the ASEAN Countries. *Economics Letters* 49, 329–334.
- Ahmad, Jaleel (2001) Causality between Exports and Economic Growth: What do the Econometric Studies Tell Us? *Pacific Economic Review* 6:1, 147–67.
- Ahmad, Jaleel, Somchai Harnhirun, and Jing Yang (1997) Exports and Economic Growth in the ASEAN Countries: Cointegration and Causality Tests. *International Review of Economics and Business* 44:2, p. 419.
- Ahmed, J. and A. C. C. Kwan (1991) Causality between Exports and Economic Growth. *Economic Letters* 37, 243–248.

- Ahmed, Qazi Massod, M. Sabihuddin Butt, and Shaista Alam (2000) Economic Growth, Export and External Debt Causality: The Case of Asian Countries. *The Pakistan Development Review* 34:4, 591–08.
- Akbar, M. and Z. F. Naqvi (2000) Export Diversification and Structural Dynamic Growth Process: The Case of Pakistan. *The Pakistan Development Review* 39:4, 573–589.
- Alderman, H., J. Behrman, S. Khan, D. Ross, and R. Sabot (1996a) The Income Gap In Cognitive Skills in Rural Pakistan. *Economic Development and Cultural Change* 44.
- Alderman, H., J. Behrman, S. Khan, D. Ross, and R. Sabot (1996b) The Returns To Endogenous Human Capital In Pakistan's Rural Wage Market. *Oxford Bulletin of Economics and Statistics*.
- Al-Yousif, Yousif Khalifa (1997) Exports and Economic Growth: Some Empirical Evidence from Arab Gulf Countries. *Applied Economics* 29, 693–697.
- Amoateng, K. and B. Amoako-Adu (1996) Economic Growth, Export and External Debt Causality: The Case of African Countries. *Applied Economics* 28, 21–27.
- Asteriou, D. and G. M. Agiomirgianakis (2001) Human Capital and Economic Growth: Time Series Evidence from Greece. *Journal of Policy Modeling* 23:5, 481–489.
- Awokuse, Titus O. (2003) Is the Export-Led Growth Hypothesis Valid for Canada? *Canadian Journal of Economics* 36: 1, 126–136.
- Awokuse, Titus O. (2005) Exports, Economic Growth and Causality in Korea. *Applied Economics Letters* 12:11, 693–96.
- Bahmani-Oskooee, M. and A. Nasir (2004) ARDL Approach to Test the Productivity Bias Hypothesis. *Review of Development Econ. J.* 8, 483–488.
- Bahmani-Oskooee, M. and T. J. Brooks (1999) Bilateral J Curve between US and Her Trading Partners. *Weltwirtschaftliches Archiv*, Band 135, Heft I, 56–165.
- Bahmani-Oskooee, M., H. Mohtadi, and G. Shabsigh (1991) Exports, Growth and Causality In Ldcs: A Re-Examination. *Journal of Development Economics* 36, 405–415.
- Balasubramanyam, V. N., M. Salisu and D. Sapsford (1996) Foreign Direct Investment and Growth in EP and IS Countries. *The Economic Journal* 106, 92–105.
- Banerjee, A., J. W. Dolado, Galbraith, and D. F. Hendry (1993) *Cointegration, Error Correction and the Econometrics Analysis of Non-Stationary Data*. Oxford: Oxford University Press.
- Bannerjee, A., J. W. Dolado, and R. Mestre (1998) Error-Correction Mechanism Tests for Cointegration in Single Equation Framework. *Journal of Time Series Analysis* 19, 267–283.
- Behrman, J. R. and B. L. Wolfe (1987a) How Does Mother's Schooling Affect the Family's Health Nutrition Medical Care Usage and Household? *Journal of Econometrics* 36.
- Behrman, J. R. and B. L. Wolfe (1987b) Investments in Schooling in Two Generations in Pre-Revolutionary Nicaragua: The Roles of Family Background and School Supply. *Journal of Development Economics* 27.
- Birdsall, N. (1985) Public Inputs and Child Schooling in Brazil. *Journal of Development Economics* 18.
- Brown, R. L., J. Durbin and J. M. Evans (1975) Techniques for Testing the Constancy of Regression Relationships Over Time. *Journal of the Royal Statistical Society, Series B*, 37, 149–192.

- Chen, Shyh-Wei (2007) Exactly What Is the Link between Export and Growth in Taiwan? New Evidence from the Granger Causality Test. *Economics Bulletin* 6:7, 1–10.
- Chow, P. C. Y. (1987) Causality between Export Growth and Industrial Development: Empirical Evidence from the NICS. *Journal of Development Economics* 26:1, 55–63.
- Chuang, Y. C. (2000) Human Capital, Exports and Economic Growth: A Causality Analysis for Taiwan, 1952-1995. *Review of International Economics* 8:4, 712–720.
- Dargahi, J. (2003) Analyses of Economic Growth Elements in Iran. *Journal of Research in Economics* p. 26.
- De Meulemeester, J. L. and D. Rochat (1995) A Causality Analysis of the Link between Higher Education and Development. *Economics of Education Review* 14:4, 351–361.
- Demirhan, Erdal and Selcuk Akcay (2005) The Causality Relationship between Export Growth and Economic Growth: Empirical Evidence from Selected MENA Countries. *Iktisat Isletme Ve Finans* May, 20:230, 124–131.
- Deolalikar, A. B. (1993) Gender Differences in the Returns to Schooling and School Enrollment Rates in Indonesia. *Journal of Human Resources* 28.
- Din, Musleh ud (2004) Exports, Imports, and Economic Growth in South Asia: Evidence Using a Multivariate Time-Series Framework. *The Pakistan Development Review* 43:2, 105–124.
- Doganlar, Murat and Mahir Fisunoglu (1999) Causality between Exports and Economic Growth in Asian Countries. *Yapi Kredi Economic Review* 10:1, 3–11.
- Emadzadeh, et al. (2000) The Role of Human Capital in Economic Growth. *Journal of Planning and Development* 5:1, 21.
- Engle, R. F. and C. W. J. Granger (1987) Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica* 55, 251–76.
- Gould, D. and R. Ruffin (1995) Human Capital, Trade and Economic Growth. *Weltwirtschaftliches Archiv* 131:3, 425–445.
- Graves, Philip E. and J. A. Holman (1995) Korean Exports Economic Growth: An Econometric Reassessment. *Journal of Economic Development* 20:2, 45–56.
- Gregory, A. W. and B. E. Hansen (1996) Residual-Based Tests for Cointegration in Models with Regime Shifts. *Journal of Econometrics* 70, 99–126.
- Grossman, G. and E. Helpman (1991) *Innovation and Growth in the Global Economy*. Cambridge, MA: MIT Press.
- Hansen, H. and J. Rand (2006) On the Causal Links between FDI and Growth in Developing Countries. *The World Economy* 29:1, 21–41.
- Hatemi, J. Abdunnasser (2002) Export Performance and Economic Growth Nexus in Japan: A Bootstrap Approach. *Japan and the World Economy* 14:1, 25–33.
- Hatemi, J. Abdunnasser and Manuchehr Irandoust (2000) Export Performance and Economic Growth Causality: An Empirical Analysis. *Atlantic Economic Journal* 28:4, 412–426.
- Heller, P. and R. Porter (1978) Exports and Growth: An Empirical Investigation. *Journal of Development Studies* 5:2, 191–193.
- Helpman, E. and P. Krugman (1990) *Market Structure and Foreign Trade*. Cambridge MA: MIT Press.
- Hsiao, M. C. W. (1987) Tests of Causality and Exogeneity between Exports and Economic Growth: The Case of the Asian NICs. *Journal of Economic Development* 12, 143–159.

- In, F. and C. Doucouliagos (1997) Human Capital Formation and US Economic Growth: A Causality Analysis. *Applied Economics Letters* 4:5, 329–331.
- Islam, Muhammed N. (1998) Export Expansion and Economic Growth: Testing For Cointegration and Causality. *Applied-Economics* 30:3, 415–425.
- Johansen, S. (1988) Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control* 12, 231–254.
- Johansen, S. (1991) Estimation And Hypothesis Testing of Co-Integration Vectors in Gaussian Vector Autoregressive Models. *Econometrica* 59, 1551–1580.
- Johansen, S. and K. Juselius (1990), Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics* 52, 169–210.
- Jones, Jonathan D. (1989) A Comparison of Lag-length Selection Techniques in Tests of Granger Causality between Money Growth and Inflation: Evidence for the US, 1959–86. *Applied Economics* 21, 809–822.
- Jordaan, André C. and Joel Hinaunye Eita (2007) Testing the Export-led growth Hypothesis for Botswana: A Causality Analysis. University of Pretoria, Department of Economics. (Working Papers 2007-20).
- Judson, R. (2002) Measuring Human Capital Like Physical Capital: What Does it Tell Us? *Bulletin of Economic Research* 54, 209–231.
- Jung, W. S. and P. J. Marshall (1985) Exports, Growth and Causality in Developing Countries. *Journal of Development Economics* 18:2, 1–12.
- Khalid, Ahmed M. and Bay Teck Cheng (1997) Imports, Exports and Economic Growth: Cointegration and Causality Tests for Singapore. *Singapore Economic Review*, October, 42:2, 32–39.
- Khan, S., W. D. Shaw, and F. Hussain (1991) Causality between Literacy and Labour Productivity in Pakistan. *Economics of Education Review* 10:3, 245–251.
- Kim, J. (1998) Economic Analysis of Foreign Education and Students Abroad. *Journal of Development Economics* 56:2, 337–356.
- King, E. M. and L. A. Lillard (1987) Education Policy and Schooling Attainment in Malaysia and the Philippines. *Economics of Education Review* 6.
- Kohpaiboon, A. (2004) Foreign Trade Regime and FDI-growth Nexus: A Case Study of Thailand. Australian National University. (Working Paper).
- Komijani and Memernejad (2004) Impotence of Human Capital and R&D in Economic Growth of Iran. *Journal of Research in Economics* 31.
- Konya, L. (2006) Exports and Growth: Granger Causality Analysis on OECD Countries with a Panel Approach. *Economic Modeling* 23, 978–992.
- Kovacic, Zlatko J. and Djordje Djukic (1991) Export Expansion and Economic Growth in Yugoslavia: Some Empirical Evidence. *Economic Analysis and Workers' Management* 25:2, 95–113.
- Kremers, J. J. M., Neil R. Ericsson, and Juan J. Dolado (1992) The Power of Cointegration Tests. *Oxford Bulletin of Economics and Statistics* 54, 325–343.
- Kwan, A. C. C. and J. Cotsomotis (1991) Economic Growth and Expanding Export Sector: China 1952–1985. *International Economic Review* 5, 105–117.
- Lee, D. W. and T. H. Lee (1995) Human Capital and Economic Growth: Tests based on International Evaluation of Educational Achievement. *Economic Letters* 47, 219–225.

- Lee, Daniel Y. and Ming Shiun Pan (2000) On Exports and Economic Growth in East Asian Countries: Linear and Nonlinear Causality Analyses. *Pennsylvania Economic Review* Fall 9:2, 66–78.
- Liu, X., C. Wang and Y. Wei (2001) Causal Links between Foreign Direct Investment and Trade in China. *China Economic Review* 12:2-3, 190–202.
- Liu, X., H. Song and P. Romilly (1997) An Empirical Investigation of the Causal Relationship between Openness and Economic Growth in China. *Applied Economics* 29:12, 1679–1686.
- Liu, X., P. Burridge and P. J. N. Sinclair (2002) Relationships between Economic Growth, Foreign Direct Investment and Trade: Evidence from China. *Applied Economics* 34:11, 1433–1440.
- Lucas, R. (1988) On the Mechanics of Economic Development. *Journal of Monetary Economics* 22, 3–42.
- MacKinnon, J. G. (1996) Numerical Distribution Functions for Unit Root and Cointegration Tests. *Journal of Applied Econometrics* 11, 601–618.
- Mah, Jai S. (2005) Export Expansion, Economic Growth and Causality in China. *Applied Economics Letters* 12:2, 105–107.
- Mansouri, B. (2005) The Interactive Impact of FDI and Trade Openness on Economic Growth: Evidence from Morocco. Paper presented on the 12th Economic Research Forum (ERF) Conf., Cairo.
- Marin, D. (1992) Is the Export-led Growth Hypothesis Valid for Industrialised Countries? *The Review of Economics and Statistics* 74, 678–688.
- Mohamadi, A. (2006) Role of Education in Iran Economic Growth-Fars Province. *Education* 22:4, 57–84.
- Mosconi, R. and C. Giannini (1992) No-causality in Cointegrated Systems: Representation, Estimation and Testing. *Oxford Bulletin of Economics and Statistics* 54, 399–417.
- Narayan, P. K. (2005) The Saving and Investment Nexus for China: Evidence from Cointegration Tests. *Applied Economics* 37, 1979–1990.
- Narayan, P. K. and R. Smyth (2004a) Temporal Causality between Human Capital and Real Income in Cointegrated VAR Processes, Empirical Evidence from China, 1960-1999. *International Journal of Business and Economics* 3:1, 1–11.
- Narayan, Paresh Kumar and Russell Smyth (2004b) Temporal Causality and the Dynamics of Exports, Human Capital and Real Income in China. *International Journal of Applied Economics* 1;1, 24–45.
- Ng, S. and P. Perron (2001) Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power. *Econometrica* 69, 1519–1554.
- Nili, M. and S. H. Nafisi (2003) Relationship between Human Capital and Economic Growth. *Quarterly Journal of Economic Researches of Iran*, p. 17.
- Omisakin, Ohusegun A. (2009) Export-led Growth Hypothesis: Further Econometric Evidence from Nigeria. *Pakistan Journal of Social Sciences* 6:4, 219–223.
- Onchoke, S. N. and F. In (1994) An Empirical Investigation of LR Relationship between Export Revenues and Economic Growth in the South Pacific Island Nations. *The Singapore Economic Review* 38:2, 213–228.
- Pacific Island Countries. Economic Papers (Economic Society of Australia).

- Pakistan, Government of (Various Issues) *Pakistan Economic Survey*. Islamabad: Finance Division, Economic Advisor's Wing.
- Perron, P. (1989) The Great Crash: The Oil Price Shock and the Unit Root Hypothesis. *Econometrica* 57, 1361–1401.
- Perron, P. (1997) Further Evidence on Breaking Trend Functions in Macroeconomic Variables. *Econometrica* 80, 355–385.
- Pesaran, M. H. and B. Pesaran (1997) *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford: Oxford University Press.
- Pesaran, M. H. and Y. Shin (1995) An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. In S. Storm, A. Holly and P. Diamond (ed.) *Centennial Volume of Ragnar Frisch*. Cambridge: Cambridge University Press.
- Pesaran, M. H. and Y. Shin (1999) An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. In S. Strom (ed.) *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge: Cambridge University Press.
- Pesaran, M. H., Y. Shin and R. J. Smith (1996) Testing for the Existence of a Long-run Relationship. Department of Applied Economics, University of Cambridge, Cambridge. (DAE Working Paper No. 9622).
- Pesaran, M. H., Y. Shin and R. J. Smith (2001) Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics* 16, 289–326.
- Pissarides, C. (1997) Learning by Trading and the Returns to Human Capital in Developing Countries. *World Bank Economic Review* 11:1, 17–32.
- Rambaldi, A. N. and H. E. Doran (1996) Testing for Granger Non-causality in Cointegrated Systems Made Easy. Department of Econometrics, University of New England. (Working Papers in Econometrics and Applied Statistics No. 88, pp. 1-22).
- Ramiret, A., G. Ranis and F. Stewart (1997) Economic Growth and Human Development. Economic Growth Centre, Yale University (Centre Discussion Paper No. 787).
- Ranis, G., F. Stewart and A. Ramirez (2000) Economic Growth and Human Development. *World Development* 28: 2, 197–219.
- Rebelo, Sergio T. (1991) Long-run Policy Analysis and Long-run Growth. *Journal of Political Economy* 99:3, 500–521.
- Reppas, P. A. and D. K. Christopoulos (2005) The Export-output Growth Nexus: Evidence from African and Asian Countries. *Journal of Policy Modeling*, 27, 929–940.
- Riddell, R., M. Robinson, J. deConinck, A. Muir, and S. White (1995) *Nongovernmental Organisations and Rural Poverty Alleviation*. New York: Oxford University Press.
- Romer, P. (1987) Endogenous Technical Change. *Journal of Political Economy* 89, 71–102.
- Romer, P. (1990) Human Capital and Growth: Theory and Evidence. *Carnegie-Rochester Conference Series on Public Policy* 32, 251–285.
- Romer, Paul M. (1986) Increasing Returns and Long-run Growth. *Journal of Political Economy* 94:5, 1002–1037.
- Saikkonen, Pentti and Helmut Lutkepohl (2000) Testing for the Cointegrating Rank of a VAR Process with Structural Shifts. *Journal of Business and Economic Statistics* (American Statistical Association) 18:4, 451–464.

- Sezgin, Selami and Tulide Yildirim (2002) The Demand for Turkish Defense Expenditure, Defense and Peace Economies. *Taylor and Francis Journals* 13:2.
- Shan, J. and F. Sun (1995) On the Export-led Growth Hypothesis for the Little Dragons: An Empirical Reinvestigation. *Applied Economic Journal* 26:4, 353–369.
- Shan, J. and F. Sun (1998) On the Export-led Growth Hypothesis: The Econometric Evidence from China. *Applied Economics Journal* 30, 1055–1065.
- Shan, J. and G. G. Tian (1998) Causality between Exports and Economic Growth: The Empirical Evidence from Shanghai. *Australian Economic Papers* 37:2, 195–202.
- Sharma, S. C., M. Norris, and D. W. W. Cheung (1991) Exports and Economic Growth in Industrialised Countries. *Applied Economics Journal* 23, 697–708.
- Shirazi, Nasim Shah and Turkhan Ali Abdul Manap (2004) Exports and Economic Growth Nexus: The Case of Pakistan. *The Pakistan Development Review* 43:4, 563–579.
- Stock, J. H. and M. Watson (1993) A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica* 61, 783–820.
- Stock, J. H. and M. W. Watson (1988) Testing for Common Trend. *Journal of the American Statistical Association* 83, 1097–1107.
- Stokey, N. (1996) Free Trade, Factor Returns and Factor Accumulation. *Journal of Economic Growth* 1:4, 255–271.
- Thornton, J. (1996) Cointegration, Causality and Export-led Growth in Mexico, 1895–1992. *Economic Letters* 50, 413–416.
- Toda, H. Y. and P. C. B. Phillips (1993) Vector Autoregressions and Causality. *Econometrica* 61, 1367–1393.
- Toda, H. Y. and T. Yamamoto (1995) Statistical Inference in Vector Autoregressive with Possible Integrated Processes. *Journal of Econometrics* 66, 225–250.
- Turner, P. (2006) Response Surfaces for an F-test for Cointegration. *Applied Economics Letters* 13, 479–482.
- UNDP (Various Issues) *Human Development Report*. New York: Oxford University Press.
- Vohra, Rubina (2001) Export and Economic Growth: Further Time Series Evidence from Less-developed Countries. *International Advances in Economic Research* 7:3, 345–350.
- Wernerheim, C. M. (2000) Cointegration and Causality in the Exports-GDP Nexus: The Post-War Evidence for Canada. *Empirical Economics* 25, 111–125.
- Xu, Z. (1996) On the Causality between Export Growth and GDP Growth: An Empirical Reinvestigation. *Review of International Economics* 4, 172–184.
- Zapata, H. O. and A. N. Rambaldi (1997) Monte Carlo Evidence on Cointegration and Causation. *Oxford Bulletin of Economics and Statistics* 59, 285–298.

## **Comments**

The paper titled 'A Dynamic Analysis of the Relationship among Human Development, Exports and Economic Growth in Pakistan' examines linkages among these three variables using latest econometric techniques. Specifically it tests three hypotheses; export-led growth hypothesis, human capital-based endogenous growth hypothesis and growth-driven export hypothesis. The theoretical construct of this paper is derived from endogenous growth theory which clearly supports second hypothesis and to some extent the first one. However, results of this paper reject the first two hypotheses and accept only the third one. So, there seems to be some contradiction of theory and results that needs to be explained in more detail.

Also recommendations of authors that government should allocate more resources for the development of human capital and government should revive export promotion schemes do not fit with the results of this paper. Similarly, their conclusion that invalidity of export-led growth hypothesis is due to brain drain and mismatch of existing and desired human capital is not based on data and analysis used in this paper.

**M. Mazhar Iqbal**

Quaid-i-Azam University,  
Islamabad.

## Efficiency Dynamics of Sugar Industry of Pakistan

ABDUL RAHEMAN, ABDUL QAYYUM, and TALAT AFZA

### 1. INTRODUCTION

Sugarcane is among the most valuable crops of Pakistan. It is a source of raw material for entire sugar industry. At present, the sugar industry is second largest agro-based industry in Pakistan. The future of this industry in Pakistan is mainly attributed to the production efficiency because of higher cost of production; increase in the imports and due to declining competitiveness of the domestic sugar industry. Productive efficiency can be improved by the adoption and development of new production technologies but at present it is difficult due to limited income and credit to the out growers. Therefore, this industry can improve the efficiency of its operations using currently available technology.

Measures of productivity, its growth and sources for the sugar industry of Pakistan play a significant role for policy development. Productivity growth can be decomposed into three components: technical change, scale effects, and changes in the degree of technical efficiency [Coelli, *et al.* (2005)]. Technical change means progress in technology not only physically in the form of improved machinery but also innovations in the knowledge base. Regarding scale effects, it relate to economies in production. If there exists increasing economies of scale it indicates that the production of additional outputs will require a less than proportional increase in inputs. Improvements in the degree of technical efficiency arise from situations where resources can be used more efficiently by applying practices from the present stock of knowledge.

The most comprehensive measure of aggregate or sectoral productivity is Total Factor Productivity (TFP). However, given the paucity of good data, this area of research has remained quite limited in Pakistan [Ali (2004)]. There are some studies on manufacturing sector of Pakistan which include Raheman, *et al.* (2008), where TFP and its sources are estimated using Malmquist Productivity growth index for major manufacturing industries of Pakistan using aggregate firm level financial data but sugar industry is not among the industries analysed. The results of the study highlighted the

Abdul Raheman <abdulehman@uair.edu.pk> is PhD Scholar, Department of Management Sciences, COMSATS Institute of Information Technology, Islamabad and Assistant Professor, University Institute of Management Sciences, PMAS-Arid Agriculture University Rawalpindi. Abdul Qayyum <abdulqayyum@pide.org.pk> is Professor at the Pakistan Institute of Development Economics, Islamabad. Talat Afza <talatafza@ciitlahore.edu.pk> is Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Lahore.

role of efficiency change in the TFP growth while deficiencies in terms of technological progress. Similarly, another study by Mahmood, *et al.* (2007) examined the efficiency of the large scale manufacturing sector of Pakistan by using the stochastic production frontier approach for periods 1995-96 and 2000-01. Afzal (2006) also analysed the TFP for the large scale manufacturing sector from 1975 to 2001 using three different approaches. There are no reported productivity efficiency studies for the sugar industry in Pakistan.

This study attempts to fill this gap by estimating firm level efficiency and total factor productivity growth and its components for a sample of twenty sugar firms in the sugar industry and to assess the variations in TFP growth between firms and over Time. The TFP growth is estimated for the period 1998 to 2007. This study, therefore, would provide a fresh perspective on the growth of TFP in sugar sector for use in developing appropriate policy responses towards this sector of Pakistan's economy.

There are several techniques available, parametric and non-parametric, to estimate total factor productivity. The most widely used example of a non-parametric technique is DEA [Coelli (1995); Seiford (1996)]. Parametric techniques encompass stochastic frontier techniques and Bayesian methods [Kalirajan and Shand (1999)]. In this paper we employ DEA to estimate Malmquist TFP indices from panel data set. The reason for the choice of DEA as the method of estimation is that the methodology has been employed widely to conduct benchmarking analysis [for example, see Jaforullah and Whiteman (1999)]. Most of the existing studies that employs panel data for estimation of efficiency and productivity change reports estimates for the entire data period, while in the present study our focus is on the annual estimates because we wish to examine how productivity changes through time at the firm level.

The basic objective of this paper is to use the Data Envelopment Analysis (DEA) as a tool for the measurement of TFP growth for sugar industry and sugar firms. The objective/purpose is also to decompose TFP growth into technical change, efficiency change and scale efficiency change in order to understand the source of productivity for Pakistani sugar firms listed at Karachi Stock Exchange. This decomposition enables policymakers to trace lagging productivity to particular factors. For example, if slowing technical progress causes declining TFP growth, the production frontier can be shifted upward through investment in research and development (R&D); if slow productivity growth is traced primarily to deteriorating technical efficiency (TE), learning-by-doing processes and managerial practices can be targeted for this purpose; if there will be benefits from SE, production scales should be adjusted toward optimum values. The specific objective of the study is to provide policy implications and strategies for improvement in the production efficiency of sugar firms. Policymakers can recommend policies that improve the productivity of firms only if they understand the sources of variation in productivity growth.

Generally, studies at country level on productivity growth are based on the overall or aggregate data; therefore, the results of those studies are average of the overall economy which comprises of different sectors. Hence contribution in each country's productivity has different proportion of sectors. This study uses financial data of sugar firms extracted from annual reports obtained from different sources. This data allows examination of the TFP performance of individual firms, which was not previously done.

The structure of this article is as follows. In the following section, an overview of sugar industry of Pakistan is presented followed by the third section which describes the data used in the analysis and methodology opted for analysis including discussion of input and output variables. Then the results of our Malmquist TFP estimates are presented. In the final section we discuss the results presented and provide conclusions.

## 2. OVERVIEW OF SUGAR INDUSTRY OF PAKISTAN

Sugarcane is an important industrial and cash crop in Pakistan. Pakistan is an important sugarcane producing country and is ranked fifth in terms of area under sugar cultivation, 60th in yield and 15th in sugar production. Sugarcane is grown on over a million hectares and provides the raw material for Pakistan's 84 sugar mills which comprise the country's second largest agro-industry after textiles [Pakistan Annual Sugar Report (2009)]. The sugar sector constitutes 4.2 percent of manufacturing. In size, the sugar sector matches the cement sector. Sugar industry has an indirect socio-economic impact in overall terms which is significantly larger than its direct contribution to GDP because of its backward (sugarcane growers) and forward linkages (food processors) in the economy.

The sugar cane yield for some important countries of the world is given in the following Table 1.

Table 1

### *Sugarcane Yield of World*

| Country    | Cane Yield (T/ha) | Sugar Recovery (%) | Sugar Yield (t/ha) |
|------------|-------------------|--------------------|--------------------|
| Australia  | 100.4             | 13.8               | 13.85              |
| Egypt      | 110.8             | 11.5               | 12.74              |
| Brazil     | 68.4              | 14.5               | 9.91               |
| USA        | 80.2              | 11.7               | 9.38               |
| Colombia   | 80.5              | 11.5               | 9.26               |
| Mexico     | 79.5              | 11.6               | 9.22               |
| India      | 66.9              | 9.9                | 6.64               |
| Pakistan   | 49.0              | 9.2                | 3.54               |
| World Avg. | 64.4              | 10.6               | 6.82               |

Source: [www.pakboi.gov.pk/word/Sugar%20.doc](http://www.pakboi.gov.pk/word/Sugar%20.doc)

According to the Table 1, Egypt is the highest in terms of sugarcane yield per hector which is 110.8 tons per hector while the Pakistan is the lowest in terms of this yield. As far as the sugar recovery is concerned, Brazil has the highest percentage and again Pakistan is at the lowest. If we analyse the sugar yield from sugarcane, Australia has the highest sugar yield in these countries and again Pakistan is at the lowest with 3.54 tons per hector. It indicates that in Pakistan, improvements can be made in terms of sugarcane yield, sugar recovery and sugar yield.

The area under cultivation has increased more rapidly than any other major crops. The Table 2 presents the area production and yield during period 1997-98 to 2007-08.

Table 2

*Pakistan Sugarcane Area and Yield*

| Year    | Area (000 Ha) | Produced 000 |                   | Utilisation % by<br>Sugar Mills |
|---------|---------------|--------------|-------------------|---------------------------------|
|         |               | Tonnes       | Yield per Hectare |                                 |
| 1997-98 | 1,056.2       | 53,104       | 50.28             | 77.32                           |
| 1998-99 | 1,155.1       | 55,191       | 47.78             | 77.90                           |
| 1999-00 | 1,009.8       | 42,000       | 41.59             | 69.00                           |
| 2000-01 | 960.0         | 43,620       | 45.40             | 67.47                           |
| 2001-02 | 999.7         | 48,041       | 48.10             | 76.33                           |
| 2002-03 | 1,099.7       | 52,049       | 47.30             | 80.28                           |
| 2003-04 | 1,074.8       | 53,800       | 50.10             | 81.15                           |
| 2004-05 | 966.4         | 43,533       | 45.00             | 73.74                           |
| 2005-06 | 907.0         | 44,292       | 48.80             | 67.94                           |
| 2006-07 | 1,033.0       | 54,871       | 53.12             | 73.78                           |
| 2007-08 | 1160.0        | 61,503       | 53.02             | –                               |
| 2008-09 | 1045.0        | 55,385       | 53.00             | –                               |

Source: Pakistan Sugar Mills Association Annual Report: 2007, 2008.

During the year 2007-08 production of sugar was estimated at 61.5 Million Metric Ton (MMT), an increase of 12 percent over previous year due to increase in area under cultivation and yield. While during 2008-09 sugar production is estimated at 55MMT a decline of 10 percent over the previous year. According to press reports [*Jang Weekly News*, August (2009)], Pakistan's 2009-10 sugar production is expected around 3 millions tons as against 3.2 million tons in the last year. The annual consumption of sugar varies in between 3.6 to 4.2 million tons, but according to the industry's officials, it has gone down since October due to economic slowdown and higher prices that resulted in lower demand from industries like drink producers. With this scenario, Pakistan has to import sugar which exposes it to the effects of shortage and rising prices in the world.

The consumption of sugar is showing an increasing trend for the last 15 years. In 1995-96, it was 2.89 million tons, which increased to 3.95 million tons in 2005-06. This is mainly due to increase in the population growth of the country, which is now almost 170 million. According to a rough estimate, the country will need approximately 5.5 million tons of sugar to meet the local demand by year 2020. It will require about 1.5 million hectares of area under cultivation which is at present about 1 hector. The per capita sugar consumption is around 25kg per year which is highest in the developing countries. The demand of sugar will increase in the coming years at the rate of about 2.3 percent because of growth in the population which is about 2.3 percent.

The sugarcane production in terms of sugarcane crushed, sugar made and recovery percentage is presented in the Table 3 for period 1997-98 to 2006-07.

Table 3

*Sugarcane Production and Recovery*

| Year      | No. of Mills | Cane Crushed Tonnes | Sugar Made Tonnes | Recovery |
|-----------|--------------|---------------------|-------------------|----------|
| 1997-98   | 71           | 41,062,268          | 3,548,953         | 8.64%    |
| 1998-99   | 71           | 42,994,911          | 3,530,931         | 8.21%    |
| 1999-2000 | 69           | 28,982,711          | 2,414,746         | 8.33%    |
| 2000-01   | 65           | 29,408,879          | 2,466,788         | 8.39%    |
| 2001-02   | 69           | 36,708,638          | 3,197,745         | 8.71%    |
| 2002-03   | 71           | 41,786,689          | 3,652,745         | 8.74%    |
| 2003-04   | 71           | 43,661,378          | 3,997,010         | 9.15%    |
| 2004-05   | 71           | 32,101,739          | 2,922,126         | 9.10%    |
| 2005-06   | 74           | 30,090,632          | 2,588,176         | 8.59%    |
| 2006-07   | 77           | 40,483,977          | 3,516,218         | 8.69%    |

Source: Pakistan Sugar Mills Association Annual Report: 2007.

This table is showing an increasing trend in terms of sugarcane crushed and sugar made except for years 2004-05 and 2005-06. During these two years Pakistan sugar industry faced the crisis due to decline in area under cultivation which causes decline in production and yield. Otherwise number of mills increased during this period.

After getting an overview of the sugar industry, we develop the methodology for estimating productivity growth of sugar industry in Pakistan by examining this issue at firm level.

### 3. METHODOLOGY

Total factor productivity growth and its sources are estimated using Data Envelopment Analysis approach. Malmquist productivity growth indices are calculated for twenty sugar firms and also for sugar industry. The Malmquist Productivity Index also includes the sources of productivity growth for these firms.

#### 3.1. Malmquist TFP Index

The Data Envelopment Analysis (DEA) methodology was initiated by Charnes, *et al.* (1978) who built on the frontier concept started by Farell (1957). The methodology used in this paper is based on the work of Fare, *et al.* (1994) and Coelli, *et al.* (1998) and Raheman, *et al.* (2008). The DEA-Malmquist Index has been used to calculate the total factor productivity growth of sugar firms listed at Karachi stock exchange where each firm in the sugar industry is a Decision Making Unit (DMU).

This Malmquist productivity index can be decomposed into efficiency change, technical change and total factor productivity growth. TFPG is geometric mean of efficiency change and technical change. We have used the DEAP software developed by Coelli (1996) to compute these indices. Following Fare, *et al.* (1994), the Malmquist output-orientated TFP change index between periods  $s$  (the base period) and period  $t$  (the subsequent period) is calculated as follows:

$$m_0(y_s, x_s, y_t, x_t) = \left[ \frac{d_0^s(y_t, x_t)}{d_0^s(y_s, x_s)} \times \frac{d_0^t(y_t, x_t)}{d_0^t(y_s, x_s)} \right]^{\frac{1}{2}} \dots \dots (1)$$

In the above equation,  $d_0^s(y_t, x_t)$  represents the distance from the period  $t$  observation to the period  $s$  technology,  $y$  represents output and  $x$  represents input. Like the DEA specification, each of the distance functions is calculated as a linear program. While interpreting the Malmquist index, when  $m_0$  is greater than 1 this indicates that the TFP index has grown between periods  $t$  and  $s$  while  $m_0$  less than 1 indicates that TFP has declined. This productivity index can also be written in the following way.

$$m_0(y_s, x_s, y_t, x_t) = \frac{d_0^t(y_t, x_t)}{d_0^s(y_s, x_s)} \left[ \frac{d_0^s(y_t, x_t)}{d_0^t(y_t, x_t)} \times \frac{d_0^s(y_s, x_s)}{d_0^t(y_s, x_s)} \right]^{\frac{1}{2}} \dots (2)$$

By re-expressing the Malmquist index in this way we have derived the following components. The ratio outside the bracket measures the change in the output-oriented measure of technical efficiency between period  $s$  and  $t$ . The other part of Equation 2 measures the technical change which is measured as a geometric mean in the shift in the production technology between two periods evaluated at  $x_t$  and  $x_s$ .

In the above model efficiency change (catching up effect) and a technical change (frontier effect) as measured by shift in a frontier over the same period. In this methodology, we will use the output oriented analysis because most of the firms and sectors have their objectives to maximise output in the form of revenue or profit.

### 3.2. Variables

We have applied the Data Envelopment Analysis (DEA) approach to the revenue producing firms by converting the financial performance measures to the firm's technical efficiency equivalents. We have followed the methodology of Raheman, *et al.* (2008) which is also based on Feroz, *et al.* (2003) and Wang (2006), who have converted the financial performance measures to the firm's technical efficiency equivalent using DuPont Model.<sup>1</sup> The DuPont model is a technique for analysing a firm's profitability using traditional performance management tools. For enabling this, DuPont model integrates income statement elements with balance sheet.

This process of measuring financial performance indicators can be converted into output and input variables. Where, sales revenue can be used as output variable while cost of goods sold, operating expenses, total assets and shareholder's equity as input variables. In this way long term resources total assets and equity and short term resources cost of goods sold and operating expenses are used to produce output in the form of sales revenue.

<sup>1</sup>The Dupont formula and discussion regarding conversion of financial performance measures to firm's technical efficiency equivalents can be seen in Raheman, *et al.* (2008).

### 3.3. Data

There are 38 sugar firms listed in the sugar and allied sector on Karachi stock exchange. We have used the data only for those sugar firms which have performed the operations and are among the listed firms on the Karachi Stock Exchange during the study period 1998 to 2007. Furthermore, only those firms are included in the analysis which have their shareholder's equity positive because of the consideration of the imitates of Data Envelopment Analysis Programme (DEAP) and their annual reports (financial statements) are available for all the ten years. Hence, finally 20 firms are selected for the analysis. Malmquist productivity Index has been used to calculate the Total Factor Productivity Growth and its sources for these twenty sugar firms.

## 4. RESULTS AND DISCUSSION

The data of twenty sugar firms is used to construct a grand frontier using TFP Index technique where each firm is compared to the frontier. We have calculated Malmquist total factor productivity Index which shows TFP growth, efficiency change, technical change, pure technical efficiency and scale change component for all the sugar firms in the sample.

### 4.1. Total Factor Productivity Growth in Sugar Sector

Malmquist Index of firm means for efficiency change, technical change, pure efficiency change, scale efficiency change and TFP growth are presented in Table 4. Sugar industry experienced an overall negative TFP growth of -0.1 percent during 1998–2007 which is insignificant. It means that during the study period there is no substantial

Table 4

*Malmquist Index of Firm Means (1998–2007)*

| No.                      | Firm  | TE<br>Change | Tech.<br>Change | PE<br>Change | SE<br>Change | TFP<br>Change |
|--------------------------|---|--------------|-----------------|--------------|--------------|---------------|
| 1                        | Adam Sugar Mills Limited                        | 0.967        | 1.021           | 0.978        | 0.988        | 0.987         |
| 2                        | Al Abass Sugar Mills Limited                    | 0.996        | 1.008           | 0.999        | 0.997        | 1.004         |
| 3                        | Al Noor Sugar Mills Limited                     | 1.000        | 0.996           | 1.000        | 1.000        | 0.996         |
| 4                        | Chashma Sugar Mills Limited                     | 1.000        | 0.993           | 1.000        | 1.000        | 0.993         |
| 5                        | Dewan Sugar Mills Limited                       | 0.987        | 1.007           | 1.000        | 0.987        | 0.993         |
| 6                        | Faran Sugar Mills Limited                       | 1.000        | 0.980           | 1.000        | 1.000        | 0.980         |
| 7                        | Habib Sugar Mills Limited                       | 1.000        | 1.012           | 1.000        | 1.000        | 1.012         |
| 8                        | Haseeb Waqas Sugar Mills Limited                | 0.983        | 1.005           | 0.987        | 0.996        | 0.988         |
| 9                        | Husein Sugar Mills Limited                      | 1.001        | 0.999           | 0.998        | 1.003        | 0.999         |
| 10                       | JDW Sugar Mills Limited                         | 1.000        | 0.999           | 1.000        | 1.000        | 0.999         |
| 11                       | Kohinoor Sugar Mills Limited                    | 0.979        | 1.001           | 0.981        | 0.998        | 0.980         |
| 12                       | Mirpurkhas Sugar Mills Limited                  | 0.998        | 1.058           | 0.995        | 1.002        | 1.056         |
| 13                       | Noon Sugar Mills Limited                        | 0.991        | 0.999           | 0.989        | 1.002        | 0.990         |
| 14                       | Sanghar Sugar Mills Limited                     | 1.011        | 1.008           | 1.007        | 1.004        | 1.019         |
| 15                       | Shahtaj Sugar Mills Limited                     | 1.000        | 0.999           | 1.000        | 1.000        | 0.999         |
| 16                       | Shakarganj Mills Limited                        | 1.002        | 1.112           | 1.000        | 1.002        | 1.114         |
| 17                       | Sind Abadgar Sugar Mills Limited                | 1.000        | 1.022           | 1.000        | 1.000        | 1.022         |
| 18                       | Tandlianwala Sugar Mills Limited                | 1.000        | 1.008           | 1.000        | 1.000        | 1.008         |
| 19                       | The Frontier Sugar Mills and Distillery Limited | 0.910        | 0.998           | 1.000        | 0.910        | 0.908         |
| 20                       | The Thal Industries Corporation Limited         | 1.015        | 0.937           | 1.000        | 1.015        | 0.951         |
| <b>Mean Sugar Sector</b> |   | 0.992        | 1.008           | 0.997        | 0.995        | 0.999         |

increase or decrease in the total factor productivity growth. The analysis of sugar mills revealed that TFP growth increased for seven out of twenty mills. The decline in technical efficiency by 0.8 percent is offset by a same percentage increase in the technical change which resulted in insignificant overall TFP growth. The technical change in 11 out of 20 firms is more than 1. Pure efficiency change and scale efficiency change results in technical efficiency change. In case of pure efficiency change, it is one or more than one in most of the firms but overall the pure efficiency of sugar industry declined by 0.7 percent while for scale efficiency change, value close to unity shows that most of the firms are operating at optimum scale but again the scale efficiency of sugar industry declined by 0.5 percent. Therefore, both scale efficiency and pure technical efficiency have contributed to the decline in efficiency change.

In the above table, the comparison of total factor productivity change in different firms shows that Shakarganj Mills Limited on average has the highest growth in TFP (11.4 percent) during 1998 to 2007, followed by the Mirpurkhas Sugar Mills Limited that has (5.6 percent) total factor productivity growth. The worst performer in terms of total factor productivity growth is the Frontier Sugar Mills and Distillery Limited and the Thal Industries Corporation Limited. Total factor productivity of these two mills decreased on average by -9.2 percent and -4.9 percent respectively.

The results presented in Table 5 show that TFP growth has been volatile with little apparent trend. The changes in TFP growth closely follow changes in technical progress with changes in technical efficiency. The years 2002 and 1999 appear to be the years where the total factor productivity growth was the highest at 5.3 percent and 5.2 percent respectively. During years 2001 and 2007, the TFP growth is lowest at 4.7 percent and 4.4 percent respectively. If we analyse the efficiency change over period, it indicates that during year 2003 the efficiency increased by 3.9 percent while it decreased by -5.9 percent during 2006. On the other hand the technological change increased by 8.7 percent during year 2002 where the TFP growth is also maximum. Similarly technical change is negative in the similar years where TFP growth was negative i.e. year 2001 and 2007.

Table 5

*Malmquist Index of Yearly Means of All Sugar Firm (1998-2007)*

| Year        | TE Change | Tech. Change | PE Change | SE Change | TFP Change |
|-------------|-----------|--------------|-----------|-----------|------------|
| 1999        | 0.998     | 1.054        | 0.994     | 1.005     | 1.052      |
| 2000        | 0.957     | 1.036        | 0.970     | 0.986     | 0.991      |
| 2001        | 1.005     | 0.948        | 1.016     | 0.989     | 0.953      |
| 2002        | 0.969     | 1.087        | 0.965     | 1.004     | 1.053      |
| 2003        | 1.039     | 0.999        | 1.023     | 1.016     | 1.038      |
| 2004        | 1.024     | 0.960        | 1.015     | 1.009     | 0.983      |
| 2005        | 0.985     | 1.026        | 0.990     | 0.995     | 1.011      |
| 2006        | 0.941     | 1.022        | 0.985     | 0.956     | 0.962      |
| 2007        | 1.010     | 0.947        | 1.014     | 0.996     | 0.956      |
| <b>Mean</b> | 0.992     | 1.008        | 0.997     | 0.995     | 0.999      |

These above results show an overall picture of TFP growth, efficiency change and technical change for the sugar industry. For firm level analysis, these measures of productivity need to be analysed at firm level during period 1998 to 2007.

#### 4.2. Total Factor Productivity Growth

Yearly comparative results of TFP growth for individual firms during 1998–2007 are presented in Table 6 which provides a complete understanding about the performance of these sugar firms.

During first year of analysis, The Thal Industries Corporation Limited performed best among all the firms with TFP growth 24.2 percent followed by The Frontier Sugar and Distillery Limited where the productivity increased by 19.9 percent. Habib sugar mill is the worst performer with decline in TFP growth by –6.6 percent. This year was also the most favourable for sugar industry where the TFP of 15 out of 20 firms increased and TFP for sugar industry increased by 5.2 percent. During year 2000, the total factor productivity of 10 out of 20 firms increased with the Husein sugar mills limited has the highest TFP growth of 9.6 percent. In the next year 2001, the TFP declined for thirteen sugar mills and the Chashma sugar mill was the worst performer in terms of TFP growth which declined by 25.2 percent and the TFP declined by 4.7 percent for the overall sugar industry which is the worst performance for the overall sugar industry during the study period. The next three years 2002, 2003 and 2004 were relatively better years for the sugar firms where the TFP increased for 12 out of 20 firms in all the three years. Mirpurkhas sugar mill was the best performer during year 2002 while Faran sugar mill was the best performer during year 2003 and Chashma sugar mill during 2004. TFP growth for the sugar industry increased during 2002 and 2003 while declined during 2004. Shakarganj sugar mill played a leading role in total factor productivity growth with highest (best performance) 76.6 percent during year 2005. Year 2006 was suitable for nine sugar mills in terms of total factor productivity with highest TFP growth for Dewan sugar mill at 35.9 percent. In this year the TFP for the sugar industry declined by 3.8 percent. Year 2006-07 was a crucial year for the sugar industry where the productivity change for fourteen out of twenty firms declined and the TFP for the sugar industry declined by 4.4 percent. In this year the best performer was the Chashma sugar mill with a growth of 23 percent in total factor productivity. These results serve to show that firm-level results can display a great deal of variations.

In terms of total factor productivity change, Shakarganj sugar mill has relatively more stable results. In this firm TFP change in seven out of nine years is greater than unity. Due to this reason, this firm topped in ranking in terms of total factor productivity. As discussed earlier year 2006-07 was the most crucial year for most of the firms where TFP declined for fourteen firms in the sample. Excluding this year from the analysis, the overall TFP growth for the sugar industry would increase to 0.53 percent which is now –0.1 percent including year 2007. The Frontier sugar mill is the worst performer in terms of TFP growth followed by the Thal industries corporation limited which has negative TFP growth for six out of nine years.

Two sources of total factor productivity named technical efficiency change and technical change are presented in the next section.

Table 6

*Comparative Total Factor Productivity Change in all Sugar Firms During (1998–2007)*

| Sector  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Mean  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Adam Sugar Mills Limited                        | 1.101 | 0.914 | 1.277 | 1.082 | 0.916 | 0.976 | 1.020 | 0.865 | 0.811 | 0.987 |
| Al Abass Sugar Mills Limited                    | 1.046 | 0.952 | 1.056 | 0.894 | 1.128 | 1.087 | 0.882 | 1.016 | 1.000 | 1.004 |
| Al Noor Sugar Mills Limited                     | 1.022 | 1.005 | 0.947 | 0.944 | 1.032 | 0.990 | 1.051 | 1.012 | 0.967 | 0.996 |
| Chashma Sugar Mills Limited                     | 1.118 | 0.984 | 0.748 | 1.199 | 0.769 | 1.222 | 0.966 | 0.852 | 1.230 | 0.993 |
| Dewan Sugar Mills Limited                       | 1.030 | 0.988 | 0.995 | 0.818 | 1.141 | 1.062 | 0.967 | 1.091 | 0.888 | 0.993 |
| Faran Sugar Mills Limited                       | 1.034 | 1.070 | 1.045 | 0.768 | 1.668 | 0.591 | 0.892 | 1.359 | 0.789 | 0.980 |
| Habib Sugar Mills Limited                       | 0.934 | 1.020 | 0.965 | 0.925 | 1.063 | 1.135 | 0.996 | 1.125 | 0.971 | 1.012 |
| Haseeb Waqas Sugar Mills Limited                | 0.992 | 1.046 | 0.885 | 1.138 | 1.019 | 1.001 | 1.067 | 0.822 | 0.964 | 0.988 |
| Husein Sugar Mills Limited                      | 1.053 | 1.096 | 0.770 | 1.667 | 0.794 | 1.013 | 0.999 | 0.874 | 0.956 | 0.999 |
| JDW Sugar Mills Limited                         | 1.069 | 0.892 | 1.284 | 0.792 | 1.072 | 0.998 | 1.036 | 0.994 | 0.923 | 0.999 |
| Kohinoor Sugar Mills Limited                    | 1.079 | 1.023 | 0.832 | 1.154 | 0.888 | 1.082 | 1.040 | 0.979 | 0.804 | 0.980 |
| Mirpurkhas Sugar Mills Limited                  | 0.976 | 1.025 | 1.003 | 1.812 | 0.943 | 0.879 | 1.175 | 1.064 | 0.864 | 1.056 |
| Noon Sugar Mills Limited                        | 1.059 | 1.054 | 0.935 | 1.079 | 0.963 | 1.007 | 0.996 | 0.851 | 0.984 | 0.990 |
| Sanghar Sugar Mills Limited                     | 1.066 | 0.976 | 1.051 | 0.716 | 1.249 | 1.131 | 0.963 | 1.213 | 0.919 | 1.019 |
| Shahtaj Sugar Mills Limited                     | 1.062 | 0.893 | 0.966 | 1.164 | 0.921 | 0.985 | 0.964 | 0.979 | 1.082 | 0.999 |
| Shakarganj Mills Limited                        | 1.020 | 0.961 | 1.080 | 1.024 | 1.085 | 1.203 | 1.766 | 0.984 | 1.070 | 1.114 |
| Sindh Abadgar Sugar Mills Limited               | 0.986 | 1.016 | 0.974 | 0.929 | 1.121 | 0.871 | 1.015 | 1.298 | 1.039 | 1.022 |
| Tandlianwala Sugar Mills Limited                | 0.995 | 0.978 | 0.941 | 1.184 | 0.840 | 1.015 | 1.047 | 1.013 | 1.089 | 1.008 |
| The Frontier Sugar Mills and Distillery Limited | 1.199 | 1.005 | 0.762 | 1.146 | 1.124 | 1.202 | 0.855 | 0.387 | 0.892 | 0.908 |
| The Thal Industries Corporation Limited         | 1.242 | 0.944 | 0.762 | 1.210 | 1.368 | 0.565 | 0.787 | 0.970 | 0.999 | 0.951 |
| <b>Mean</b>                                     | 1.052 | 0.991 | 0.953 | 1.053 | 1.038 | 0.983 | 1.011 | 0.962 | 0.956 | 0.999 |

### 4.3. Technical Efficiency Growth

Firm-wise technical efficiency movement is presented in Table 7 for understanding the contribution made by technical efficiency in the productivity growth of sugar firms.

The results in general suggest that technical efficiency is an important factor in dampening the total factor productivity growth of the sugar industry. The average efficiency change for eight mills is less than one while for nine firms it is equal to one which means there is no change in the managerial efficiency during study period for these firms. During year 1999, the technical efficiency change for eight firms is less than one and Habib sugar mills the worst performer with a decline in efficiency change by -8.7 percent. In this year six mills did not show any change in their efficiency. Managerial efficiency further declined in year 2000, where 14 mills have their efficiency change in negative and three mills have no change in efficiency. During this year AL Abass sugar mill was the worst performer with a decline in efficiency change by 13.8 percent. Year 2001 was relatively better for the sugar industry in terms of managerial efficiency where thirteen mills were having their efficiency change equal to or more than one. The efficiency change for sugar industry declined during years 2002, 2005 and 2006 by -3.1 percent, -1.5 percent and -5.9 percent respectively. The maximum decline in the managerial efficiency for the sugar industry was during year 2006. On the other side efficiency change increased during years 2003, 2004 and 2007.

The firm level changes in managerial efficiency shows that many mills remain static as their efficiency change remain equal to one in most of the years. These firms include Faran sugar mills, JDW sugar mills and Shahtaj sugar mills limited. Thal industries corporation limited which is on top in ranking according to managerial efficiency based on aggregate efficiency change is also more stable firm where efficiency change is more than one in seven out of nine years.

### 4.4. Technology Adoption

The comparative technical change for twenty sugar firms during period 1998 to 2007 is presented in Table 8. Generally, the technical change can be seen in eleven firms where Shakarganj mills limited at the top with 11.2 percent change followed by the Mirpurkhas sugar mills limited with 5.8 percent. In year 1999, the comparative technical change shows positive change where all mills have their technical change more than one and Thal industries corporation top in ranking followed by the Chashma sugar mills limited. In this year technical change increased by 5.4 percent for the overall sugar industry. Year 2000 was also better in terms of technical change where it was positive for sixteen mills and sugar industry overall recorded a 3.6 percent technical progress. In this year Haseeb Waqas sugar mills limited was the best performer where technical change increased by 13 percent while Shahtaj sugar mills limited was the worst performer with decline in technical progress by 10.7 percent. Years 2001 and 2007 were the worst in terms of technical progress where it declined by 5.2 percent and 5.3 percent respectively. In these years only three to four mills were having their technical change in positive. The best year according to technical progress was the year 2002 where the technical change increased by 8.7 percent for the overall sugar industry and eighteen firms have their technical change above one. In this year Mirpurkhas sugar mill was highest in ranking

Table 7

*Comparative Efficiency (Managerial Efficiency) Change in all Sugar Firms during (1998–2007)*

| Sector  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Mean  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Adam Sugar Mills Limited                        | 1.000 | 0.981 | 1.019 | 1.000 | 0.966 | 0.990 | 0.996 | 0.884 | 0.877 | 0.967 |
| Al Abass Sugar Mills Limited                    | 0.992 | 0.862 | 1.169 | 0.839 | 1.158 | 1.030 | 0.857 | 1.057 | 1.061 | 0.996 |
| Al Noor Sugar Mills Limited                     | 1.000 | 0.985 | 0.995 | 0.891 | 1.076 | 0.951 | 1.025 | 1.052 | 1.034 | 1.000 |
| Chashma Sugar Mills Limited                     | 1.000 | 1.000 | 0.886 | 1.128 | 0.814 | 1.227 | 0.945 | 0.862 | 1.229 | 1.000 |
| Dewan Sugar Mills Limited                       | 0.984 | 0.948 | 1.071 | 0.789 | 1.115 | 1.026 | 0.936 | 1.085 | 0.968 | 0.987 |
| Faran Sugar Mills limited                       | 1.000 | 1.000 | 1.000 | 0.825 | 1.212 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Habib Sugar Mills Limited                       | 0.913 | 0.920 | 1.083 | 0.862 | 1.094 | 1.115 | 0.917 | 1.085 | 1.051 | 1.000 |
| Haseeb Waqas Sugar Mills Limited                | 0.954 | 0.925 | 1.035 | 1.063 | 0.987 | 1.005 | 1.041 | 0.820 | 1.043 | 0.983 |
| Husein Sugar Mills Limited                      | 1.016 | 1.071 | 0.819 | 1.221 | 0.956 | 1.038 | 0.967 | 0.953 | 1.012 | 1.001 |
| JDW Sugar Mills Limited                         | 1.000 | 0.882 | 1.134 | 0.951 | 1.052 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Kohinoor Sugar Mills Limited                    | 1.038 | 0.947 | 0.930 | 1.082 | 0.913 | 1.075 | 0.984 | 1.011 | 0.857 | 0.979 |
| Mirpurkhas Sugar Mills Limited                  | 0.919 | 1.012 | 1.053 | 1.072 | 0.952 | 0.843 | 1.136 | 1.097 | 0.933 | 0.998 |
| Noon Sugar Mills Limited                        | 1.029 | 0.961 | 1.049 | 1.000 | 1.000 | 1.000 | 0.964 | 0.874 | 1.052 | 0.991 |
| Sanghar Sugar Mills Limited                     | 1.042 | 0.935 | 1.116 | 0.664 | 1.292 | 1.127 | 0.983 | 1.066 | 1.000 | 1.011 |
| Shahtaj Sugar Mills Limited                     | 1.000 | 1.000 | 0.977 | 1.023 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Shakarganj Mills limited                        | 0.965 | 0.912 | 1.155 | 0.968 | 1.033 | 1.000 | 1.000 | 1.000 | 1.000 | 1.002 |
| Sind Abadgar Sugar Mills Limited                | 0.944 | 0.992 | 1.025 | 0.878 | 1.143 | 0.924 | 1.122 | 1.000 | 1.000 | 1.000 |
| Tandlianwala Sugar Mills Limited                | 0.961 | 0.923 | 1.011 | 1.115 | 0.870 | 0.987 | 1.008 | 1.025 | 1.127 | 1.000 |
| The Frontier Sugar Mills and Distillery Limited | 1.135 | 0.890 | 0.870 | 1.074 | 1.156 | 1.213 | 0.871 | 0.396 | 0.935 | 0.910 |
| The Thal Industries Corporation Limited         | 1.097 | 1.013 | 0.810 | 1.136 | 1.119 | 1.000 | 1.000 | 0.914 | 1.092 | 1.015 |
| <b>Mean</b>                                     | 0.998 | 0.957 | 1.005 | 0.969 | 1.039 | 1.024 | 0.985 | 0.941 | 1.01  | 0.992 |

Table 8

*Comparative Technical Change in all Sugar Firms during (1998-2007)*

| Sector  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Mean  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Adam Sugar Mills Limited                        | 1.101 | 0.932 | 1.252 | 1.082 | 0.948 | 0.986 | 1.024 | 0.979 | 0.925 | 1.021 |
| Al Abass Sugar Mills Limited                    | 1.054 | 1.104 | 0.903 | 1.066 | 0.974 | 1.056 | 1.030 | 0.961 | 0.943 | 1.008 |
| Al Noor Sugar Mills Limited                     | 1.022 | 1.021 | 0.952 | 1.059 | 0.959 | 1.041 | 1.026 | 0.962 | 0.935 | 0.996 |
| Chashma Sugar Mills Limited                     | 1.118 | 0.984 | 0.844 | 1.063 | 0.945 | 0.996 | 1.022 | 0.988 | 1.001 | 0.993 |
| Dewan Sugar Mills Limited                       | 1.047 | 1.042 | 0.929 | 1.038 | 1.023 | 1.035 | 1.033 | 1.005 | 0.917 | 1.007 |
| Faran Sugar Mills Limited                       | 1.034 | 1.070 | 1.045 | 0.931 | 1.376 | 0.591 | 0.892 | 1.359 | 0.789 | 0.980 |
| Habib Sugar Mills Limited                       | 1.024 | 1.109 | 0.891 | 1.073 | 0.972 | 1.018 | 1.086 | 1.037 | 0.924 | 1.012 |
| Haseeb Waqas Sugar Mills Limited                | 1.039 | 1.130 | 0.855 | 1.071 | 1.032 | 0.996 | 1.025 | 1.003 | 0.925 | 1.005 |
| Husein Sugar Mills Limited                      | 1.036 | 1.023 | 0.941 | 1.365 | 0.831 | 0.976 | 1.033 | 0.917 | 0.945 | 0.999 |
| JDW Sugar Mills Limited                         | 1.069 | 1.012 | 1.132 | 0.833 | 1.019 | 0.998 | 1.036 | 0.994 | 0.923 | 0.999 |
| Kohinoor Sugar Mills Limited                    | 1.039 | 1.080 | 0.895 | 1.067 | 0.972 | 1.007 | 1.056 | 0.967 | 0.938 | 1.001 |
| Mirpurkhas Sugar Mills Limited                  | 1.062 | 1.013 | 0.953 | 1.691 | 0.990 | 1.043 | 1.035 | 0.970 | 0.926 | 1.058 |
| Noon Sugar Mills Limited                        | 1.030 | 1.097 | 0.892 | 1.079 | 0.963 | 1.007 | 1.033 | 0.974 | 0.936 | 0.999 |
| Sanghar Sugar Mills Limited                     | 1.024 | 1.043 | 0.941 | 1.079 | 0.966 | 1.004 | 0.980 | 1.138 | 0.919 | 1.008 |
| Shahtaj Sugar Mills Limited                     | 1.062 | 0.893 | 0.988 | 1.137 | 0.921 | 0.985 | 0.964 | 0.979 | 1.082 | 0.999 |
| Shakarganj Mills limited                        | 1.057 | 1.054 | 0.935 | 1.058 | 1.050 | 1.203 | 1.766 | 0.984 | 1.070 | 1.112 |
| Sind Abadgar Sugar Mills Limited                | 1.044 | 1.024 | 0.950 | 1.058 | 0.981 | 0.942 | 0.904 | 1.298 | 1.039 | 1.022 |
| Tandlianwala Sugar Mills Limited                | 1.036 | 1.059 | 0.931 | 1.063 | 0.965 | 1.028 | 1.040 | 0.989 | 0.966 | 1.008 |
| The Frontier Sugar Mills and Distillery Limited | 1.056 | 1.129 | 0.876 | 1.067 | 0.972 | 0.991 | 0.982 | 0.976 | 0.954 | 0.998 |
| The Thal Industries Corporation Limited         | 1.132 | 0.931 | 0.940 | 1.065 | 1.223 | 0.565 | 0.787 | 1.061 | 0.916 | 0.937 |
| <b>Mean</b>                                     | 1.054 | 1.036 | 0.948 | 1.087 | 0.999 | 0.96  | 1.026 | 1.022 | 0.947 | 1.008 |

with a progress of 69 percent followed by Husein sugar mills limited with 36.5 percent. JDW sugar mill was the worst performer where the technical change declined by 16.7 percent. Shakarganj sugar mill was the leading one during year 2004 and 2005, where the technical progress increased by 20.3 percent and 76.6 percent. Further, increase of 76.6 percent is the maximum increase in any mill in a year during period 1998 to 2007.

The ranking of all sugar firms in terms of total factor productivity growth, technical efficiency change and technical change is presented in Table 9. According to the ranking, Shakarganj mills limited is top in ranking according to TFP growth and technical change while at number three according to efficiency change. Mirpurkhas sugar mill is although next in ranking according to TFP growth and technical change but at number thirteen according to managerial efficiency change. Similar type of ranking is for the Sind Abadgar sugar mill which is at third in ranking as per TFP growth and technical change but at number eleven according to efficiency change. This indicates that technical change is the major factor which affects the total factor productivity growth for the sugar firms. The Frontier sugar mills and distillery limited is the laggard firm according to efficiency change and technical change. The other laggard firm is The Thal Industries Corporation limited according to TFP growth and technical change but highest in ranking according to efficiency change. This also indicates that for sugar firms technical change is the major source of total factor productivity.

## 5. CONCLUSION

Research on productivity growth is very important because economic growth cannot be sustainable without improvement in the Total Factor Productivity. From a policy point of view, the assessment of TFP growth is important as it serves as a guide for resource allocation and investment decisions. In this paper we have applied Data Envelopment Analysis approach for estimating TFP growth, efficiency change and technological progress in Pakistan's sugar industry using data for twenty sugar firms from 1998 to 2007. Productivity Growth is estimated using Malmquist productivity index. The decomposition of TFP growth also helped us to identify improvement in efficiency and contribution of technological progress and innovation to productivity growth in sugar industry. Most of the studies of productivity growth efficiency which are based on panel data discuss the estimates of overall sample or sector. However, we have presented the estimated TFP growth, efficiency change and technical change at each firm level and for each year during 1998 to 2007 which shows that these estimates varies widely at firm level during the data period.

The empirical estimates on the performance of sugar industry yielded several striking results. The Malmquist TFP results reflect a tormenting picture for the sugar industry. Overall sugar industry improved technological progress by 0.8 percent while managerial efficiency change declined by a same percentage. Due this reason the overall TFP growth during 1998–2007 remained almost static with a decline of 0.1 percent.

The results of TFP growth and its components also presents divergent trend in the individual years for the overall sugar industry. The efficiency change declined for nine sugar firms and remained equal to one for nine sugar firms during period 1998 to 2007, while the technical change is positive for eleven out of twenty sugar firms. Therefore, the result shows static TFP Growth. It suggests that sugar industry is lacking in terms of

Table 9

*Ranking of Sugar Firms Based on Malmquist TFP and its Components*

| Rank-<br>ing | Industry                                      | TFP<br>Change | Industry                                      | TE<br>Change | Industry                                      | Tech.<br>Change |
|--------------|---|---------------|---|--------------|---|-----------------|
| 1            | Shakarganj Mills Limited                      | 1.114         | The Thal Industries Corporation Limited       | 1.015        | Shakarganj Mills Limited                      | 1.112           |
| 2            | Mirpurkhas Sugar Mills Limited                | 1.056         | Sanghar Sugar Mills Limited                   | 1.011        | Mirpurkhas Sugar Mills Limited                | 1.058           |
| 3            | Sind Abadgar Sugar Mills Limited              | 1.022         | Shakarganj Mills Limited                      | 1.002        | Sind Abadgar Sugar Mills Limited              | 1.022           |
| 4            | Sanghar Sugar Mills Limited                   | 1.019         | Husein Sugar Mills Limited                    | 1.001        | Adam Sugar Mills Limited                      | 1.021           |
| 5            | Habib Sugar Mills Limited                     | 1.012         | Al Noor Sugar Mills Limited                   | 1.000        | Habib Sugar Mills Limited                     | 1.012           |
| 6            | Tandlianwala Sugar Mills Limited              | 1.008         | Chashma Sugar Mills Limited                   | 1.000        | Al Abass Sugar Mills Limited                  | 1.008           |
| 7            | Al Abass Sugar Mills Limited                  | 1.004         | Faran Sugar Mills Limited                     | 1.000        | Sanghar Sugar Mills Limited                   | 1.008           |
| 8            | Husein Sugar Mills Limited                    | 0.999         | Habib Sugar Mills Limited                     | 1.000        | Tandlianwala Sugar Mills Limited              | 1.008           |
| 9            | JDW Sugar Mills Limited                       | 0.999         | JDW Sugar Mills Limited                       | 1.000        | Dewan Sugar Mills Limited                     | 1.007           |
| 10           | Shahtaj Sugar Mills Limited                   | 0.999         | Shahtaj Sugar Mills Limited                   | 1.000        | Haseeb Waqas Sugar Mills Limited              | 1.005           |
| 11           | Al Noor Sugar Mills Limited                   | 0.996         | Sind Abadgar Sugar Mills Limited              | 1.000        | Kohinoor Sugar Mills Limited                  | 1.001           |
| 12           | Chashma Sugar Mills Limited                   | 0.993         | Tandlianwala Sugar Mills limited              | 1.000        | Husein Sugar Mills Limited                    | 0.999           |
| 13           | Dewan Sugar Mills Limited                     | 0.993         | Mirpurkhas Sugar Mills Limited                | 0.998        | JDW Sugar Mills Limited                       | 0.999           |
| 14           | Noon Sugar Mills Limited                      | 0.990         | Al Abass Sugar Mills Limited                  | 0.996        | Noon Sugar Mills Limited                      | 0.999           |
| 15           | Haseeb Waqas Sugar Mills Limited              | 0.988         | Noon Sugar Mills Limited                      | 0.991        | Shahtaj Sugar Mills Limited                   | 0.999           |
| 16           | Adam Sugar Mills Limited                      | 0.987         | Dewan Sugar Mills Limited                     | 0.987        | The Frontier Sugar Mills & Distillery Limited | 0.998           |
| 17           | Faran Sugar Mills Limited                     | 0.980         | Haseeb Waqas Sugar Mills Limited              | 0.983        | Al Noor Sugar Mills Limited                   | 0.996           |
| 18           | Kohinoor Sugar Mills Limited                  | 0.980         | Kohinoor Sugar Mills Limited                  | 0.979        | Chashma Sugar Mills Limited                   | 0.993           |
| 19           | The Thal Industries Corporation Limited       | 0.951         | Adam Sugar Mills Limited                      | 0.967        | Faran Sugar Mills Limited                     | 0.980           |
| 20           | The Frontier Sugar Mills & Distillery Limited | 0.908         | The Frontier Sugar Mills & Distillery Limited | 0.910        | The Thal Industries Corporation Limited       | 0.937           |

managerial efficiency which could be explained by a general reduction in the quality of managerial decision-making among the best practice firms. Regardless of the reason for this decline, it has potentially serious implications for the longer-term financial viability of these sugar firms. Except few firms which are relatively stable include Shakarganj mills limited and Al Abass sugar mills limited, all sugar firms have a mix trend over 1998–2007 which affects the productivity and ranking of firms.

The pattern of TFP growth tends to be driven more by technical change (or technical progress) rather than improvements in technical efficiency. Shakarganj mills limited has highest technical change and also better performance in terms of managerial efficiency change which lead it top in ranking in terms of TFP. This firm has also performed better in terms of stability over the period 1998 to 2007, where the TFP increased for seven out of nine years. The major source for Mirpurkhas sugar mill is the technical change, which lead it to next in ranking. The technical change is also a main source of relatively better performance for Sind Abadgar sugar mill and Habib sugar mill while Sanghar sugar mill is also among the top ranking firms where the main sources is managerial efficiency. The Frontier sugar mill is among the worst performers in terms of productivity over 1998 to 2007 where the problem lies in managerial efficiency and also non adoption of new technologies. Similarly, The Thal Industries is also one of the laggard firms in terms of TFP where the major source is non adoption of new technologies although top in ranking in terms of efficiency change.

The research suggests that the Pakistani sugar industry is facing serious productivity growth problems where no increase is recorded in total factor productivity during 1998 to 2007. Therefore, this industry must increase total factor productivity in most of the firms and efforts must be made to provide a stable pattern to the productivity growth. The improvement is needed in both technical efficiency and technological progress in the sugar industry. For increasing technical efficiency, efforts are needed to improve the quality of inputs like capital and labour. On the other side the management aspect cannot be ignored and it is also very important in terms of capital. Furthermore, the research and development (R & D) activities can also play a vital role in bringing technological progress. Although there is very little increase in the technical change but for further considerable increase in the productivity, efforts could be made to increase the research and development (R & D) activities in this industry. Therefore, firms in the sugar industry need greater investment in (R & D) activities and adoption of new technologies.

#### REFERENCES

- Afzal, M. (2006) Some New Production Measurement Methods for Large-scale Manufacturing Sector of Pakistan. PhD Dissertation (unpublished) submitted to National College of Business Administration and Economics. *Agricultural Economics* 78:2, 331–8.
- Ali, S. (2004) Total Factor Productivity Growth in Pakistan's Agriculture: 1960–1996. *The Pakistan Development Review* 43: 4, 493–513.
- Burki, A. A. and K. Mahmood ul Hassan (2005) Effects of Allocative Inefficiency on Resource Allocation and Energy Substitution in Pakistan's Manufacturing. Lahore University of Management Sciences. (CMER Working Paper No. 04-30).

- Charnes, A., W. W. Cooper, and E. Rhodes (1978) Measuring the Efficiency of Decision Making Units. *European Journal of Operations Research* 2, 429–444.
- Coelli, T. (1996) A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Programme. Centre for Efficiency and Productivity Analysis. Armidale, NSW, Department of Econometrics, University of New England, Australia. (Working Paper 96/08).
- Coelli, T. J., D. S. P. Rao, C. J. O'Donnell, and G. E. Battese (2005) *An Introduction to Efficiency and Productivity Analysis* (2nd ed.). New York: Springer.
- Coelli, T., D. S. P. Rao, and G. E. Battese (1998) *An Introduction to Efficiency and Productivity Analysis*. Boston: Kluwer Academic Publishers.
- Coelli, T. J. (1995) Recent Developments in Frontier Modelling and Efficiency Measurement. *Australian Journal of Agricultural Economics* 39, 219–45.
- Fare, R., S. Grosskopf, M. Norris, and Z. Zhang (1994) Productivity Growth, Technical Progress, and Efficiency Change in Industrialised Countries. *The American Economic Review* 84, 66–83.
- Farrell, M. J. (1957) The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society* 120, 253–81.
- Feroz, E. H., S. Kim, and R. L. Raab (2003) Financial Statement Analysis: A Data Envelopment Analysis Approach. *Journal of Operational Research Society* 54, 48–58.
- Jaforullah, M. and J. Whiteman (1999) Scale Efficiency in the New Zealand Dairy Industry: A Non-parametric Approach. *Australian Journal of Agricultural and Resource Economics* 43, 523–42.
- Kalirajan, K. P. and R. T. Shand (1999) Frontier Production Functions and Technical Efficiency Measures. *Journal of Economic Surveys* 13, 149–72.
- Mahmood, T., E. Ghani, and M. Din (2007) Efficiency of Large Scale Manufacturing in Pakistan: A Production Frontier Approach. Pakistan Institute of Development Economics. (Working Paper 27).
- Malmquist, S. (1953) Index Numbers and Indifference Curves. *Trabajos de Estadística* 4, 1, 209–42.
- Pakistan Sugar Mills Association of Pakistan (2007) *Annual Report -2007*.
- Pakistan Sugar Mills Association of Pakistan (2008) *Annual Report -2008*.
- Raheman, A., Talat A., Abdul Q. and A. B. Mahmood (2008) Estimating Total Factor Productivity and Its Components: Evidence from Major Manufacturing Industries of Pakistan. *The Pakistan Development Review* 47:4.
- Seiford, L. M. (1996) Data Envelopment Analysis: The Evolution of the State of the Art. *Journal of Productivity Analysis* 7, 99–137.
- Squires, D. and C. Reid (2004) Using Malmquist Indices to Measure Changes in TFP of Purse-Seine Vessels While Accounting for Changes in Capacity Utilisation, The Resource Stock and the Environment. SCTB17 Forum Fisheries Agency. (Working Paper, pp. 1–15).
- Wang, J. C. (2006) Corporate Performance Efficiency Investigated by Data Envelopment Analysis and Balanced Scorecard. *Journal of American Academy of Business* 9:2, 312–18.

## Comments

The paper titled 'Efficiency Dynamics of Sugar Industry of Pakistan' is interesting and analytical technique used in this paper is latest one. However, write up of this paper needs some editing. For example, in abstract and introduction of this paper, it is stated that total factor productivity (TFP) in sugar industry will be decomposed in 3 categories; technical, scale and managerial. But in Table 4, Malmquist indices have been worked out for technical efficiency change, technical change, production efficiency change, scale efficiency change and TFP. Furthermore, only 3 of these indices have been discussed in Sections 5.3 and 5.4.

In abstract of the paper it is mentioned that there are 81 sugar mills in Pakistan whereas on page 4, the number changes to 84. Also subheading 5.1 is exactly same as 5.2 that should be avoided. Similarly, in Table 1 in 'Overview of Sugar Industry', sugar yield in Pakistan is reported as 3.54 while its correct figure comes out 4.51. Column 4 in Tables 2 and 3 of this section are not commented anywhere in the text. Furthermore, the first sentence in paragraph 2 at page 5 states that area under sugarcane cultivation has increased but data in Table 2 and the last sentence in first paragraph at page 6 do not support it. Calculation of Malmquest indices on pages 8 and 9 is not properly explained. I am sure that careful editing of this paper will improve its reading and worth.

**M. Mazhar Iqbal**

Quaid-i-Azam University,  
Islamabad.

## **An Analysis of Technology Adoption by Export-oriented Manufacturers in Pakistan**

TARIQ MAHMOOD, MUSLEH UD DIN, and EJAZ GHANI

### **1. INTRODUCTION**

The last two decades have witnessed a remarkable spread of technology in all spheres of economic activity. The change has been so rapid that firms are finding it difficult to keep pace with ever-changing market situations. The issue of technology adoption is particularly relevant for export-oriented manufacturers who face tough competition in international markets and must maintain a competitive edge by adopting latest product and process technologies to meet the requirements of upscale global markets. It is generally believed that Pakistani firms have lagged behind their competitors in international markets in terms of technological advancement and consequently Pakistan's exports continue to remain concentrated in low value-added and low quality product segments. However, the question of technology adoption by export-oriented manufacturers has received little attention in the empirical literature. This study is an attempt to explore the determinants of technology adoption by export-oriented manufacturing firms in Pakistan based on a survey of such firms in four major export categories including textiles and apparel, leather and leather products, agro-food processing and fisheries.

According to Woodside and Biemens (2005), the term technology adoption refers to the decision-making process of an individual firm.<sup>1</sup> Technology adoption is a complex phenomenon and depends in large measure on firm characteristics and the economic environment under which the firms operate. This study focuses on firm characteristics that are believed to influence the probability of firms' decisions whether to invest in technology or not. The data relating to technology adoption is seldom available in a developing country like Pakistan. However the survey conducted by Pakistan Institute of Development Economics in collaboration with United Nations Industrial Development Organisation (UNIDO) contains a binary response question<sup>2</sup> which has been used as a

Tariq Mahmood <tariqpide@yahoo.com> is Senior Research Economist at the Pakistan Institute of Development Economics, Islamabad. Musleh ud Din <muslehuddin@pide.org.pk> is Joint Director at the Pakistan Institute of Development Economics, Islamabad. Ejaz Ghani <ejazg@yahoo.com> is Chief of Research at the Pakistan Institute of Development Economics, Islamabad.

<sup>1</sup>Technology adoption is distinct from technology diffusion. Sarkar (1998) defines technology diffusion as a "mechanism that spreads successful varieties of products and processes through economic structure and displaces wholly or partly the existing inferior varieties". See also Rogers (1995) for a similar distinction.

<sup>2</sup>The statement of the question is: "Please indicate whether or not you have made investment in the past three years in issues such as process technology, packaging, product design, that were necessary to meet specific client/market requirements."

dependent variable in a Logit model for estimation of probabilities of firms' decision to invest in technology. The rest of the paper is organised as follows: Section 2 describes the data and sets out the methodology. Section 3 provides a discussion of the empirical results whereas Section 4 contains conclusions and policy recommendations.

## 2. DATA AND METHODOLOGY

This study is based on a survey of export-oriented firms conducted by the Pakistan Institute of Development Economics (PIDE) in collaboration with the United Nations Industrial Development Organisation. The sample covers 157 exporting firms in four major sectors viz. textiles, leather, agro-food processing and fisheries located in Sindh and Punjab provinces.<sup>3</sup> Various sub-sectors are covered under each of the major export segment: in the textiles, yarn, fabrics, knitwear, garments and bed sheets and towels; in leather, tanning, footwear and leather products; in agro-food processing, horticulture products, and rice; and the fisheries comprise various types of fish processing enterprises and fish exporters.<sup>4</sup>

Various models have been used in the literature to model firms' decisions pertaining to technology adoption. In this paper, we employ the rank model of technology adoption.<sup>5</sup> This model is based on the observation that the decision to adopt a particular technology is a choice made by a particular firm that is influenced by a range of firm's characteristics including the age and size of the enterprise, volume of sales, location, and type of ownership. These characteristics are assumed to determine a threshold level and the adoption of technology is likely to occur if this threshold is crossed. The rank model of technology adoption has a sound theoretical basis in that it is built upon the profit maximising behaviour of a firm. The empirical implementation of the rank model is carried out in terms of a binary choice model.

The choice of technology adoption is a discrete choice. Firms either invest or do not invest in new technologies. Due to this categorical nature of dependent variable, the ordinary least squares method will not produce the best linear unbiased estimator i.e., OLS estimate are biased and inefficient. This situation calls for the use of one of the binary dependent variable techniques. In the literature two most commonly used techniques are Logit and Probit models. The basic difference between these two techniques lies in the assumption about the distribution of the error term. In the Logit model, errors are assumed to follow the logistic distribution, whereas in the Probit model errors are assumed to follow the standard normal distribution.<sup>6</sup> In this paper we use the Logit estimation technique.

This function has two useful characteristics in the present context. First, the value of the function is limited between 0 and 1, as necessary for a probability model. Second, the distribution of the function follows an S-shaped curve, exhibiting a typical technology adoption pattern (Figure 1).

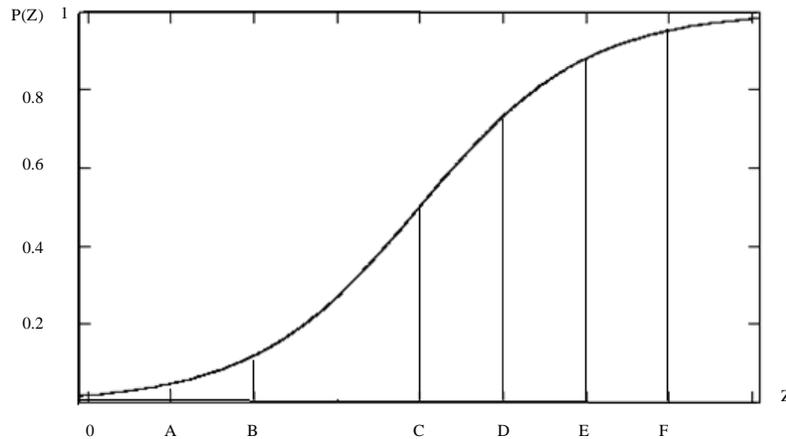
<sup>3</sup>The sample was selected from a universe of 1300 exporters using the stratified sampling approach.

<sup>4</sup>See PIDE (2007) for further details.

<sup>5</sup>The rank model was first propounded by David (1969) and was further developed by David (1975); Davies (1979); and Ireland and Stoneman (1986). The model and its variants have been extensively used in studies of technology adoption at the firm level; see for instance David and Olsen (1984); Bartoloni and Baussola (2001); Fariaa, *et al.* (2002) and Parhi (2008). For a detailed survey of this literature [see Sarkar (1998) and Geroski (2000)].

<sup>6</sup>The choice between the Logit and Probit models is largely one of convenience and convention, since the substantive results are generally indistinguishable [Long (1997), p. 83].

**Fig. 1. The Logistic Function, with  $z$  on the Horizontal Axis and  $P(z)$  on the Vertical Axis**



The impact of an event on the probability depends on the initial probability of the event. If the  $Z$  moves from point A to point B, the probability of the event increases by a very small amount. However, a movement of equal magnitude from point C to point D increases the probability of the event by a relatively larger amount. Again the change in the value of the probability is small as  $Z$  moves from point E to F. This is a typical behaviour of technology adoption; at initial stages adoption occurs at a slow pace, gradually it picks up momentum, and slows down again as adoption process approaches a saturation point.

The logistic function is given by:

$$P_i = e^z / (1 + e^z)$$

Where  $P_i$  is the probability of a binary outcome (adoption or non-adoption of new technology by the firm  $i$ , and  $Z = \beta X$ , where vector  $X$  represents firms' characteristics, and  $\beta$  is a vector of coefficients. The unknown parameters can be estimated by Maximum Likelihood Method. The natural log of odds ratios is given by:

$$Z_i = \ln[P_i / (1 - P_i)]$$

Since these probabilities are not directly observable, we proxy these by a binary variable  $y_i$  which takes a value of 1 if the  $i^{\text{th}}$  firm makes an investment in new technology and 0 otherwise. Using  $y_i$  as a dependent variable we estimate the following model:

$$y_i = \beta_0 + \beta_1 \ln \text{Age}_i + \beta_2 \text{Dsize}_i + \beta_3 \text{Location}_i + \beta_4 \ln \text{Sales}_i + \beta_5 \text{Cert}_i + \beta_6 \text{Own}_i + v_i$$

Where

Age = Age of firm in years.

Dsize = Dummy variable with a value of 1 for large sized enterprises and 0 otherwise.

Location = Dummy variable taking a value of 1 if the firm is located in Karachi and 0 otherwise.

Sales = Sales in US\$.

Certi = Dummy variable taking a value of 1 if the firm is certified and 0 otherwise.

Own = Dummy variable taking a value of 1 if the firm is domestically owned and 0 otherwise.

The age of the firm can affect the probability of investment in new technology in two ways. On the one hand, older firms that are more experienced and are better cognizant of the market opportunities and requirements could be more inclined to invest in new technology to maintain their competitive strengths acquired over a longer period of time. Also, older firms may in fact need to invest in new technology to replace their older machinery and equipment. One may, however, argue that newer firms having a modern outlook may be more likely to invest in new technology. The empirical evidence in the literature is mixed: Parhi (2008) finds a positive effect of age on technology adoption whereas Fariaa, *et al.* (2002) report a negative relationship between firms' age and probability of technology adoption.

Firm size can also influence a firm's decision to adopt new technology. The theoretical relationship between firm size and probability of investing in new technology is ambiguous. On the other hand, there are many reasons to expect positive relationship between firm size and investment. Large firms enjoy economies of scale in production, have a relatively higher capacity for taking risks, and have better financial positions all of which contribute to higher probability of investment on new technology. On the other hand, smaller firms may be more inclined to invest in new technology because of their desire to establish a toehold in the market and to enhance their scale based on newer technology. Empirical studies on the role of firm size in technology adoption find mixed evidence: Bartoloni and Baussola (2001) find positive relationship between firm size and technology adoption, whereas other studies have shown a higher probability of technology adoption by smaller firms [e.g. Oster (1982)].

Spatial clustering of economic activity and its role in interactive learning processes is important in technology adoption. The new literature on economic geography explicitly incorporates the role of geographical location in economic development process.<sup>7</sup> Positive externalities of such location include "cluster development" which leads to establishment of networks for dissemination of information so that 'best practices' in one cluster can foster demonstration effect in others. To capture such advantages, we use Location as a dummy variable which takes a value of 1 if the firm is located in Karachi—the city being the biggest commercial hub in Pakistan and still the only major port is believed to offer such geographical advantages. Fariaa, *et al.* (2002) find that firms located in industrialised districts have an 8 percent greater probability of adopting technology than those located in poor regions. However there are some negative externalities like congestion which may divert investment away from such a location. Sign and significance of this variable will reflect the net effect of these positive and negative externalities.

The firm's level of sales is likely to positively affect the probability of investment in new technology. Firms with larger sales have a better capacity as well as better motivation to invest in new technology to retain their market share through improving product and process technologies. Hence we expect this variable to have a positive sign.

<sup>7</sup> See, for instance, Krugman (1995).

Recent years have witnessed a growing demand from buyers for certification of conformity with standards and technical regulations.<sup>8</sup> The emerging trade environment under the umbrella of the World Trade Organisation (WTO) also calls for adherence to standards and norms such as quality certification as well as certification of conformity with health, labour, and environment standards. Such certifications demonstrate compliance with product safety and quality and manufacturers having such certifications are expected to perform better in export markets. Export-oriented firms that have obtained product and process certifications may be better inclined to upgrade their technology owing to their awareness of the benefits of new product and process technologies. We, therefore, expect that firms that are certified are more likely to invest in new technology and hence this variable is expected to have a positive sign in the Logit regression.

Ownership is also expected to play an important role in influencing a firm's decision to adopt new technology. We argue that domestic-owned firms are more likely to adopt new technology as compared with foreign-owned firms not least because of the technology gap they face and their drive to catch up with their foreign-owned counterparts. The foreign-owned firms, on the other hand, may be less likely to invest in new technology owing to their better technological base as compared with domestic-owned firms. Hence odds are in favour of domestic ownership having a higher probability of technology adoption.

### 3. MODEL ESTIMATION

The specified model has been estimated as a Logit regression<sup>9</sup> (Table 1). The null hypothesis that all the slope coefficients are simultaneously equal to zero is tested in terms of the likelihood ratio (LR) statistic. Given the null hypothesis, the LR statistic follows the  $\chi^2$  distribution with degrees of freedom equal to the number of explanatory variables. The results indicate that the null hypothesis is rejected. McFadden R-squared turns out to be about 0.32. However, as the theory suggests, in binary dependent models goodness of fit is of secondary importance. What actually matters is the expected signs of the coefficients and their statistical and/or practical significance.

Table 1

#### *Results of Logit Regression Model*

| Dependent Variable: $Y_i$ |             |                    |             |       |
|---------------------------|-------------|--------------------|-------------|-------|
| Method: ML - Binary Logit |             |                    |             |       |
| Variable                  | Coefficient | Std. Error         | z-Statistic | Prob. |
| C                         | -3.67       | 1.96               | -1.87       | 0.06  |
| LAGE                      | -0.73       | 0.38               | -1.94       | 0.05  |
| DSIZE                     | 1.75        | 0.67               | 2.60        | 0.01  |
| LOCATION                  | 0.66        | 0.61               | 1.09        | 0.28  |
| LSALES                    | 0.53        | 0.21               | 2.55        | 0.01  |
| CERT                      | 1.14        | 0.64               | 1.78        | 0.08  |
| OWNERSHIP                 | 1.44        | 0.85               | 1.69        | 0.09  |
| LR statistic (6 df)       | 36.29       | McFadden R-squared |             | 0.32  |
| Probability(LR stat)      | 0.00        |                    |             |       |

<sup>8</sup>Standards of certification are ISO9000, ISO14000, HACCP, SA8000, OHSAS, EUREPGAP, and Traceability.

<sup>9</sup>A Probit model has also been estimated, but the results are very similar (see Appendix).

The variable 'age' has a negative and significant coefficient implying that relatively new entrants are more likely to invest in new technology whereas the older firms are less inclined to invest in new technology. As expected, the coefficient of 'sales' is positive and significant, indicating that firms with large sales volumes have a higher probability to invest in new technology due to their better capacity to undertake such investments. This is because firms with large sales volumes. The dummy variable for firm size also turns out to be positive and significant showing that larger firms have a higher likelihood of investment in new technology to enhance economies of scale and achieve technological efficiency.

The coefficient of the dummy variable for certification is significant with a positive sign implying that being certified to international quality standards increases the probability of a firm's technology adoption. Firms that have obtained product and process standards have a better awareness about the benefits of new technology in terms of product quality and process efficiency. Hence such firms have a better likelihood of investing in new technology to maintain their competitive strengths. The location dummy turns out to be positive but insignificant, implying that clustering and other locational advantages do not significantly affect the firm's likelihood of investing in new technology.

The dummy variable for ownership has a positive and significant coefficient implying that domestically-owned firms are more likely to invest in new technology. As argued earlier, domestic firms may have a greater need for new technology as compared with foreign-owned firms and hence their probability of investing in new technology is higher. Alternatively, this result also implies that foreign-owned firms are less likely to invest in new technology. Mansfield (1994) argues that foreign-owned firms may not be inclined towards investing in new technology in developing countries as they are more concerned with their intellectual property rights and lax enforcement of intellectual property rights in developing countries acts as a potential deterrent to investment in new technology by foreign firms.

In the Logit regression, the marginal effects provide a good approximation to the magnitude of change in the dependent variable due to a change in the independent variable (Table 2). The predicted probability of a firm investing in new technology is 0.87 for large, certified and domestically-owned firms, evaluated at average values of

Table 2

*Marginal Effects of the Logit Regression*

| Marginal effects after logit |       |           |       |      |      |
|------------------------------|-------|-----------|-------|------|------|
| y = Pr(Investment) (predict) |       |           |       |      |      |
| = 0.87                       |       |           |       |      |      |
| Variable                     | dy/dx | Std. Err. | z     | P> z | X    |
| Lage                         | -0.08 | 0.04      | -2.06 | 0.04 | 2.90 |
| DSize*                       | 0.24  | 0.11      | 2.28  | 0.02 | 0.64 |
| Location*                    | 0.08  | 0.07      | 1.08  | 0.28 | 0.50 |
| Isales                       | 0.06  | 0.02      | 2.61  | 0.01 | 7.87 |
| Cert*                        | 0.16  | 0.11      | 1.49  | 0.14 | 0.78 |
| Own*                         | 0.23  | 0.17      | 1.38  | 0.17 | 0.85 |

(\*) dy/dx is for discrete change of dummy variable from 0 to 1.

firm's age and volume of sales. An increase of one year in firm's age reduces the predicted probability of investing in new technology by 8 percent, holding other independent variables constant at the mean values. Similarly, certified firms are 16 percent more likely than non-certified firms to invest in new technology, holding other variables at their mean values.

The empirical findings have several policy implications. First, there is a need to provide a supportive environment to new export-oriented enterprises as these enterprises are likely to play a leading role in adoption of new technology. A key initiative could be the provision of tax credit on research and development expenditure. This would provide an incentive to such enterprises to upgrade and maintain their technological competencies. Second, there is a need to create a level playing field between domestic and foreign investors. Various incentives that are routinely provided to foreign investors should also be extended to domestic enterprises especially when the latter are more likely to invest in new technology in line with market requirements. Third, technical certifications not only help exporters to gain market share but are also instrumental in encouraging firms to adopt new technology. Unfortunately, however, obtaining certifications of conformity to various product and process standards has been highlighted as a major constraint in Pakistan. There is, therefore, a need to facilitate certifications through fiscal incentives as well as through helping to upgrade and establish the necessary physical infrastructure for technical testing.

#### **4. CONCLUDING REMARKS**

This paper has analysed the factors influencing the probability of technology adoption by export-oriented firms using survey data of export-oriented enterprises. Employing the rank model of technology adoption, firm-specific characteristics such as age, volume of sales, firm size, type of ownership, certification to standards, and geographical location have been explored as possible factors influencing firms' decision to adopt new technology. The results show that younger and bigger firms have a higher probability of technology adoption. Similarly, firms with higher sales are more likely to adopt new technology. Firms that have obtained certifications of conformity with international product and process standards demonstrate a higher likelihood of technology adoption. Domestically-owned firms are found to have a higher probability of technology adoption as compared with foreign-owned firms due perhaps to the use of lower-end technology by the domestic firms in relation to the foreign-owned firms.

The empirical findings have important policy implications. First, new enterprises have demonstrated a higher likelihood of technology adoption and thus need to be nurtured through proper fiscal incentives for technology adoption including tax credits for research and development activities. Second, the domestically-owned enterprises should be offered the same incentives package as are made available to foreign-owned firms to enable them to continue investing in better product and process technologies. Finally, facilitation of certification to technical standards can be instrumental in promoting adoption of new technology by the export-oriented enterprises.

## APPENDIX

| Dependent Variable: Yi     |             |                    |             |       |
|----------------------------|-------------|--------------------|-------------|-------|
| Method: ML - Binary Probit |             |                    |             |       |
| Variable                   | Coefficient | Std. Error         | z-Statistic | Prob. |
| C                          | -1.77       | 1.07               | -1.66       | 0.10  |
| LAGE                       | -0.42       | 0.21               | -1.99       | 0.05  |
| DSIZE                      | 0.97        | 0.37               | 2.59        | 0.01  |
| LOCATION                   | 0.28        | 0.33               | 0.85        | 0.40  |
| LSALES                     | 0.28        | 0.11               | 2.60        | 0.01  |
| CERT                       | 0.58        | 0.37               | 1.58        | 0.11  |
| OWN                        | 0.68        | 0.47               | 1.44        | 0.15  |
| LR statistic (6 df)        | 35.24       | McFadden R-squared | 0.31        |       |
| Probability (LR stat)      | 0.00        |                    |             |       |

## REFERENCES

- David, P. A. (1969) A Contribution to the Theory of Diffusion. Centre for Research in Economic Growth, Stanford University. (Research Memorandum, No. 71).
- David, P. A. (1975) *Technical Innovation and Economic Growth*. Cambridge: Cambridge University Press.
- David, P. A. and T. Olsen (1984) Anticipated Automation: A Rational Expectations Model of Technological Diffusion. Technological Innovation Programme Centre for Economic Policy Research, Stanford University. (Working Paper No. 2).
- Davies, S. (1979) *The Diffusion of Process Innovations*. Cambridge: Cambridge University Press.
- Faria, A., et al. (2002) Determinants of Adoption of Flexible Production Technologies: Evidence from Portuguese Manufacturing Industry. *Economics of Innovation and New Technology* 11:6, 569–580.
- Geroski, P. A. (2000) Models of Technology Diffusion. *Research Policy* 29, 603–625.
- International Finance Corporation (2009) *Doing Business 2010, Pakistan*. A Co-publication of The World Bank and the International Finance Corporation.
- Karshenas, M. and P. Stoneman (1993) Rank, Stock, Order and Epidemic Effects in the Diffusion of New Process Technology. *Rand Journal of Economics* 24: 4, 503–527.
- Karshenas, M. and P. Stoneman (1995) Technological Diffusion. In P. Stoneman (ed.) *Handbook of the Economics of Innovation and Technological Change*. Oxford: Blackwell.
- Krugman, P. (1995) *Development, Geography and Economic Theory*. Cambridge, MIT Press.
- Long, J. S. (1997) *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA.: Sage.
- Mansfield, E. (1968) *Industrial Research and Technological Innovation: An Econometric Analysis*. New York: Norton.
- Parhi, Mamata (2008) Technological Dynamism of Indian Automotive Firms: A Close Look at the Factors Inducing Learning and Capability Building. Paper presented in the VI Globelics Conference at Mexico City, September 22–24.

- PIDE (2007) Trade Related Challenges Facing Exporters in Pakistan. United Nations Industrial Development Organisation.
- Rogers, Everett M. (1995) *Diffusion of Innovations* (4th ed.). New York: Free Press.
- Sarkar, J. (1998) Technological Diffusion: Alternative Theories and Historical Evidence. *Journal of Economic Surveys* 12:2, 131–176.
- Woodside, A. G. and W. G. Biemans (2005) Modeling Innovation, Manufacturing, Diffusion and Adoption/Rejection Processes. *Journal of Business and Industrial Marketing* 20:7, 380–393.

## Comments

The paper titled 'An Analysis of Technology Adoption by Export-oriented Manufacturers in Pakistan.' It is an excellent paper that analyses the issue of technology adoption by 4 major export industries of Pakistan including textile, leather product, agro-food and fisheries. The authors have identified 6 characteristics; age, size, location, volume of sales, status of certification and ownership that may affect technology adoption. The conclusion is that young and large firms adopt new technology more often than old and small ones. Location has insignificant effect while certification and ownership by locals have positive effect.

Following points may be useful for further improvement of this paper.

- Technology adoption and ownership have been taken as binary variables; yes or no and domestic or foreign respectively. They can better be defined as percentage of total annual expenditures spent on new technology adoption and percentage share of foreign ownership in a given firm respectively.
- Both size and volume of sales represent the size of firm, therefore one of them may be omitted.
- Spatial clustering generates external economies of scale as best practices in one firm foster demonstration effect for others. Keeping this fact in view, taking Karachi as the only clustering location seems somewhat inappropriate. It is quite possible in other cities as well.
- The authors may consider ranking of 4 sectors considered in the research with respect to technology adoption. That is they want to answer the question; which sector adopted new technology at first and which one at the last.
- Some financial variables like debt equity ratio, price earning ratio and return on equity should have been included in the list of explanatory variables.

Policy implications of this research are very clear and worth serious consideration of policy-makers.

**M. Mazhar Iqbal**

Quaid-i-Azam University,  
Islamabad.

## **Government Expenditure and Tax Revenue, Causality and Cointegration: The Experience of Pakistan (1972–2007)**

ZINAZ AISHA and SAMINA KHATOON

### **1. INTRODUCTION**

The main objective of Pakistan's fiscal policy is sustained economic growth with declining debt services, poverty alleviation, the creation of employment opportunities and investment in human and physical infrastructure. The tax to GDP ratio fluctuated in a narrow band of 10 to 11 percent for almost one decade because of half hearted attempts to reform tax procedure. On the revenue side, tax-GDP and revenue to GDP ratios either remain stagnant or secular decline, mainly due to structural weaknesses in the tax system and administration at the federal level and at provincial government level. The expenditure of the government in relation to GDP with total expenditure is also showing, overall decline since the beginning of 1980.

In the short run, fiscal policy can be considered expansionary when public expenditures exceed public revenues and the resulting deficit can be explained as to finance additional government expenditures. If these expenditures are growth enhancing, then a government deficit reveal an indirect effect on long-term economic growth. In a Ricardian economy, deficit simply means taxes delayed, there should be no difference between tax and deficit finance of government expenditures, as long as the tax structure remains unchanged in the future [Ludvigson (1996)]. On the other hand, if the economy is non-Ricardian, then public deficits can change the private incentives to accumulation and influence the rate of growth of the economy.

In Pakistan, higher level of current budget deficit are financed significantly by government borrowings these, raise the interest burden, future expenditure as well as expectations of higher taxes. Thus debt financing is an important variable in the nexus between tax revenue and expenditure. Although the relationship between revenue and expenditure is still an unsettled issue, the main purpose of the present study is to check and explain the relationship between tax revenue and expenditure variables in the context of Pakistan.

The various estimates to test the revenue/tax-expenditure nexus are examined in context to different countries and different results have been found, this study attempts to

Zinaz Aisha <zinaz\_aisha@yahoo.com> is Lecturer, Department of Economics, Sardar Bahadur Khan Women's University, Quetta, Balochistan. Samina Khatoon <samansaeed\_ku@ymail.com> is Student of MPhil, Applied Economics Research Centre, University of Karachi, Karachi.

investigate the causality between government expenditure and tax revenue in Pakistan but it differs from earlier studies on the following aspects.

Firstly, it examines two-hypothesis tax-spend or spend-tax by granger causality test verification in context of Pakistan. Secondly, it investigates for long run relationship between both of the variables with current data. The rest of the paper is organised as follows. Section 2 describes the overview of theoretical literature and literature review. Section 3 discusses the data and methodology and empirical result. Section 4 provides conclusion.

## 2. FISCAL CONDITION IN PAKISTAN

In Pakistan, since the last decades, on the revenue side, tax-to-GDP and hence, revenue-to-GDP ratios either remain constant or showed secular decline, due to structural deficiencies in the tax system or administration, at federal level and at provincial level. The expenditure to GDP exhibits a similar pattern. In 2008-09, the decline in total expenditures 40 percentage points of GDP is shared by current expenditures 1.5 percentage points of GDP and development expenditures 2.1 percentage points of GDP total revenue as percentage of GDP increase due to improvement in non-tax revenue as percent of GDP, excise duty contribution in revenue is 9 percent, total tax revenue as percentage of GDP remained at 10-11 percent since last decades due to structural weakness in tax system in Pakistan. The indirect tax and sales tax have a relatively high contribution in tax revenue, in total, indirect tax to GDP ratio stood at 5 percent and direct tax-to-GDP ratio that remains always low, requires a considerable policy measures in order to widen the tax base and strength the tax administration.

The average growth of FBR tax collection was around 16 percent during the current period comparative to the growth rate of 12 percent during the decades of 1990s. The growth rate from 12-16 percent shows the positive impact of tax reforms if nominal GDP growth rate is increasing in isolation. While the falling tax-to-GDP implies that nominal GDP grew at a faster rate than tax growth.

In Pakistan, indirect taxes contribute 60 percent of total revenue generally and particularly custom collection falls during the last decades, mostly due to trade liberalisation and GST contribution. With relation to tax, there has been a difficult time on expenditures side for the economy of Pakistan due to many unexpected events on both the domestic and external level [*Economic Survey of Pakistan (2008-09)*], if better fiscal discipline and expenditure management adopt, it would lead to drastic improvement in fiscal discipline. Total expenditures have fluctuated between 16-20 percent of GDP during the last 18 years. Negative growth in total expenditures is due to significant decline at the cost of a decline in development spending with 15.1 percent. There is a increase in total expenditures during 1980-2009 from 63.6 to 2431 billion with account of current expenditures from 37.8 to 2066 and interest payment 5.9 to 624 and defense expenditures 15.3 to 3123 billion but growth is negative in real expenditures with total expenditures 7.7 to -13.1, current 10.5 to -9.3, development 2.7 to -29.6 and defense expenditures decline 8.9 to -5.7 percent.

In future, to encourage judicious distribution of the tax burden among the different sectors of the economy it is necessary to expand the tax net to un-taxed and under-taxed sectors and also to achieve targeted tax-to-GDP ratio which is around 15 percent.

### 3. OVERVIEW OF THE THEORETICAL LITERATURE

The relationship between tax and spending is discussed in the literature with the help of four hypotheses, namely the tax-and-spend hypothesis, the spend-and-tax hypothesis, the fiscal synchronisation hypothesis, and the institutional separation hypothesis.

#### **Tax-Spend Hypothesis**

According to Friedman (1978) the level of spending adjust to the level of tax available and causality runs from tax to expenditure. This hypothesis defines a positive relationship between government spending and taxation. If tax revenue are increased government spending will also increase and will decrease with the decrease in tax revenue. As Government want to spend whatever is available for spending.

Buchanan and Wagner (1977, 1978) and Niskanen (1978, 2002, and 2006) presented an alternative version of the tax-spend hypothesis that is negative relationship between federal expenditure and tax revenues. Contrary to Friedman (1978), they suggest that higher taxes would lead to spending reductions. According to fundamentals of the Buchanan and Wagner (1977, 1978) taxpayers suffer from fiscal illusion. They argue that tax cuts lower the perceived price of government provided goods and services by the public, which increases quantity demanded of these goods and services. However, the public may incur even higher costs. One reason for this is the indirect inflation taxation that results from excessive money creation by the government. Another reason is higher interest rates associated with government debt financing that may crowd out private investment. To reduce expenditures, Buchanan and Wagner favour limit the ability of government for deficit financing. In sum, tax changes bring changes in spending, the relationship between the two is a negative. This hypothesis is also known as the “revenue dominance hypothesis” [Hasan and Linclon (1997)].

While Friedman (1978) and others believe that lower deficits require lower taxes and they oppose tax hikes as a means of reducing budget deficits [see Darrat (1998, 2002)] other proponents of the tax-and-spend hypothesis such as Buchanan and Wagner (1977) believe that tax increases as a means of solving the budget deficits. Thus, combined increases in taxes with spending cuts will lower budget deficits contrast with Friedman (1978) Who explains a positive causal relationship between the two fiscal variables, Buchanan and Wagner (1977) hypothesise a negative relationship [see Darrat (1998, 2002)].

#### **Spend-Tax Hypothesis**

According to the spend-and-tax hypothesis, government first spends than tax policies and revenues are adjusted to accommodate the desired level of spending. It is expenditure that causes taxes where causality runs from spending to revenue. According to Peacock and Wiseman (1979) once a relatively high level of taxation and expenditure is set during extra ordinary situations like wars, natural disasters, or deep recessions justify temporary increases in expenditures and taxes to pay them so, that public sector is permanently enlarged. From a policy perspective, the optimal solution for the proponents of the spend-and-tax hypothesis, a spending restraint is required to reduce public deficits and reducing expenditure for sustain current budget deficits.

Another explanation of this hypothesis is based on the research of Barro (1974, 1979, 1986). In his tax smoothing hypothesis, government spending is considered as an exogenous/dependent variable to which taxes adjust. Moreover, the intertemporal budget constraint requires that an increase in current expenditures higher future taxes. Therefore Barro, rejects the concept that the taxpayers suffer from fiscal illusion. Within the framework of the Ricardian equivalence theorem, he explain that taxpayers are rational that an increase in the current debt in nothing but a delayed burden in form of taxation. Taxpayers are, therefore, expected to fully capitalise the future tax liability. This hypothesis is also known as “expenditure dominance hypothesis”.

### **Fiscal Synchronisation Hypothesis**

The first of these is the *fiscal synchronisation* hypothesis where it is postulated that the government take decision to tax and to spend is simultaneously and changes occur concurrently and causality runs in both directions. To the proponents of this hypothesis, the quantity and quality of public goods offered by the public sector reflects the preferences of the community and the size of the government is determined by the welfare-maximising choice of a decisive individual and the decisive voter chooses the appraisal and comparison the marginal cost and benefits associated with government alternative packages implement by the government [Meltzer and Richard (1981)]. According to Musgrave (1966, p. 19) the expenditure and tax sides of the budget must be decided jointly’ so as to maximise society’s intertemporal social welfare function. The government budgetary process works on incremental basis therefore according to Wildavsky (1964) government expenditure and tax revenue determines each other simultaneously. So the implication of this hypothesis that causality runs in bidirectional.

### **Institutional Separation Hypothesis**

According to this hypothesis the management and legislative government branches have different taxation and spending functions because such all these are different institutions. So all these institutions have independent decisions regarding expenditure and revenues, indicating no causal relationship between government expenditure and tax revenue.

The *institutional separation* hypothesis suggests that there is no inter-temporal causality between public expenditure and public revenue. This absence of causal link is due to ‘many important actors with divergent interests and agendas’ [Hoover and Sheffrin (1992), p. 246] and that the disagreement between parties or groups in the decision-making process is a cause for the growing pattern of public debt [Drazen (2001); Persson, *et al.* (2000)]. A major advocate of this view is Wildavsky (1988).

Who maintains that ‘budgeting can be incremental and adjustments can be made on the margin if these separate institutions reach a consensus on the fundamentals.

## **4. LITERATURE REVIEW**

For finding the hypothesis and causality between government expenditure and tax revenue previous studies that took place include [Dhanasekaran (2001); Friedman (1972–1978); Blakely (1986); Marlow (1986); Barro (1999); Wiseman (1979)]. This issue has

been investigated for a number of countries, but a consensus has not been reached about the nexus between government revenues and expenditures. The results from these empirical studies are sensitive to the sample period under examination, the degree of temporal aggregation, the inclusion of macroeconomic controls, and the choice of econometric methodology.

The spend-tax hypothesis in the one hand, predict that governments spend first and then increase ax revenues to finance their expenditures [Peacock and Wiseman (1979); Barro (1981)].

According to (S. H. Hussain) in case of Pakistan there is unidirectional causality exist, spend to tax that is support to Barro hypothesis and the result that *TR* does not cause *GE* can best and only be explained by the political economy of Pakistan where the main expenditures are the outlays chiefly determined politically by bureaucratic and military influence (defense, debt servicing, general administration). The case of India has been recently examined by Dhanasekaran (2001) who found evidence in support of the spend tax hypothesis. It is evident, therefore, that the question remains empirically unsettled. He conclude for absence of co integration between both of the variables, unidirectional causality exist in case of India. S. Raju paper support for both the expenditures lead revenues (spend and tax hypothesis) and revenues lead expenditures (tax and spend hypothesis) between total receipts/tax receipts and different categories of expenditures at the level of the central government for India. In case of Turkey studied by Abu Wahid, using the Granger-causality testing, the results support the hypothesis that government expenditure causes tax revenues to increase in Turkey.

The so-called hypothesis tax-spend postulates that government raises tax revenues ahead of engaging in new expenditures [Friedman (1978); Buchanan and Wagner (1974); Blakely (1986); Marlow and Manage (1987); Owoye (1995)]. Ewing and Payne (1998) have examined the case of five Latin American countries using pool data technique finding mixed results for the countries in their sample. Park (1998) researched for the case of Korea and found supporting evidence for the tax-spend hypothesis. Debi, *et al.* worked for transitional economics, the empirical findings which are based granger causality test, supporting the tax-spend hypothesis. However, Friedman (1972, 1978) supports the view that increasing taxes means that one would have just as large a deficit but at a higher level of government expenditures. Owoye (1995) conducted a study of G7 countries and finds that the direction of causality runs from tax revenues to government expenditures in the case of Japan and Italy. Cheng (1999) in a study of eight Latin American countries detects a similar direction.

There is also the fiscal synchronisation hypothesis that suggests that government take decisions about revenues and expenditure simultaneously [Musgrave (1996); Meltzer and Richard (1981)]. Studied on this hypothesis worked by Mariam, *et al.* for the case of Malaysia and found bi-directional causality supporting the view of fiscal synchronisation hypothesis. Furthermore, Manage and Marlow (1986) find the presence of bi-directional causality between U.S. federal revenues and expenditures for 1929–82.

## Data

Data that is used here taken from various issues of economic survey of Pakistan, international financial statistics from the year 1972 to 2007. Data choice depends on the availability of data and time period effect after separation Pakistan.

## 5. METHODOLOGY AND EMPIRICAL RESULTS

### Granger Causality and Co-integration Test

The mostly used method to estimate causality is Granger Causality Test which shows the direction of causality. Before applying the Granger Causality test it is must to check the stationary of the variables. If the variables are stationary then apply Causality test. If variables are non-stationary, then make the ADF test to the 1<sup>st</sup> difference or logarithm and obtain the stationary series because the Granger Causality, if applied on non-stationary variables will lead to spurious regression and may provide wrong results.

In the same way co-integration test to non-stationary variables also provides spurious regression. So according to Engel Granger Co-integration if the linear combination of non-stationary variables is stationary variables have long-run relationship. To avoid the problem of heteroscedasticity we have taken the natural log of both of the variables so variables are defined as LNTR and LNGE.

### Unit Root Test

$$\Delta GE_t = \alpha_1 + \alpha_2 + \beta GE_{t-1} + \Sigma \delta \Delta GE_{t-1} + \mu_t$$

$$\Delta TR_t = \alpha_1 + \alpha_2 + \beta TR_{t-1} + \Sigma \delta \Delta TR_{t-1} + \mu_t$$

Where  $\alpha_1$   $\alpha_2$  are constants,  $t$  represents time or trends and  $\mu_t$  is pure white noise error term. The null and alternative hypotheses are  $H_0: \beta=0$  and  $H_1: \beta < 0$ . If ADF value of  $\Delta LN GE_t$  is greater than the MacKinnon value at 1 percent, 5 percent or 10 percent level of significance the null hypothesis is accepted which shows that  $\Delta LN GE_t$  has unit root and is non-stationary. On the other side if null hypothesis is rejected show that GE is stationary.

### Results of ADF Test

| Variable      | ADF Critical Value (1% Level) | Critical Value (5% Level) | Critical Value (10% Level) | Result    |                |
|---------------|-------------------------------|---------------------------|----------------------------|-----------|----------------|
| LNGE          | -2.160618                     | -4.252879                 | -3.548490                  | -3.207094 | Non-stationary |
| $\Delta$ LNGE | -4.951326                     | -3.639407                 | -2.951125                  | -2.614300 | Stationary     |
| LNTR          | -1.948808                     | -3.639407                 | -2.951125                  | -2.614300 | Non-stationary |
| $\Delta$ LNTR | -8.623730                     | -3.639407                 | -2.951125                  | -2.614300 | Stationary     |
| $v_t$         | -3.778997                     | -3.632900                 | -2.948404                  | -2.612874 | Stationary     |

The results of ADF are showing that the ADF value of LNTR and LNGE are both greater than Mackinnon value at 1 percent, 5 percent and 10 percent level of significance so null hypothesis is accepted ,both the variables are non-stationary. While 1st difference of both variables  $\Delta$ LNGE and  $\Delta$ LNTR are stationary at 1 percent, 5 percent and 10 percent level of significance.

### Granger Causality Test

For Granger Causality economic variables must be stationary which have been proved by the unit root test that GE and TR are stationary at 1st difference.

#### Results of Granger Causality Test

| H <sub>0</sub>                   | Obs | F Value | P Value | Result                |
|----------------------------------|-----|---------|---------|-----------------------|
| LNTR does not Granger Cause LNGE | 34  | 0.88922 | 0.42188 | Accept H <sub>0</sub> |
| LNGE does not Granger Cause LNTR |     | 3.02703 | 0.06398 | Reject H <sub>0</sub> |

The results of causality represent that in case of Pakistan GE are cause to TR and TR are not cause to GE. Therefore the results verify unidirectional causality i.e. spends and tax hypothesis. It is found that GE does not depend on TR so only the tax revenue may tend to reduce the budget deficit but this is difficult to answer only considering the causal relationship between two variables. Proper cost and benefit analysis of any change in taxation and expenditure is needed in order to study the problem of federal deficit.

Further it implies that Pakistan's government first engages in spending and after that to pay for this spending raise taxes to boost government revenue but it may have negative impact on investors and human capital that is skilled one because of fear to pay higher taxes in future. Due to this problem capital may flight.

### Engle Granger Co-integration Test

Co-integration defines that if the 1st difference of variable is stationary there is cointegration (long-run relationship) between the variables. Two methods are used in order to check co-integration. 1st method is presented by Engel and Granger it deals with two variables and the 2nd method is presented by Johns and Juselius based on Vector Auto Regression and this method is used for three or more variables.

Here because of two variables we have used Granger co-integration test. 1st we regress TR on GE as follows.

$$LNTR_t = \alpha_1 + \alpha_2 LN GE_t + \mu_t$$

The results of OLS regression are

$$LNTR = 0.048999 + 0.992287 * LN GE + v_t$$

|       |            |            |                                    |                |
|-------|------------|------------|------------------------------------|----------------|
| S. E. | (0.173941) | (0.014539) | Adjusted R <sup>2</sup> = 0.992540 | D.W = 1.302447 |
| t     | (0.281698) | (68.24909) | F = 4657.939                       | Prob = 0.00000 |

In second step we check the stationarity of residual by the help of ADF. Here the ADF value is smaller than Mackinnon critical value at 1 percent, 5 percent and 10 percent level of significance the residual is stationary because it has no unit root. So the results show that there is co integration relationship between TR and GE. The OLS regression is showing the co integration relationship that is long run relationship between TR and GE. A 1 percent rise in GE raises tax revenue by 0.99.

Here the coefficient of government expenditure is positive and significant which indicates that economic activity enhances as government increases its expenditure as a result tax base and tax revenue also increases because of high income. The results represent that in the long run the most important factor that affects tax revenue is government expenditure.

## 6. CONCLUSION AND POLICY IMPLICATION

In this study, the causal relationship between government total expenditure and government total revenue has been studied. In general, the results support the Barro hypothesis that government expenditure causes revenues. The result that *TR* does not cause *GE* can only be explained by the political economy of Pakistan where the main expenditures are the determined politically by bureaucratic and military influence (defense, debt servicing, general administration). Most of these consumption expenditure are for self interests rather than overall welfare.

The results conclude that while government expenditures and revenues exhibit a stable long run relationship there exists unilateral causality from expenditures to revenues in Pakistan. That is, although the possibility of budget deficit explosion in the long-run is limited, the government decide to spend first and then raise tax revenues and request for grants to finance its expenditures, rather than adopting the method of raising funds first and collect revenues and take decision to spending later according the revenues.

In general, a major portion of development expenditure in Pakistan is the residual amount left over from different consumption expenditure. Furthermore, seeing that our tests can not guarantee the final benchmark remedy of the issue of reducing the deficit, we cannot support increasing tax revenues over decreasing expenditure. Only reducing the expenditures can not solely be resolution; rather, what we need primarily is (i) reduction in the size of large consumption expenditures and use them for development and other investment expenditures, thereby moving towards Pareto optimal solutions, (ii) in determining the new development purpose and implement outlays, economic efficiency should be preferred over political determination.

In addition, as is the target for this nexus, as the tax and tariff reform programme of the government, we must need expenditure reform in which inclusive cost benefit analyses should be conducted for government expenditures together with the analyses of adopting optimal approach for gradual shifting and reformation. This whole scenario should be reanalysed in a general equilibrium framework in order to spread distributional consequences of expenditure on the entire economy.

## REFERENCES

- Araújo, J. T. and M. A. C. Martins (1999) Economic Growth with Finite Lifetimes. *Economics Letters* 62, 377–381.
- Baghestani, H. and R. McNown (1994) Do Revenues or Expenditures Respond to Budgetary Disequilibria? *Southern Economic Journal* 311–322.
- Barro, R. J. (1974) Are Government Bonds Net Wealth. *Journal of Political Economy* 82, 1095–1118.

- Bloom, D. E., D. Canning, and J. Sevilla (2001) The Effect of Health on Economic Growth: Theory and Evidence. National Bureau of Economic Research. (Working Paper No. 8587).
- Buchanan, J. and R. Wagner (1977) *Democracy in Deficit*. New York: Academic Press.
- Carneiro, J. R. Faria, and B. S. Brry (2004) Government Revenues and Expenditures in Guyinea-Bissau: Causality and Cointegration. (SSRN, No. 65).
- Dhanasekaran, K. (2001) Government Tax Revenue, Expenditure Causality, and Cointegration: The Experience of India. *Indian Economic Review* 2, 359–379.
- Ewing, B. and J. Payne (1998) Government Revenue-Expenditure Nexus: Evidence from Latin America. *Journal of Economic Development* 23, 57–69.
- Finance Division (Various Issues) *Economic Survey of Pakistan*. Islamabad.
- Friedman, M. (1978) The Limitations of Tax Limitation. *Policy Review* 7–14.
- Ludvigson, S. (1996) The Macroeconomic Effects of Government Debt in a Stochastic Growth Model. *Journal of Monetary Economics* 38, 25–45.
- Marlow, Michael L. and Neela Manage (1987) Expenditures and Receipts: Testing for Causality in State and Local Government Finances. *Public Choice* 53, 243–55.
- Owoye, O. (1995) The Causal Relationship between Taxes and Expenditures in the G7 Countries: Co-integration and Error Correction Models. *Applied Economic Letters* 2, 19–22.
- Ram, R. (1988) Additional Evidence on Causality between Government Revenue and Government Expenditure. *Southern Economic Journal* 54:3, 763–69.
- WDI (2007) Electronic Database.

## **The Impact of Tax Policies on Economic Growth: Evidence from South-Asian Economies**

IHTSHAM UL HAQ PADDA and NAEEM AKRAM

### **I. INTRODUCTION**

There has been an unmitigated debate regarding the role of fiscal policy in regulating the levels and composition of revenue, expenditure and public debt with the objective of achieving fiscal tolerance over a period of time. In this context, in the literature numerous, basic policy issues are also highlighted: including appropriate size of the state, the role of the government in accelerating economic growth, social development and redistribution of the benefits of the economic growth, improving employment and social justice by reducing inequality in income and wealth between income classes and present and future generations, and ensuring efficiency by promoting optimum allocation of resources.

The public policy instruments, such as tax rate changes, have different implications in exogenous (neoclassical) and endogenous growth theories. The neoclassical theory predicts that permanent changes in government policies do not have permanent effect on the growth of output. This implies that changes in a country's tax structure should have only transitory impact on its long-run economic growth [Ramsey (1928); Solow (1956); Cass (1965) and Barro (1979)]. Such changes allow a country to move towards a higher or lower level of economic activity, but the new long-run growth path converges to the old long-run path. It is only the transition period from the old path to the new path that rate of growth of a country's real output can increase or decrease. The policy effects according to the endogenous growth theory are opposite to that of neoclassical theory which argues that changes in tax rate may have an impact on growth [Romer (1986, 1990); Lucas (1988); Rebelo (1991); Jones, Manuelli, and Rossi (1993); Aghion and Howitt (1992); Kim (1992) and Gomme (1993)].

The different views of neoclassical and endogenous growth theories fall out to the empirically testing the validation of exogenous versus endogenous impact of tax policies on economic growth. The changes in the tax rate will be permanent and, given their different effects on growth, under the both types of growth theories, it would be very useful to empirically distinguish the exogenous and endogenous policy effects on the growth.

Ihtsham ul Haq Padda <ihtsham91@yahoo.com> is Assistant Professor, FSES, Federal Urdu University of Arts, Science and Technology, Islamabad. Naeem Akram <naeem378@yahoo.com> is Research Officer, Ministry of Finance, Government of Pakistan, Islamabad.

*Authors' Note:* Authors are extremely grateful to Dr Fazal Mahmood for valuable discussion and comments on the paper. The paper is revised in the light of the comments received during the 25th AGM of Pakistan Society of Development Economists. The viewpoints parented here are the Authors' personal and do not represent the views of their affiliated institutions.

This study tests whether tax policies conducted by Pakistan, India and Sri Lanka have transitory or permanent effect on their economic growth. After this introductory section the organisation of the paper is as follows: Section II deals the theoretical and empirical background of the growth impact of public policies which shows that there is almost no study of this type for developing economies, Section III deals with a brief history of tax collection and economic growth of Pakistan, India and Sri Lanka showing low tax rates as compared to developing countries. Section IV highlights estimation methodology which shows how properties of time series and dynamic model are used to investigate the growth effect of an increase in the tax rate. Section V is devoted to the discussion of results shows that a rise in tax rate permanently reduces the level of output but has transitory effects on the economic growth. The last section gives conclusions emerged from the paper.

## II. THEORETICAL AND EMPIRICAL BACKGROUND

As discussed above the major feature of the endogenous growth theory is permanent change in a variable (potentially influenced by government policies) causes a permanent change in economic growth of a country while the neo-classical growth theory predicts only temporarily effect of such policies. Therefore, the endogenous growth theory predicts that financing through taxes may have an impact on welfare and/or on growth. Tax policy can affect economic growth by discouraging new investment and entrepreneurial incentives or by distorting investment decisions since the tax code makes some forms of investment more profitable than others or by discouraging work effort and workers' acquisition of skills. The empirical literature suggests both direct and inverse relationship between tax burdens and rates of growth i.e., a higher tax burden can decrease or elevate the rate of economic growth. Thus, future economic output may be higher with the optimal rate of taxation and hence future tax revenues would be higher with a lower rate of taxation.<sup>1</sup>

Barro's (1979) tax-smoothing hypothesis says that, if the marginal cost of raising tax revenue is increasing the optimal tax rate is a martingale. This implies that changes in the tax rate will be permanent and, given their different effects on growth, under the two types of growth models, very useful in empirically distinguishing between the exogenous and endogenous models. The endogenous growth models predict that temporary government spending policies have a positive effect on output but a zero effect for permanent spending shocks. To analyse the effects of government spending decision Devereux and Love (1995) used a two-sector endogenous growth model which has been extended to allow for an endogenous consumption leisure decision. The findings explore that a permanent increase in the share of government spending in output financed with lump-sum taxes will endorse interest and long-run economic growth at the cost of social welfare. It also argues that a permanent increase in government spending reduces the long-run growth when it is funded with an income tax or wage income tax but a temporary rise in government spending increases the GDP but it has only transitory impact on the economic growth.

Karras (1999) analysed the effect of tax policies on economic growth for a panel of 11 OECD countries. The results support the theoretical predictions of the neoclassical growth theory and inconsistent with that of endogenous theory. Similar findings were

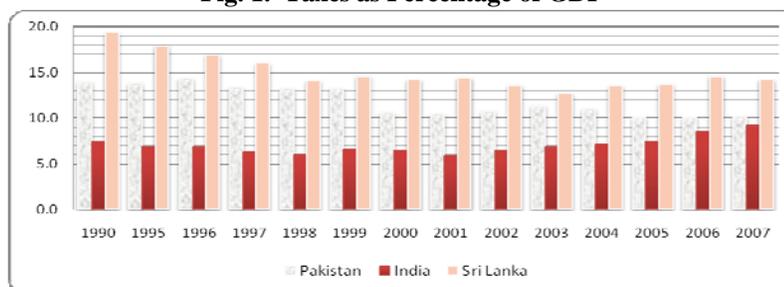
<sup>1</sup> See Scully (2006) and Kocherlakota and Yi (1996) for details.

found by Tomljanocich (2004) who tests empirically whether tax policies have transitory or permanent impact on the growth rate of output for the U. S. states. These all studies are about developed economies and almost no such study is available for developing economies. Therefore, present study aims to fill the existing gap in literature on fiscal policies and economic growth.

### III. TAX COLLECTION AND ECONOMIC GROWTH SITUATION OF SELECTED COUNTRIES

To finance expenditure, government collects resources from various sources in such a way that it is equitable, improves social welfare and does not results in creating distortions in the economy. The trends in the Tax collection of the selected countries as summarised in Figure 1.

**Fig. 1. Taxes as Percentage of GDP**



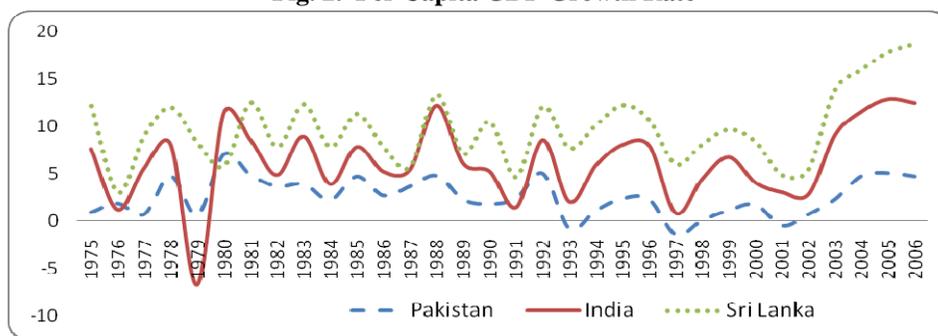
Sources: Key indicators of Asia and Pacific; Asian Development Bank (2008).

It reveals that, tax revenue collection has been the highest in Sri Lanka. In Sri Lanka, during 1970s, tax revenues were on average 18 percent of GDP, and this ratio persisted in 1980s. During the 1990s, the tax/GDP ratio started to decline and in 2007 it, for various reasons (presumably civil war and other exogenous disturbances) became only 14.2 percent of GDP. This is an unfortunate development and has largely been responsible for lower allocations to health and education. It is also surprising because IMF-led reforms generally require raising the tax/GDP ratio. Since 1970s, in India, the tax revenue/GDP ratio has remained in the narrow band of 6-10 percent of GDP, in 2007 the ratio was 9.2 percent. Pakistan is recognised as a country of having narrow tax base, grossly inadequate tax to GDP ratio and low elasticity of tax revenue with respect to GDP growth rate. Tax revenues are on average 13.7 percent of GDP during 1980s this ratio has been reduced to 13.1 percent in 1990s, this declining trend persisted and in FY 2006-07 tax revenues reaches to only 10.6 percent of GDP. Consequently, even with good growth performance, low tax collection has forced the governments to rely on loans for financing of deficit. To increase tax revenue, during 2001 tax reforms are introduced and in this regard Federal Board of Revenue (FBR) has taken numerous steps. Introduction of large Tax-Payer Units (LTU), Medium Tax-Payer Units (MTU), Universal Self Assessment Scheme (USAS) and enlargement of tax base, are resulted in stimulating tax revenues. This increase is excellent in absolute terms but as a percentage of GDP these tax reforms are a failure.<sup>2</sup>

<sup>2</sup>Siddiqui (2006).

The low tax collection coupled with high expenditure is resulted in persistent fiscal deficit in the selected countries. This situation has deteriorated the economic performance of the countries. A brief history of economic growth is summarised in Figure 2. Since Independence from British Government, Indian economic growth rate remains very low and it has been referred as ‘Hindu growth rate’. During 1990s, Indian has taken a decision to end up the closed and regulated policy regime and liberalised the economic policies and adopted an outward-oriented approach. Reforms in industry, trade, investment, financial sector and capital markets were introduced. This opened up almost all areas of the economy to domestic and foreign private investment. Similarly sound macroeconomic management resulted in reducing the internal and external imbalances helped in attaining sustained higher economic growth. Per capita GDP growth accelerated rapidly after 1990s from less than 4 percent in 1990s to around 7 percent after 2002.

**Fig. 2. Per Capita GDP Growth Rate**



Source: *World Development Indicators* (2009).

GDP growth in Pakistan has fluctuated significantly over the years. If in one decade country was categorised as fastest growing in the region, then in other decade it lost those gains. During 1970s, 1971 war has badly affected the economy. Consequently, economy went into recession in 1970s. Separation of East Pakistan, nationalisation of industrial, financial and other institutions accompanied with worldwide recession caused by oil crisis were some of the causes for the recession in Pakistan. During 1970s average per capita GDP growth was only 1.8 percent per annum. 1980s is a decade of revival of economic growth; per capita GDP grew at an average rate of 4 percent per annum. This growth rate has been achieved by promoting private sector, denationalisation and deregulation of industrial sector combined with stimulating the workers remittance flow and increased capital flows due to participating in Afghan war. During the last decade of twentieth century Pakistan faced severe fiscal imbalances. Because of Nuclear Test in 1998 different sanctions have imposed on Pakistan, debt burden reached to unsustainable levels. Moreover during entire decade there was political uncertainty in the country. For these reasons average annual growth fell to 1.4 percent in the Nineties. The growth rate touched its lowest of -0.4 percent in 2000-01. During that time more than half of the government's revenue was spent on debt servicing of public debt. After the event of 9/11, economic sanctions imposed following the Pakistan's 1998 nuclear tests have been lifted and debt is also rescheduled. Resultantly near stagnant economy suddenly started

showing miraculous growth. Per capita GDP grew at an average rate of approximately 5 percent per annum during 2004-06. However, at present due to electricity crisis, terrorism, rising prices of oil and commodities, increasing current account deficit, worsening law in order situation and worldwide recession Pakistan economy has lost its growth momentum.

Civil conflict in the north and east of the Sri Lanka has severely affected the Sri Lankan Economic growth. It can be seen that during 1970s per capita GDP growth was on average 5.6 percent and due to civil war in 1980's it fell down to only 1.6 percent country. However in spite of the impacts of civil war, economic growth has improved during 1990s and later on, per capita GDP growth is on average 4 percent during 1990s and in 2007 it was 4.9 percent.

It can be summarised that all the selected countries are poor and developing so to stimulate economic growth, curtail the incidence of poverty and improve the indicators of human development, these countries require tremendous amount of resources to finance development and social expenditures. Given the downward rigidity of current expenditure, and crucial importance of the development expenditure, the only way would be to mobilise additional resources by generating higher level of tax and non-tax revenues. Therefore, there is an urgent need for implementing tax reforms. To this end, these countries have to bring under-taxed and un-taxed sectors in the tax net. Above all, sincere efforts should be made for curbing smuggling, corruption and tax evasion.

#### **IV. TESTING PROCEDURE OF ENDOGENOUS VERSUS EXOGENOUS GROWTH EFFECT**

Evan (1997) proposes a methodology to examine whether fiscal policies have permanent or transitory impact on economic growth. Using a simple stochastic growth model that nests both endogenous and exogenous growth, he demonstrates that the growth rate should be stationary at level if any policy variable has exogenous effect on growth and difference stationary if it has endogenous effect, when any policy variable affecting investment is difference stationary. This study uses tax rate as a policy variable, which affects the investment, to check whether the effect of the tax policy is endogenous or exogenous on the growth in selected developing countries.

Unit root test is used to test the difference stationarity of the tax rate and then to verify whether the real per capita GDP growth rate series is stationary at level or difference stationary. When the tax rate series is difference stationary indicating tax-smoothing behaviour, for its endogenous effect on growth the per capita real GDP growth rate should be stationary at first difference and in the case of exogenous growth it should be stationary at level.

For robustness of the endogenous versus exogenous growth test the methodology of the Karras (1999) and Tomljanovich (2004) is used, as an alternative way by estimating a dynamic time-series model to check how permanent changes in tax rate affect economic growth. A natural procedure for testing the AK models is to test this restriction explicitly, considering the joint time-series behavior of taxes and growth. The restriction from the AK models suggests a dynamic relationship between taxes and growth as the following specification,

$$W_t = \eta + A(L)W_{t-1} + B(L)\tau_t + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where  $W$  is the growth rate of real GDP,  $\eta$  is intercept,  $A(L)$  and  $B(L)$  are  $P^{\text{th}}$ -order polynomials in the lag operator  $L$  and  $t$  index of time. This specification can be rewritten as,

$$W_t = \eta + A(L)W_{t-1} + B(L)\tau_t + \varepsilon_t + C(L)\Delta\tau_{t-1} + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad (2)$$

$$c_q = \sum_{j=q+1}^P b_j \quad \text{Where, } q = 1, 2, \dots, p - 1. \quad \dots \quad \dots \quad \dots \quad (3)$$

Where  $B(1)$  is a parameter equal to the sum of the coefficients of polynomial  $B(L)$ , and  $C(L)$  is a  $(p-1)^{\text{th}}$ -order polynomial whose coefficients are related to those of  $B(L)$  according to (3). It follows that estimating  $B(1)$  in model (2) can be used to analyse whether impact of tax policy is endogenous or exogenous on economic growth. If

- (I)  $B(1) < 0$  suggests that the sum of the coefficients in the polynomial  $B(1)$  is negative and suggests that a permanent shock in the tax rates will permanently reduce growth as suggested by the endogenous growth theory.
- (II)  $B(1) < 0$  shows that the distortions in the tax rate has only transitory effect on growth, supporting neoclassical theory.

**V. DISCUSSION OF RESULTS**

Three South-Asian countries namely; Pakistan, India and Sri Lanka are included for the analysis. The selection of these countries is because of the same geographical location and common economic and political structure. The study could conduct panel analysis but in such a case there is a loss of individual properties of the countries. Moreover, Pakistan, India and Sri Lanka have different fiscal structure and definition of the variables. In such a situation panel data analysis may be spurious and it is very hard to draw specific policy conclusions on the basis of panel data results. To avoid such a situation the study conducts time series analysis for each country separately.

The data are obtained from International Financial Statistics (IFS) for the period of 1973–2008. The average marginal tax rate should be computed using changing weights. There are several reasons to choose total revenue-to-GDP ratio as a proxy of tax-to-GDP ratio. The computation of average marginal tax rate is difficult due to unavailability of data. The average tax rate, revenue-to-GDP ratio, would be a better proxy for effective tax rate than a fixed-weighted average marginal tax rate. Moreover, data of taxes for all selected countries are not available for reasonable long period for empirically valid results. Another reason to use revenue-to-GDP ratio is that governments are directly concerned to its total revenue, not the tax revenue alone, while deciding its expenditures. The per capita GDP is used as the proxy for economic growth.

Many tests are available to check for unit root in a time series but this study uses GLS transformed Dickey-Fuller (DF-GLS) which is the extension of Dickey and Fuller (1979) unit root test known as Augmented Dickey Fuller (ADF) test. Elliott, *et al.* (1996) propose a simple modification of the ADF tests in which the data are detrended so that explanatory variables are taken out of the data prior to running the test regression. The unit root test results are presented in Table 1 for each country. It shows that tax rate series for all countries are non-stationary at level but becomes stationary at first difference but the growth rate series is stationary at level.

Table 1

*DF-GLS Unit Root Test Results*

| Unit Root Test in | Pakistan |             | India    |             | Sri Lanka |             |
|-------------------|----------|-------------|----------|-------------|-----------|-------------|
|                   | Tax Rate | Growth Rate | Tax Rate | Growth Rate | Tax Rate  | Growth Rate |
| Level             | -2.483   | -4.397*     | -2.515   | -7.369*     | -.329     | -.921*      |
| First Difference  | -.533*   | -           | -.394*   | -           | -.684*    | -           |

\*Indicates stationarity at 5 percent level. The selection of lag length is based on SIC. The inclusion of constant or both constant and trend as exogenous depends on DW and Adjusted R<sup>2</sup>.

Thus tax rate series are difference stationary, consistent with the tax-smoothing theory, while the growth rate of per capita real output is stationary at level for all the three South-Asian countries. This shows that while using Evans (1997) methodology the results lead to the conclusion that changes in tax rate have exogenous impact on economic growth. Hence, first test indicates that the tax policies have only transitory impact on the growth in the selected South-Asian countries. These findings also support the neoclassical growth theory in the context of relationship between taxes and economic growth.

To make the analysis robust, as proposed in the previous section, the model 2 [proposed by Karras (1999) and Tomljanovich (2004)] has been estimated. Empirical estimates of model 2 are presented in Table 2. Overall analysis of all the three countries presents similar results. The value of constant term is positive and statistically insignificant for Pakistan and India but significant for Sri Lanka.  $B(1)$  is positive and statistically insignificant for Pakistan while for India and Sri Lanka it is negative and statistically

Table 2

*Dependent Variable: Real GDP Growth Rate ( $W_t$ )*

|                               | Pakistan                | India                    | Sri Lanka               |
|-------------------------------|-------------------------|--------------------------|-------------------------|
| $C$                           | 0.007541<br>[0.169299]  | 0.13279<br>[1.826196]    | 0.052155*<br>[2.154445] |
| $\tau_t$                      | 0.09674<br>[0.306064]   | -0.849258<br>[-1.516797] | -0.12658<br>[-1.069376] |
| $W_{t-1}$                     | 0.048985<br>[0.261704]  | 0.370216<br>[1.836722]   | 0.205131<br>[1.190013]  |
| $\Delta\tau_{t-1}$            | 0.390968<br>[1.00204]   | 1.457755*<br>[2.442025]  | 0.21185<br>[1.527523]   |
| $\Delta\tau_{t-2}$            | 1.418877*<br>[3.534296] | 0.467287<br>[0.707417]   | -                       |
| <i>R-squared</i>              | 0.422423                | 0.546548                 | 0.129461                |
| <i>Adjusted R<sup>2</sup></i> | 0.278028                | 0.306485                 | 0.042407                |
| <i>AIC</i>                    | -.21915                 | -.9553                   | -.28921                 |
| <i>SIC</i>                    | -.89534                 | -.47536                  | -.10964                 |
| <i>DW stat</i>                | 1.856722                | 1.945872                 | 2.041616                |

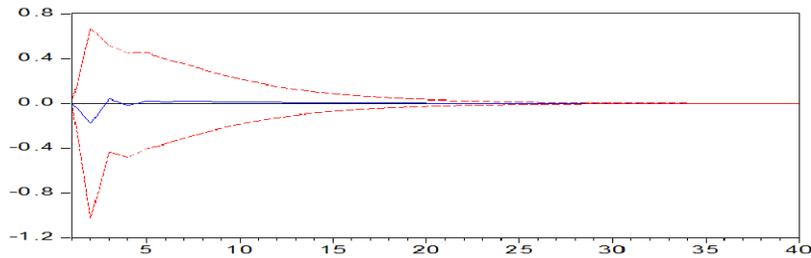
Note: The coefficient  $t$ -values are given in brackets. The lag selection in the model criteria are maximum Adjusted R-square and minimum of AIC and SIC. The lag lengths of differenced tax rate are four, seven and one for Pakistan, India and Sri Lanka, respectively.

\*Indicates significance at 5 percent level.

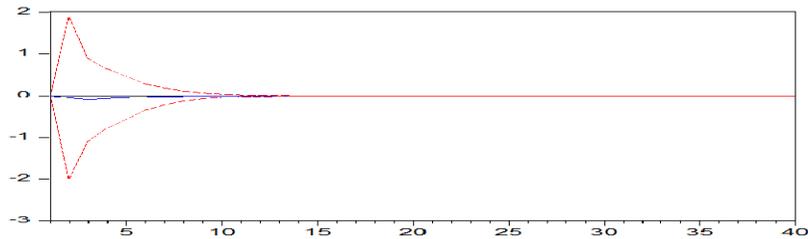
insignificant at 5 percent significance level indicating that it is not different from zero. The results designate that, the hypothesis that  $B(1) = 0$  cannot be rejected in any of the country. Like our earlier analysis based on Evans (1997) methodology these findings also supports the view of neoclassical growth theory. Thus empirical analyses show that changes in tax rate do not permanently alter the real GDP growth rate. This means that the effects of tax rate changes on the growth are transitory. Our findings for the South Asian countries are similar to Karras (1999) who comes to the same conclusions for the developed countries.

The findings that tax policies have only transitory impact on the growth of these countries appeals for an analysis for how long this transitory effect of tax policy on economic growth persists in these countries. To analysis this issue, impulse response functions are estimated. Figures 3 shows the impact of one unit change in tax rate on real per capita growth rate of GDP of Pakistan, India and Sri Lanka.

**Fig. 3. Response of Real per Capita GDP Growth Rate to One Unit Tax Rate Innovation Pakistan**



**India**



**Sri Lanka**

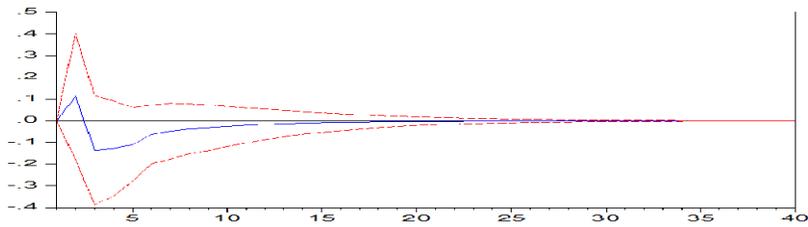


Figure 3 shows that for Pakistan 1 percent increase in tax rate decreases real per capita growth rate of GDP almost 0.15 percent for first year after that its impact decreases and lasts for almost 10 years and after that it expires. The Indian situation is illustrated in figure which shows that 1 percent increase in tax rate causes to decrease almost 0.1 percent decrease the growth rate and effect ends in 7 years. The situation of Sri Lanka is different from other two. The figure shows that for first years 1 percent increase in tax rate increases the growth rate almost 0.1 percent only for one year but after that it impacts negatively. This negative impact on the growth lasts almost next 15 years. The overall findings of the impulse response functions depicts that the impact tax policies on economic growth are transitory in Pakistan, India and Sri Lanka.

## VI. CONCLUSION

This study conducts three different analysis first based on Evans (1997), second using Karras (1999) and Tomljanovich (2004) methodology and Impulse Response functions. Main focus of the study was to analyse the impacts of tax rate changes on economic growth. The analyses which are robust depict that tax policies adopted by the South-Asian countries have only transitory impact on their economic growth. However, Impulse Response function has shown government policies can affect the growth in the transition path to the steady-state growth. Second, a higher tax rate permanently reduces the level of output but has no permanent effects on the output growth rate. These findings suggest that the relationship between output and the tax rate is best described by the neoclassical growth theory and inconsistent with the endogenous growth theory.

In the light of above findings, the impact of tax rate changes is transitory and negative for short-term in Pakistan and India but for Sri Lanka its positive for first year and thereafter it has also negative effect on economic growth. The tax rates in all these countries are low as compared to developed countries. Due to low tax rates these countries heavily depend on bond financing and foreign debt. In view of these finding the most important policy implication of the study is that the optimal tax rate should be decided to finance the budget. For this purpose government can use debt and tax instruments simultaneously. For example, as Padda (2009) argues, in response to an unexpected increase in government expenditures or decreases in output the government should analyse how much part of this increase is becoming the permanent part of its expenditure. The permanent part should be financed by imposing taxes as after all its impact diminishes and the transitory part should be financed by issuing bonds. However, bond financing should be contingent providing a guard against transitory shocks to the budget and should be retired when good days come in future. In this way these South-Asian economies can minimise the tax distortion by spreading required tax increase over several periods.

## REFERENCES

- Aghion, P. and P. Howitt (1992) A Model of Growth Through Creative Destruction. *Econometrica* 60, 323–351.
- Akram, N., I. H. Padda, and M. Khan (2008) The Long Term Impact of Health on Economic Growth in Pakistan. *The Pakistan Development Review* 47:4, 487–500.
- Barro, R. J. (1974) Are Government Bonds Net Wealth? *Journal of Political Economy* 82, 1095–1117.

- Barro, R. J. (1979) On the Determination of the Public Debt. *Journal of Political Economy* 87: 5, 940–971.
- Cass, D. (1965) Optimum Growth in an Aggregative Model of Capital Accumulation. *The Review of Economic Studies* 32: 3, 233–240.
- Devereux, M. B. and D. R. Love (1995) The Dynamic Effects of Government Spending Policies in a Two-Sector Endogenous Growth Model. *Journal of Money, Credit and Banking* 27:1, 232–256.
- Dickey, D. A. and W. A. Fuller (1979) Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association* 74, 427–431.
- Elliott, G., J. R. Thomas, and H. S. James (1996) Efficient Tests for an Autoregressive Unit Root. *Econometrica* 64, 813–836.
- Evans, P. (1997) Government Consumption and Growth. *Economic Inquiry* 35, 209–217.
- Gomme, P. (1993) Money and Growth Revisited: Measuring the Costs of Inflation in an Endogenous Growth Model. *Journal of Monetary Economics* 32, 51–77.
- Jones, C. I. (1995) Time Series Tests of Endogenous Growth Models. *The Quarterly Journal of Economics* 110: 2, 495–525.
- Jones, Larry E., R. E. Manuelli, and P. E. Rossi (1993) Optimal Taxation in Models of Endogenous Growth. *The Journal of Political Economy* 101: 3, 485–517.
- Karras, G. (1999) Taxes and Growth Testing the Neoclassical and Endogenous Growth Models. *Contemporary Economic Policy* 17:3, 177–188.
- Kim, S. J. (1992) Taxes, Growth and Welfare in an Endogenous Growth Model. PhD dissertation.
- Kocherlakota, N. R. and K. M. Yi (1996) A Simple Time Series Test of Endogenous vs. Exogenous Growth Models: An Application to the United States. *Review of Economics and Statistics* 78, 126–134.
- Kocherlakota, N. R. and K. M. Yi (1997) Is There Endogenous Long-run Growth? Evidence from the United States and the United Kingdom. *Journal of Money, Credit and Banking* 29: 2, 235–262.
- Lucas (1988) On the Mechanisms of Economic Development. *Journal of Monetary Economics*. 22, 3–42.
- McCallum, B. T. (1996) Neoclassical vs. Endogenous Growth Analysis: An Overview. *FRB Richmond Economic Quarterly* 82:4.
- Padda, Ihtsham Ul Haq (2009) Have Developing Countries been Seeking to Minimise the Welfare Cost of Taxation? Evidence from Barro's Tax Smoothing Hypothesis. PhD Dissertation. Federal Urdu University of Arts, Science and Technology, Islamabad.
- Ramsey, F. P. (1928) A Mathematical Theory of Saving. *The Economic Journal*. 38: 152, 543–559.
- Rebelo, S. (1991) Long-run Policy Analysis and Long-run Growth. *The Journal of Political Economy* 99:3, 500–521.
- Romer, P. M. (1986) Increasing Returns and Long-Run Growth. *The Journal of Political Economy* 94: 5, 1002–1037.
- Romer, P. M. (1990) Endogenous Technological Change. *The Journal of Political Economy* 98:5, S71–S102.

- Siddiqui, R. (2006) The Pakistani Economy: Performance and Challenges. *The Muslim World* 96, 251–268.
- Solow, R. M. (1956) A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70, 65–94.
- Scully, G. W. (2006) Taxes and Economic Growth. National Center for Policy Analysis. (NCPA Policy Report No. 292).
- Tomljanocich, M. (2004) The Role of State Fiscal Policy in State Economic Growth *Contemporary Economic Policy* 22: 3, 318–330.
- World Bank (2009) *World Development Indicators*. Washington, DC: World Bank.

## **Dynamic Effects of Changes in Government Spending in Pakistan's Economy**

ATTIYA YASMIN JAVID and UMAIMA ARIF

In recent prolonged recessions across the world, nearly every government in Asia, Europe, and North America is pursuing some vigorous form of fiscal stimulus policy, defined generally as debt-financed consumer-oriented tax cuts and substantial increases in government spending to push up aggregate demand in the hope that economic output, jobs, and incomes follow [Foster (2009)].

The effect of an increase in government spending on macroeconomic activities and the way these effects are transmitted have long been a subject of analysis and debate as two different theories have been proceeded to elaborate this issue. The main reason for the disparity between these two theories lies in how the consumer is implicit to behave in each case. The Keynesian framework treats expansionary fiscal policy as exclusively an exogenous increase in aggregate demand making demand-constraint firms to sell more output that ultimately boost income, employment and through multiplier effect enhance consumption as short run phenomena of price stickiness make output demand determined prices to alter steadily and firms mainly follow the cost push from increasing wages. The consumers in this model are assumed to behave in non-Ricardian fashion with consumption depending on their current disposable income and not on their lifetime income. Therefore, the effect of increase in government spending depends on the way it is being financed with the multiplier escalating with the size of deficit finance.

Contrary to it, the real dynamic general equilibrium model, [Baxter and King (1993)] with optimising agents and flexible prices, takes fiscal policy as influencing the economy through negative wealth effect commenced by the tax financing of increasing government expenditure. The model featured infinitely lived Ricardian household with consumption decisions determined by intertemporal budget constraint at any point in time. This phenomenon would provoke a fall in private consumption coupled with an increase in labour supply therefore results in raising output and employment whereas lowering wages. The wealth effect analysis differs from the aggregate demand effect analysis since equilibrium output and employment brought about by fiscal policy results from the optimal response of household labour supply thus with respect to wages and private consumption the findings of neoclassical general equilibrium framework are in contrast with Keynesian framework.

Attiya Yasmin Javid <attiyajavid@pide.org.pk> is Professor at the Pakistan Institute of Development Economics, Islamabad. Umaima Arif <umaima@pide.org.pk> is Staff Economist at the Pakistan Institute of Development Economics, Islamabad.

The empirical facts are not supportive in discriminating the two theories since there are two set of studies implying contrary and opposing results. The reason might be that the method of financing: taxes, borrowing domestically or from abroad, and monetisation of debt may also determine the outcome of fiscal policy. The approach of raising taxes and growing concerns about increasing public debt are not political popular, therefore, the central bank accommodates the increased government spending by issuing more credit, creating an increase in the monetary base. The effectiveness of fiscal policy is highly dependent on the effects of government spending in crowding out private spending. In theory, a dollar increase in government spending that is financed by an equal increase in taxes increases aggregate demand and, hence, economic activity, i.e., the balanced budget multiplier is positive. An increase in government spending that is not matched by an equal increase in taxes creates budget deficit as in case of Pakistan. The deficit is financed by government debt and it has important implications for economic activity. Specifically, the effectiveness of an increase in government spending is less likely to be enhanced, the more the government debt and the higher the degree of monetisation. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt as in Ricardian case. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. Higher the public debt, the higher is the risk premia in interest rates. In addition, financing government spending by borrowing from domestic financial institutions decreases available credit for the private sector. Accordingly, higher government spending is bound to crowd out private investment.

Government spending in the Pakistan has risen from 6.6 billion in 1980-81 to 260.9 billion rupees in 1990-91 and it increase to 2279 billion rupees in 2007-08. The spending drift has been accompanied by deficits and a growing public debt 1715 billion rupees in 2001-02 to 3209 billion in 2007-08. The government spending changes often lead to significant shifts in macro-economic variables.

The present study investigates the effects of government spending on macroeconomic variables by estimating Vector Autoregressive model. The impulse response functions are presented to analyse the transmission mechanism for the variables including government spending per capita, GDP per capita, consumption per capita, debt to GDP ratio, long term interest rate and real exchange rate. The effects of fiscal shocks are examined keeping track of the debt dynamics that arises following a fiscal shock, i.e., increase in government spending and allowing for the possibility that taxes, spending and interest rates might respond to the level of the debt, as it evolves over time. The present study contributes to the existing empirical literature by characterising the dynamic effects of shocks in government spending for a developing economy. The debt to GDP is included as a feedback to obtain accurate responses to the dynamic effects of fiscal shocks as discussed in the conventional economics.

The study is organises as follows. Section 2 discusses the theoretical and empirical literature in this area briefly. The methodology and data is presented in Section 3. The empirical results are discussed in Section 4 and last section concludes the study.

## 2. LITERATURE REVIEW

Extensive theoretical literature investigates and scrutinises the consequences of government spending on the macro economy. Neoclassical framework developed by Hall (1980), Baro (1981, 1987), Aschauer and Greenwood (1985), Mankiw (1987) is the pioneer work to study the effects of fiscal policy on the macroeconomic variables. Later on neoclassical growth model is further extended by Aiyagari, Christiano, and Eichenbaum (1990) and Baxter and King (1993) by incorporating a government sector evaluating the consequences of a government expenditure shock. These models explored that government expenditure augmentation generates a negative wealth effect for the household which results in reducing consumption and increasing labour supply. In addition, enlarged labour supply stimulates real wages to shrink and interest rates to rise.

The neoclassical growth model is further extended by introducing market imperfections, increasing returns to scale as well as monopolistic and oligopolistic competition [Rotemberg and Woodford (1992) and Devereux, Head, and Lapham (1996)] asserting that government spending shock boost demand for goods which ultimately increase labour demand and hence real wages. Galí, Lopez-Salido, and Valles (2007) broaden the New Keynesian model through incorporating consumers who neither borrow nor save and consume the disposable income each period, consequently do not reduce consumption in response to a positive government expenditure shock. The government spending modelling with oligopolistic pricing and monopolistic competition taking increasing returns shows that an increase in government spending can enhance productivity, wages, and private consumption [Rotemberg and Woodford (1992) Devereux, Head, and Lapham (1996)]. The evidence postulates that an increase in military spending increases output more than hours and hence raises rather than lowers the real wage. The outcome however contradicts the predictions of the neoclassical model.

The empirical consequences of government spending shocks have not gained significant consideration in spite of extensive theoretical work on government spending. The studies commenced for the assessment of these insights consist of the studies on the comparative results of permanent and impermanent alteration in government spending [Barro (1981)], the connection of government spending with consumption or Solow residuals [Hall (1980)]; or the impact of government spending on real interest rates [Barro (1987, 1981); Evans (1987) and Plosser (1987)].

A small number of studies are conducted to examine the consequences of government spending shocks on the macroeconomic behaviour. The existing empirical studies categorise dual results determined by the particular credentials plan of the government expenditure shock. Ramey and Shapiro (1998) using descriptive approach to identify the Vector Autoregressive (VAR) model work out large military build-ups in the US, the Korean war, the Vietnam war and the Carter-Reagan build-up as abrupt and unanticipated boost in government expenditures. The macroeconomic variables respond to those events in standard way as output and hours rise and consumption and real wages fall. Eichenbaum and Fisher (2005) use an analogous methodology to approximate the impulse responses of macroeconomic variables to unanticipated alteration in government expenditure and contrast those to impulse responses approximated by standard neoclassical model. The empirical evidence shows that hours worked goes up, investment

shortly enlarge, whereas real wages and consumption decline hence implying that the standard neoclassic model can report plausibly well for the consequences of unanticipated changes in fiscal policy. An analogous evidence is drained by Edelberg, Eichenbaum, and Fisher (1999), who transform a neoclassic growth model by evaluating two type of capital, non-residential and residential capital. Blanchard and Perotti (2002) using structural VAR approach to explore government expenditure shock necessitate fiscal policy variables not to react instantly to other innovations in the economy; specifically they make use of the recursiveness assumption. Their conclusions confirm and substantiate the results of Ramey and Shapiro (1998) pertaining to output and hours worked but are contradictory to consumption and real wages. Mountford and Uhlig (2005) adopting a structural VAR, but without considering any timing restriction make use of sign restrictions to limit the reactions of fiscal variables, whereas the reactions of other macroeconomic variables are left without any restriction. In addition they permit for a pre-announcement of fiscal policy shocks and their findings corroborate the results of Blanchard and Perotti (2002) apart from consumption which shows a weak positive response.

Ravn, Schmitt-Grohé, and Uribe (2007) discharge Ramey's critique towards the usage of structural VAR models as they argued that shocks are by assumption orthogonal to the information set and accordingly make out a structural VAR as in Blanchard and Perotti (2002). Chung and Leeper (2007) highlights the significance of the intertemporal government budget constraint for a structural VAR analysis so as to approximate reduced form shocks that can be plot into structural innovations, government debt and private investment. Leeper, Walker, and Yang (2008) dealing with the matter of exploring pre-announced tax shocks assert that the estimated impulse response functions are biased due to a variation in the information set of the agents in the economy and the information set of the econometrician intending to approximate the effects of pre-announced tax shocks.

Kriwoluzky (2009) estimates a structural VAR considering the pre-announced nature of fiscal shock by checking the signs of important variables like investment whereas response of other variables of interest is left open. The study considers the criticism of Leeper, Walker, and Yang (2008) regarding the estimation of structural VAR as the restrictions are directly applied on the impulse response functions of the VAR thus necessitating them to be well-matched with the impulse response functions of the dynamic stochastic general equilibrium (DSGE) model with forward looking agents leading to closing the gap in the information sets of the econometrician and agents of the economy.

As pointed out by Ramey (2008) another issue that needs to be considered is the composition of government expenditures and what component is used in the estimation as abstracting from government transfers, government expenditures are defined as the summation of government investment expenditures and government consumption expenditures and both categories have different implications for the variables of interest. Turnovsky and Fisher (1995) pointed out that an increase in government investment expenditures enhances productivity and consequently private consumption and real wages. Involving government investment expenditures would therefore support Keynesian outcome, that is to say an increase in both variables of interest and make impure the analysis. Furthermore, the study pointed out that quantitatively government

consumption expenditure is more relevant as they are about five times larger than the government investment expenditure since the 1970s.

### 3. METHODOLOGY AND DATA

The identification of fiscal shocks and for the empirical characterisation of fiscal policy transmission, there are three distinct approaches that have been widely employed in the literature. Blanchard and Perotti (2002) apply a structural VAR approach; government spending is assumed to be predetermined within the quarter and identification is achieved by restricting the contemporaneous relationships between the fiscal and other variables included in the VAR. Under this assumption, the reduced-form residuals from a regression of government spending on the lags of all other variables in the VAR are identified as structural government spending shocks. Ramey and Shapiro (1998) identify the dates at which the relevant military initiatives were first announced and trace the dynamic response of the economy to these announcements using dummy variables arguing that such events are truly exogenous source of variation in government spending. Mountford and Uhlig (2009), Romer and Romer (2009) and Enders, Müller, and Scholl (2008) have used a narrative approach which is based on sign restrictions to identify shocks.

Following Blanchard and Perotti (2002) and Favero (2007); Corsetti, *et al.* (2009), the present study adopts unrestricted VAR analysis. Let  $y_t$  a vector of macro variables: aggregate output, and private consumption both in logs and per-capita terms; a measure of the ex-ante long-term real interest rate and the log of the real exchange rate; the public debt scaled by GDP, the following model is estimated. The study of the dynamic response of macroeconomic variables to shifts in fiscal policy is typically carried out estimating a VAR of the following form:

$$Y_t = \sum_{i=1}^k C_i Y_{t-i} + u_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where  $Y_t \equiv [g_t, con_t, int_t, er_t, debt_t]$  is five dimensional vector in logarithm of per capita government spending ( $g_t$ ), per capita private consumption ( $con_t$ ), long run interest rate ( $int_t$ ), real exchange rate ( $er_t$ ) and debt to GDP ratio ( $debt_t$ ). The ordering of the variables are very important in VAR models. Government spending is ordered first as it does not react contemporaneously to shocks to other variables in the system. The changes in government spending, unlike changes in taxes, are largely unrelated to the business cycle. Therefore, it seems plausible to assume that government spending is not affected contemporaneously by shocks originating in the private sector. Private consumption does not react contemporaneously to the shocks in tax, interest rate and exchange rate but it is affected contemporaneously by spending shocks. Taxes do not react contemporaneously to interest rate shocks, but are affected contemporaneously by government spending, private consumption shocks, and the interest rate and exchange rate are affected contemporaneously by all shocks in the system. Ordering the debt to GDP comes last can justified on the grounds of debt is set as a function of all variables in the vector of variables.

It is expected that consumers respond differently to an innovation in government spending depending on whether or not they believe government to meet its intertemporal budget constraint by adjusting taxes and/or spending in the future. The dynamic behaviour of taxes and spending following a fiscal shock depends on the debt stabilisation motive in the fiscal reaction function and create heterogeneity of impulse responses to fiscal shocks [Favero (2007)].<sup>1</sup> Romer and Romer (2007) also find that the effect of tax shock on output depends on whether the change in taxes is motivated by the government's desire to stabilise the debt, or is unrelated to the stance of fiscal policy.

A feedback from the level of debt ratio to taxes and government spending is necessary for stability of the debt, unless the rate of growth of the economy is exactly equal to the average cost of financing the debt. Such a feedback is a feature of the Pakistani fiscal data as is revealed by a positive correlation between the government surplus-to-GDP ratio and the government debt-to-GDP ratio [Javid, Arif, and Sattar (2008)]. The interest rates, an important variable in the transmission of fiscal shocks, depend on future expected monetary policy and on the risk premium: both may be affected by the debt dynamics. It is expected that the impact of a given fiscal shock on interest rates will be very different depending on whether the shock produces a path of debt that is stable or not [Favero (2007)].

## Data

The data series for this study are extracted from International Financial Statistics (IFS) CD-ROM (2008) issued by *International Monetary Fund, Pakistan Statistical Year Book 2008, Pakistan Economic Survey* (Various Issues). The data set includes government expenditure, private consumption, long-term real interest rate and real exchange rate; tax and public debt scaled by GDP for the period 1971–2008. All data series are converted in to year 2000 rupees.

## 4. EMPIRICAL RESULTS

To analyse the macroeconomic effect of government spending changes methodology suggested by Favero (2007) and Perotti (2007) is adopted using the Pakistani data for the period 1971–2008. The systematic relationship between government spending and macroeconomic variables are estimated by an unrestricted Vector Autoregressive Model (VAR) model how government spending innovations are transmitted to consumption per capita, output per capita, long run interest rate, real exchange rate and debt to GDP ratio. The advantage of this methodology is that it only requires the estimation of a relatively small number of parameters and it does not impose any restrictions on the economy. The VAR models are characterise with no a priori distinction between endogenous and exogenous variables and forecast performance is better than the one obtained by simultaneous equation model.

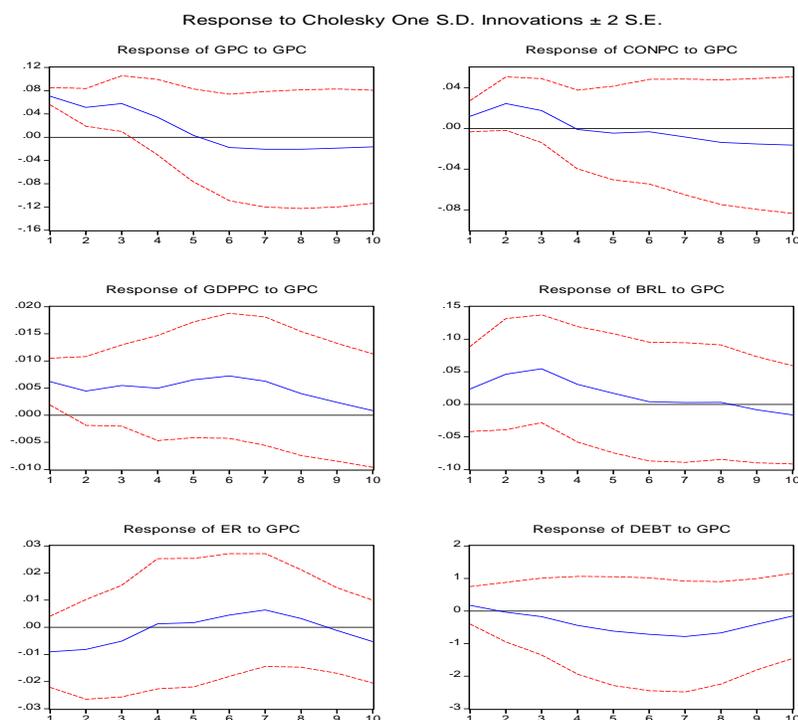
<sup>1</sup>For instance, Perotti (2007) finds that the effect on US consumption of an increase in government spending is positive and statistically significant in the 1960s and 1970s, but became insignificant in the 1980s and 1990s. Favero (2007) finds a sharp difference in the way US fiscal authorities responded to the accumulation of debt in the two samples as explanation. Since the early 1980s, following a shock to spending or taxes, both fiscal policy instruments are adjusted over time in order to stabilise the debt ratio. This does not appear to have happened in the 1960s and 1970s, when there is no evidence of a stabilising response of fiscal policy.

For estimation, first step is to test the stationarity of each variable. The Augmented Dickey-Fuller (ADF) unit root test is applied on government spending, consumption, debt to GDP, long-term interest rate and real exchange rate with a constant and a trend. The ADF test results show the acceptance of the unit root in all series, that is, all the series are non-stationary at level, which is indicative of I(1) process, and therefore all the variables are taken in first difference for further analysis.

The VAR model includes five variables: government spending, aggregate output, and private consumption, all in logs and per-capita terms; the log of long-term real interest rate, real exchange rate; debt to GDP ratio following Chung and Leeper (2007), Favero (2007), Coretti, *et al.* (2008). The three years lags are selected for VAR model estimation based on the Akikia Information Criteria. The VAR allows to identify how the government spending shock influences macroeconomic variables by estimating the impulse response functions and variance decomposition. The two set of impulse responses are used in the model one considering the debt to finance the deficit in face of rising government spending and other omitting debt because the VAR methodology reveals possible differences in the results.

The following Figure 1 displays the impulse response function using VAR model, which provides an empirical exploration of the possibility of an expansionary fiscal contraction.

**Fig. 1. Dynamic Impact of Government Spending Shock on Macro-variables**



*Note:* The VAR model is estimated with three lags and a constant. The ordering is government spending, consumption output, interest rate, exchange rate and debt to GDP ratio.

As figure shows government spending has a negative impact on consumption, output (GDP) and exchange rate. The government spending reacts strongly negative and persistently to its own shock Blanchard and Perotti (2002) find the same result. These results suggest that the impulse responses of consumption to a government expenditure shock increase instantaneously for one year but decline thereafter and one can say that the standard neoclassic model can account reasonably well for the effects of fiscal policy shocks in Pakistan's economy during 1970–2008. In those models, an increase in government expenditures creates a negative wealth effect for the households reduce consumption and increase labour supply. The increased labour supply induces real wages to decrease and interest rates to increase. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt as Ricardian case suggests. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The higher the public debt, the higher is the risk premia in interest rates. In addition, financing government spending by borrowing from domestic financial institutions decreases available credit for the private sector. Accordingly, higher government spending is bound to crowd out private investment.

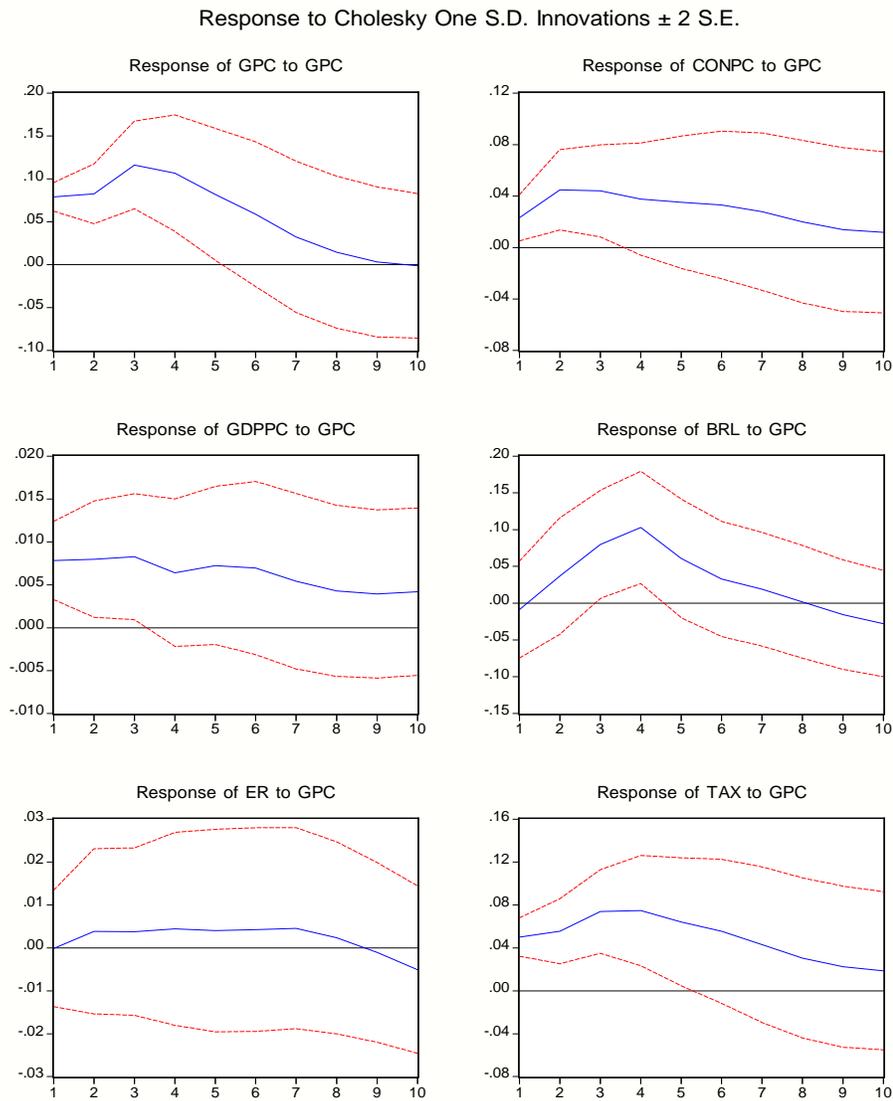
An expansion in government spending leads to rise in the real interest rate and an immediate increase in consumption and output. In the long run, there is a permanently lower interest rate, and a lower capital stock, employment, and output. Higher interest rate crowds-out private investment and moderates the effect of government spending on aggregate demand in short run in case of Pakistan's economy. In the long run this moderating effect has negative impact on interest rate. The empirical evidence suggests that in short period there is stimulating effect of expansionary fiscal policy, it is only one side which correctly describes that deficit financing can raise the level of demand in part of the economy and ignores government borrowing to finance deficit spending that automatically reduces demand elsewhere [Foster (2007)]. Cagon, *et al.* (2009) find the impact of first year of spending expansion is very small and multiplier is less than one as consumption and investment crowd out. An unexpected increase in government spending, beyond what it would occur through automatic stabiliser, weakly stimulate the economy, that is 1 percent increase in government spending increase output by 1.3 percent after one year [Moutford and Uhlig (2002)]. A number of factors underlie the crowding out effect in the face of fiscal spending. Higher interest sensitivity of investment demand increases crowding out. An accommodating monetary policy would offset the tendency of the interest rate to rise following an increase in government spending and reduce the possibility of crowding out. Edelberg, Eichenbaum, and Fisher (1999), Eichenbaum and Fisher (2005), Corsetti, *et al.* (2009) confirm our finding by showing that hours worked go up, investment shortly enlarge, whereas real wages and consumption decline hence implying that the standard neoclassic model can report plausibly well for the consequences of unanticipated changes in fiscal policy. Blanchard and Perotti (2002), Ramey and Shapiro (1998) and several other subsequent studies find contradictory results suggest that fiscal expansion boost private consumption and output which is consistent with Keynesian analysis and contradicts the neoclassical as well as standard new Keynesian analysis.

The result of impulse response indicate the real exchange rate tend to appreciate in response to rise in government spending. This finding is according to recent open economy literature but also with the conventional literature Mundell-Fleming model of Dornbush (1980). This finding is in opposite of some studies for example Kim and Robini (2008), Monachilli and Perotti (2006), Raven, Schmitt-Grohe, and Uribe (2007) document depreciation of real exchange rate as result of fiscal expansionary shock. Furthermore, to finance deficit in face of rising government spending by debt, in the short run debt to GDP decline whereas in the long run stabilisation effect of debt occurs and debt to GDP ratio start rising [Favero (2007)]. The interest rates increase in the face of expansionary fiscal spending, as government debt builds up with fiscal expansion, the rising risk of default or increasing inflation risk further reinforce crowding out through interest rates. Therefore, interest rates are likely to be more flexible to adjust upward in the face of expansionary shocks to government spending for period of three years. An increase in government spending that is financed by domestic borrowing is expected to result in, however, a smaller multiplier. The borrowing increases the demand for the limited pool of available credit, increasing pressure on the interest rate. Higher interest sensitivity of investment demand increases crowding out. An open economy permits government to finance its deficit by importing saving, if in turn not matched by an increase in the imports of goods and services to preserve the balance of payments. Therefore, the increase in domestic demand due to deficit spending is fully offset by reduction in demand arising from an increase in exports [Foster (2009)].

In the empirical literature there are other explanations of negative effect of expansionary government spending on consumption and output. Bailey (1971) indicated that there might be a degree of substitutability between government spending and private consumption. Barro (1981) incorporated it into a general model to examine the direct effect of government purchases of goods and services on consumption utility. Kormendi (1983) and Aschauer (1985) applied the permanent-income approach and find a significant degree of substitutability between private consumption and government spending for the United States. Ahmed (1986) estimates the effects of UK government consumption in an intertemporal substitution model and finds that government expenditures tend to crowd out private consumption. Aiyagari, Rao, Christiano, and Eichenbaum (1990) and Baxter and King (1993) explored the effect of government spending shocks on various economic aggregates in a one sector neoclassical growth model with constant returns to scale and variable labour supply and conclude that increases in government spending significantly led to a decline in private consumption.

When in the VAR model tax to GDP ratio is included the results remains the same as shown in Figure 2. The tax shows a negative response to innovation in government spending. Blanchard and Perotti (2002) also find that tax respond positively to government spending shock. The positive reaction of expansionary shock on tax and a negative effect on debt seems to indicate evidence of Ricardian behaviour. An increase in tax revenue signals a reduction in future government liabilities and therefore triggers a positive wealth effect. On the other hand an increase in government debt causes a reduction in the present value of future income and therefore reduces current consumption.

**Fig. 2. Dynamic Impact of Government Spending Shock on Macro-variables**



*Note:* The VAR model is estimated with three lags and a constant. The ordering is government spending, consumption output, interest rate, exchange rate and tax to GDP ratio.

The Figure A1 in Appendix displays the impulse response function using VAR model. Blanchard and Protti (2002) and several other subsequent studies suggest that fiscal expansion boost private consumption and output. This finding is consistent with Keynesian analysis, this finding contradicts the neoclassical as well as standard new Keynesian analysis which suggests that higher government spending have a negative wealth shock for private consumption facing a large tax burden, consumers work more and consume less. The result of impulse response indicate the real exchange rate tend to

depreciate in response to rise in government spending. The other empirical findings support this result, for example Kim and Robini (2008), Monachilli and Perotti (2006), Raven, Schmitt-Grohe and Uribe (2007) document depreciation of real exchange rate as result of fiscal expansionary shock. This finding is in opposite of recent open economy literature but also with the conventional literature. The empirical investigation demonstrating variation in the effects of expansionary shocks to fiscal spending not including the method of financing is called half story by Foster (2009). The method of financing in the face of positive government spending shocks is also important. The fiscal stimulus approach breaks down because the second half of the story is ignored, deficit financing must be financed and financing carries budgetary consequences and economic costs [Foster (2009)]. In addition, the effects of government spending may vary, however, with the source of financing.

The results in Figure A1 are supported by several empirical findings, e.g., Karras (1994) examines the change of private consumption in response to increases in government spending across a number of countries and finds that public and private consumption are better described as complementary rather as substitutes. In other words, in the aggregate, they are best described as complementary goods in the sense that an increase in government spending tends to raise the marginal utility of private consumption. Based on the idea of complementarity between public and private consumption involves public spending which complements private spending include defense public order and justice [Ganelli and Tervala (2009)]. Devereux, Allen, and Beverly (1996) examine the impact of government spending shocks and found that an increase in government consumption generates an endogenous rise in aggregate productivity. The increase in productivity raises the real wage sufficiently that there is a substitution away from leisure and into consumption. Thus, an increase in government expenditures leads to an increase in private consumption. These findings imply that private consumption cannot be responsible for any crowding-out effects that government spending might have on aggregate demand. On the contrary, private consumption is probably crowded-in.

The decomposition of government spending variability is reported in Table 1. The results suggest that in case of Pakistan, variability is mostly explained by debt to GDP

Table 1

*Variance Decomposition of Government Spending*

| Period | GPC     | CONPC   | GDPPC   | BRL      | ER       | DEBT    |
|--------|---------|---------|---------|----------|----------|---------|
| 1      | 0.06883 | 0.01952 | 0.00718 | -0.05489 | -0.00894 | 0.21090 |
| 2      | 0.06191 | 0.03419 | 0.00470 | 0.00161  | -0.01018 | 0.13382 |
| 3      | 0.07244 | 0.02867 | 0.00383 | 0.03026  | -0.01108 | 0.22877 |
| 4      | 0.06142 | 0.01808 | 0.00338 | 0.06541  | -0.00793 | 0.30341 |
| 5      | 0.03193 | 0.01766 | 0.00511 | 0.02452  | -0.00626 | 0.24789 |
| 6      | 0.01481 | 0.01981 | 0.00592 | 0.00876  | -0.00341 | 0.16529 |
| 7      | 0.00339 | 0.01798 | 0.00514 | 0.00413  | 0.00067  | 0.07557 |
| 8      | 0.00513 | 0.01425 | 0.00474 | 0.00236  | 0.00141  | 0.11607 |
| 9      | 0.00732 | 0.01298 | 0.00455 | -0.00233 | 0.00009  | 0.20408 |
| 10     | 0.01142 | 0.01418 | 0.00432 | -0.01036 | -0.00310 | 0.31698 |

Cholesky Ordering: GPC CONPC GDPPC BRL ER DEBT.

Table 2

*Variance Decomposition of Government Spending*

| Period | GPC      | CONPC   | GDPPC   | BRL      | ER       | TAX     |
|--------|----------|---------|---------|----------|----------|---------|
| 1      | 0.07900  | 0.02317 | 0.00782 | -0.00866 | -0.00014 | 0.05006 |
| 2      | 0.08255  | 0.04474 | 0.00798 | 0.03692  | 0.00382  | 0.05546 |
| 3      | 0.11614  | 0.04401 | 0.00828 | 0.07983  | 0.00376  | 0.07387 |
| 4      | 0.10667  | 0.03760 | 0.00640 | 0.10291  | 0.00443  | 0.07468 |
| 5      | 0.08191  | 0.03514 | 0.00724 | 0.06072  | 0.00399  | 0.06419 |
| 6      | 0.05886  | 0.03307 | 0.00695 | 0.03283  | 0.00425  | 0.05542 |
| 7      | 0.03229  | 0.02791 | 0.00541 | 0.01893  | 0.00456  | 0.04291 |
| 8      | 0.01447  | 0.02003 | 0.00428 | 0.00174  | 0.00232  | 0.03056 |
| 9      | 0.00320  | 0.01389 | 0.00393 | -0.01561 | -0.00106 | 0.02241 |
| 10     | -0.00137 | 0.01174 | 0.00420 | -0.02788 | -0.00510 | 0.01855 |

Cholesky Ordering: GPC CONPC GDPPC BRL ER TAX.

ratio suggesting that as increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The government spending leads to increase in first year and declining effect thereafter on consumption where as output continuously negative trend.

## 5. CONCLUSION

The effects of changes in government spending on aggregate economic activity and the way these effects transmitted is central issue in macroeconomics on which there is no widespread agreement. The present study presents a dynamic analysis of the hypothesis that fiscal spending expansion is expansionary during the period 1970–2008. To analyse the transmission mechanism of government spending innovations, the impulse response functions are reported for following five variables: government spending per capita, GDP per capita, consumption per capita, debt to GDP ratio, long-term interest rate and real exchange rate. The consumption and output respond negatively to the innovation in government spending which is consistent with the standard neoclassic model. The interest rates increase in the face of expansionary fiscal spending. As government debt builds up with fiscal expansion, the rising risk of default or increasing inflation risk reinforce crowding out through interest rates. The real exchange rate tends to appreciate in response to rise in government spending. This finding is according to recent open economy literature but also with the conventional literature Mundell-Fleming model of Dornbush (1980). The empirical investigation demonstrates that the effects of government spending also vary with the source of financing. To finance deficit in face of rising government spending by debt, in the short run debt to GDP decline whereas in the long run stabilisation effect of debt occurs and debt to GDP ratio start rising [Favero (2007)]. The positive reaction of expansionary shock on tax and a negative effect on debt

seems to indicate evidence of Ricardian behaviour. An increase in tax revenue signals a reduction in future government liabilities and therefore triggers a positive wealth effect. On the other hand an increase in government debt causes a reduction in the present value of future income and therefore reduces current consumption.

There are certain limitations of the unrestricted VAR approach. It would be appropriate to apply restricted VAR techniques and use the restrictions derived by the dynamic stochastic general equilibrium (DSGE) model. Further disaggregation of government spending might be needed, to in depth analysis of the issue. The use of different econometric tests and approaches improve the reliability of the results regarding the effects of changes in government spending on aggregate economic activity and how these effects are transmitted.

APPENDIX

Fig. A1. Dynamic Impact of Government Spending Shock

Response to Cholesky One S.D. Innovations  $\pm$  2 S.E.

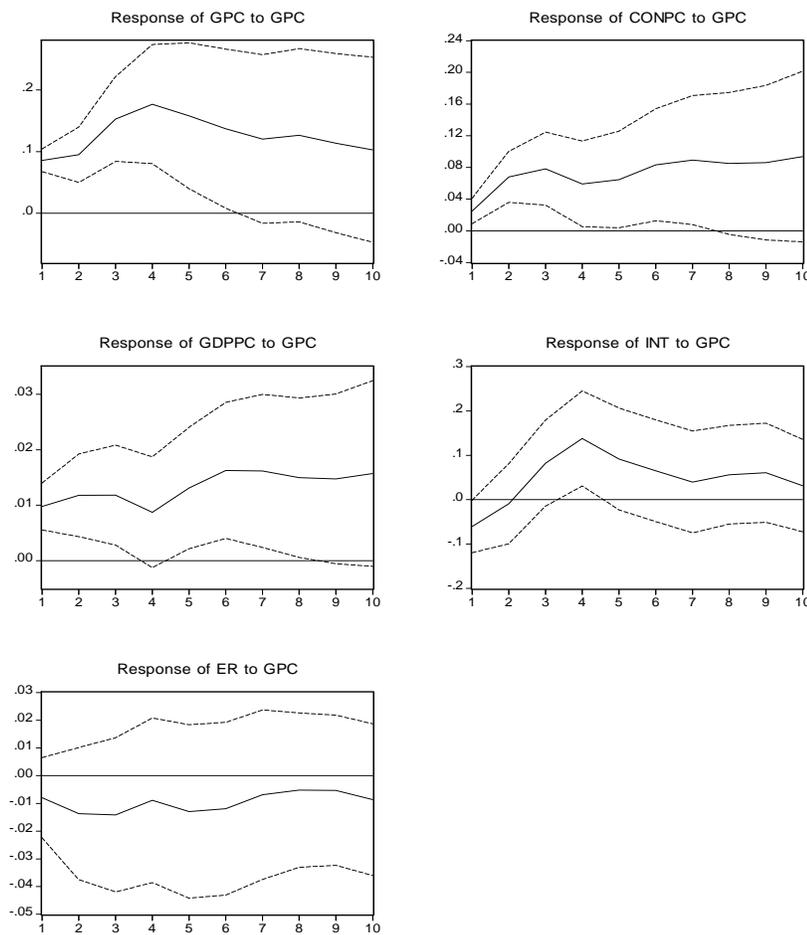


Table A 1

*Stationary Test*

|          | Level | First Difference |
|----------|-------|------------------|
| conpc    | 0.902 | -3.93*           |
| gdppc    | -2.06 | -3.44*           |
| gpc      | -0.49 | 14.60*           |
| Debt/GDP | -1.76 | -2.72**          |
| er       | -0.23 | -5.37*           |
| int      | -2.13 | -6.69*           |
| tax      | -1.42 | -4.43*           |

**REFERENCES**

- Ahmed, S. (1986) Temporary and Permanent Government Spending in an Open Economy: Some Evidence for the United Kingdom. *Journal of Monetary Economics* 17, 197–224.
- Aiyagari, S. R., L. J. Christiano, and M. Eichenbaum (1990) The Output, Employment, and Interest Rate Effects of Government Consumption. Discussion Paper / Institute for Empirical Macroeconomics 25, Federal Reserve Bank of Minneapolis.
- Aschauer, and J. Greenwood (1985) Macroeconomic Effects of Fiscal Policy. *Carnegie-Rochester Conference Series on Public Policy*, 91–138.
- Aschauer, D. A. (1985) Fiscal Policy and Aggregate Demand. *American Economic Review* 75, 117–127.
- Bailey, M. J. (1971) *National Income and the Price Level*. New York: McGraw-Hill.
- Barro, R. J. (1981) Output Effects of Government Purchases. *Journal of Political Economy* 89:6, 1086–1121.
- Barro, R. J. (1987) Government Spending, Interest Rates, Prices, and Budget Deficits in the United Kingdom, 1701–1918. *Journal of Monetary Economics* 20:2, 221–247.
- Baxter, M. and R. King (1993) Fiscal Policy in General Equilibrium. *American Economic Review* 83, 315–339.
- Blanchard, Olivier and R. Perotti (2002) An Empirical Characterisation of the Dynamic Effects of Changes in Government Spending and Taxes on Output. *Quarterly Journal of Economics* 117:4, 1329–1368.
- Burnside, Craig, M. Eichenbaum, and J. D. M. Fisher (2003) Fiscal Shocks and Their Consequences. (NBER Working Paper No. 9772).
- Chung, H. and E. M. Leeper (2007) What Has Financed Government Debt? National Bureau of Economic Research, Inc. (NBER Working Papers 13425).
- Corsetti, Giancarlo, A. Meier, and G. Muiller (2009) Fiscal Stimulus with Spending Reversals. (IMF Working Paper, WP/09/106).
- Devereux, M. B., A. C. Head, and B. J. Lapham (1996) Monopolistic Competition, Increasing Returns, and the Effects of Government Spending. *Journal of Money, Credit and Banking* 28:2, 233–54.
- Devereux, M. B., C. H. Allen, and J. L. Beverly (1996) Monopolistic Competition, Increasing Returns, and the Effects of Government Spending. *Journal of Money, Credit and Banking* 28, 233–254.

- Devereux, M. B., C. H. Allen, and J. L. Beverly (1980) *Dornbusch Open Economy Macroeconomics*. New York: Basic Books.
- Edelberg, Wendy, Martin Eichenbaum, and Jonas Fisher (1999) Understanding the Effects of Shocks to Government Purchases. *Review of Economic Dynamics* 2, 166–206.
- Eichenbaum, M. and J. D. M. Fisher (2005) Fiscal Policy in the Aftermath of 9/11. *Journal of Money, Credit and Banking* 37, 1–22.
- Enders, Z. G., J. Müller, and A. Scholl (2008) How Do Fiscal and Technology Shocks Affect Real Exchange Rates? New Evidence for the U.S. (CFS Working Paper 2008-22).
- Evans, Paul (1987) Do Budget Deficits Raise Nominal Interest Rates? Evidence from Six Countries. *Journal of Monetary Economics* 20, 281–300.
- Fabio, Canova and Evi Pappa (2004) Does it Cost to be Virtuous? The Macroeconomic Effects of Fiscal Constraints. Department of Economics and Business, Universitat Pompeu Fabra. (Economics Working Papers 926).
- Fabio, Canova and Evi Pappa (2007) Price Differentials in Monetary Unions: The Role of Fiscal Shocks. *Economic Journal, Royal Economic Society* 117:520, 713–737.
- Favero, Carlo and Giavazzi Francesco (2007) Debt and the Effects of Fiscal Policy. National Bureau of Economic Research, Inc. (NBER Working Papers 12822).
- Foster, J. D. (2009) Keynesian Fiscal Stimulus Policies Stimulate Debt—Not the Economy. Heritage Foundation. (Backgrounder, No. 2302). [www.heritage.org/research/economy/bg2302.cfm](http://www.heritage.org/research/economy/bg2302.cfm) - United States
- Galí, Jordi, J. David López-Salido, and Javier Vallés (2004) Rule-of-Thumb Consumers and the Design of Interest Rate Rules. *Journal of Money, Credit and Banking* 36, 739–764.
- Ganelli, Giovanni and Juha Tervala (2009) Can Government Spending Increase Private Consumption? The Role of Complementarity. *Economics Letters* 103, 5–7.
- Hall, R. E. (1980) Labour Supply and Aggregate Fluctuations. National Bureau of Economic Research, Inc. (NBER Working Papers 0385).
- Javid, Attiya Yasmin, Umaima Arif, and Abdul Sattar (2008) Testing the Fiscal Theory of Price Level in Case of Pakistan. *The Pakistan Development Review* 49:4.
- Karras, G. (1994) Government Spending and Private Consumption: Some International Evidence. *Journal of Money, Credit and Banking* 26, 9–22.
- Kim, Soyung and Nouriel Roubini (2008) Twin Deficit or Twin Divergence? Fiscal Policy, Current Account, and Real Exchange Rate in the U.S. *Journal of International Economics* 74:2, 362–383.
- Kormendi, R. C. (1983) Government Debt, Government Spending, and Private Sector Behaviour. *American Economic Review* 73, 994–1010.
- Kriwoluzky, Alexander (2009) Pre-announcement and Timing—The Effects of a Government Expenditure Shock. European University Institute. (Economics Working Papers ECO2009/40).
- Kwiatkowski, Denis Phillips, C. B. Peter, Peter Schmidt, and Yongcheol Shin (1992) Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root. *Journal of Econometrics* 54, 159–178.
- Leeper, E. M., T. B. Walker, and S. C. S. Yang (2008) Fiscal Foresight: Analytics and Econometrics. National Bureau of Economic Research, Inc. (NBER Working Papers 14028).

- Mankiw, N. Gregory (2000) The Savers-Spenders Theory of Fiscal Policy. *American Economic Review* 90, 120–125.
- Mankiw, N. G. (1987) Government Purchases and Real Interest Rates. *Journal of Political Economy* 407–19.
- Monacelli, T., and R. Perotti (2006) Fiscal Policy, the Trade Balance and the Real Exchange Rate: Implications for International Risk Sharing. Manuscript, IGIER - Bocconi.
- Mountford, Andrew and H. Uhlig (2002) What Are the Effects of Fiscal Policy Shocks? (CEPR Discussion Paper 3338).
- Mountford, A. and H. Uhlig (2005) What are the Effects of Fiscal Policy Shocks. Humboldt-Universität, Berlin. (Discussion Paper 2005-039).
- Mountford, A. and H. Uhlig (2009) What are the Effects of Fiscal Policy Shocks? *Journal of Applied Econometrics* 24:6, 960–992.
- Perotti, R. (2002) Estimating the Effects of Fiscal Policy in OECD Countries. European University Institute. (Mimeographed).
- Perotti, Roberto (2007) In Search of the Transmission Mechanism of Fiscal Policy. *NBER Macroeconomic Annual*.
- Plosser, Charles I. (1987) Fiscal Policy and the Term Structure. *Journal of Monetary Economics* 20:2, 343–367.
- Prescott, E. C. (1986) Theory Ahead of Business Cycle Measurement. *Federal Reserve Bank of Minneapolis Quarterly Review* 10:4.
- Ramey, V. A. (2008) Identifying Government Spending Shocks: It's All in the Timing. University of California, San Diego. (Discussion Paper).
- Ramey, Valerie (2006) Identifying Government Spending Shocks: It's All in the Timing. (Mimeographed).
- Ramey, Valerie A. and Matthew D. Shapiro (1998) Costly Capital Reallocation and the Effects of Government Spending. *Carnegie-Rochester Conference Series on Public Policy* 48, 145–194.
- Ravn, M. O., S. Schmitt-Grohe, and M. Uribe (2007) Explaining the Effects of Government Spending Shocks on Consumption and the Real Exchange Rate. National Bureau of Economic Research, Inc. (NBER Working Papers 13328).
- Romer, Christina and David H. Romer (1989) Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz. In O. Blanchard, and S. Fischer (eds.) *NBER Macroeconomics Annual*. Cambridge, MIT Press. 4, 121–170.
- Romer, Christina and David H. Romer (2007) The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. (Mimeographed).
- Rotemberg, Julio J. and Michael Woodford (1992) Oligopolistic Pricing and the Effects of Aggregate Demand on Economic Activity. *Journal of Political Economy* 100, 1153–1207.
- Turnovsky, S. J. and W. H. Fisher (1995) The Composition of Government Expenditure and Its Consequences for Macroeconomic Performance. *Journal of Economic Dynamics and Control* 19, 747–786.

## **Conflict, Security, and Development**

KAMAL MATINUDDIN

### **INTRODUCTION**

The three words Conflict, Security and Development are very much inter-linked. Each one of these has a profound effect on the other two. When ever conflicts arise, be they between individuals, social groups or nations there is bound to be lack of security and when peace does not prevail economic development is hampered. If we look at these in the reverse order we find that in areas where economic development has not taken place over a long period of time, people tend to vent their frustration against each other and against those in authority. Consequently there is insecurity, law and order breaks down and conflicts arise.

Those who hold the reigns of government in their hands; those political parties who come to power and the armed forces who come to the aid of the civil administration must realise that prolong use of force by the militants and by the armed forces alike can tear the national fabric as under.

There is a need, therefore, to carry out a serious study of the co-relation between conflicts, security and economic development. This should be done both at the government and academic level. Facts and figures must be assembled; data regarding the loss of lives, destruction of property and infrastructure should be made available. Only then a realistic assessment of the impact insecurity is having on the economic health of the nation can be made. It has to be a holistic approach, including the rising population, illiteracy, unemployment, corruption and a host of other issues, which impact on the security of the state and its economic growth.

While both developing and developed nations are faced with the problem of finding the right mix between national defence and economic development it is the former i.e., the developing nations, which face the difficult choice of where should the priority lie, security or economic development. What is needed, therefore, is a realistic assessment of the various elements of national power, before carving up the cake.

National security has both an external and an internal dimension. Most often, and quite erroneously, developing states pay greater attention to the former and give little attention to the latter until domestic unrest goes out of hand—a situation that we are facing today in Pakistan.

### **Aim**

The aim of this paper is to analyse the changing nature of the threat currently posed to Pakistan. It looks into the causes of conflicts and it explores how instability and violence in a neighbouring country spills across the international borders. It studies the impact of the War on Terror on Pakistan's security and its economic development. Finally it focuses on what needs to be done to bring about internal harmony and reduce the external threat to Pakistan's integrity so that more resources are made available for improving the economic health of the nation.

### **Changing Nature of the Threat**

During the first fifty years of our independence the threat to our security and territorial integrity came from across our eastern border. Our staff colleges and military formations always depicted a threat from Foxland, code name for India, in their exercises. A two-front threat was never visualised till the strategic environment changed in the region.

Despite unfriendly relations with the rulers of Afghanistan we never needed to position troops in the tribal areas to meet a possible threat from our western neighbour. The Afghan *Jihad* against the Soviets in 1979 saw the arrival of thousands of foreigners, seeking monetary benefit and imbued with ideological fervour against a godless occupier of a Muslim nation. The ISI—supported, US-equipped and Saudi funded *Jihadis* eventually pushed the Soviet troops out of Afghanistan.

However, the civil war that followed the withdrawal of the Soviet forces from Afghanistan impacted on the security of our western frontier. ISI became the king maker in Afghanistan supporting the Taliban against the Northern Alliance. Unknowingly they pushed a segment of Afghan society into the lap of India, which seized an opportunity to enter into Afghanistan with full force. Events that followed 9/11 compelled Pakistan to look westwards as well, to safeguard its security against its enemy in the East.

The second factor, which changed the security landscape in the region was the US invasion of Afghanistan and President Parvez Musharraf's famous U turn. Friends had suddenly become enemies, but not in the eyes of those who still supported the anti-US Taliban in Afghanistan. This pitched the government against a section of its own people.

The nature of threat took on another shape when religious extremism and terrorism slowly began to eat into the body politic in Pakistan. The security agencies had now also to tackle an enemy within.

## **CAUSES AND NATURE OF CONFLICTS**

### **Religious Extremism**

With ninety percent of the citizens of Pakistan being Muslims, a common faith should have bound us together. Unfortunately, today, religion is being used to divide the nation into different sects. Instead of letting a hundred flowers bloom some of our clerics are spreading hatred against those who do not subscribe to their interpretation of Islamic values. The attack on the places of worship of another religious group shows how hatred is being spread in Pakistan against a section of the population, whose beliefs differ from the majority.

What are worthy religious leaders do not realise is that religion alone is not strong enough a fabric to withstand the pulls and pressures inherent in a multi ethnic, and multi lingual society. Rigidly held moral beliefs leads to intolerance and eventual conflicts against those who do not subscribe to their values. Where one group begins to believe that the values and lifestyle of the other group is fundamentally evil then clashes are bound to occur.

President Parvez Musharraf, while mentioning US concerns immediately after the attack on the Twin Towers stated that the US administration had convinced itself that religious extremism was a danger to the outside world.<sup>1</sup> Unfortunately it has also become a danger to Pakistan's security.

Ironically those religious parties who today are in the forefront of the movement of the imposition of the *Shariah* are the ones who opposed the very creation of Pakistan. The highly respected and internationally acclaimed scholar of Islam, Abul Ala Maudoodi, whose followers have established a large number of religious seminaries in Pakistan had no love lost for the founder of our country as he was not a practicing Muslim in his eyes.

In the initial years of our independence religion did not play a part in our official life. Nor did the government of the day concentrate on trying to make us better Muslims.

Extremist religious views began to appear in the corridors of power during the eleven years of dictatorial rule of General Zia ul Haq. It is he who introduced a number of changes in the Constitution in order to bring it in line with what he believed to be essential Islamic values. The proliferation of *madrassas* all over the country is due to the patronage they received from the head of the state.

### ***Madrassas***

*Madrassas* are not a new phenomenon. They have been in existence in the subcontinent for centuries. The western world continues to associate *madrassas* in Pakistan with militancy and believes that they breed terrorists. This is not a true reflection of these religious seminaries. The vast majority of them provide free boarding and lodging to hundreds of thousands of children from the poorer sections of our society. They are, therefore, in a way assisting the government in removing illiteracy, which because of lack of resources or incorrect priorities, is unable to fulfill its vision of education for all.

Of late, however, some *madrassas* have begun to spread hatred against those who do not conform to their understanding of Islam many of them have gone to the extent of supporting the use of force to achieve their political ends. Students leaving these *madrassas* go convinced that that their religion requires enforcing others to follow the correct path. It is they who fall a prey to religious extremism. There were 11, 805 *madrassas* in Pakistan in 2004 imparting education to 1, 088,801 students.<sup>2</sup> The figure has risen to around 20,000 *madrassas* in 2010. According to a very reliable source around 1 percent of the *madrassas* in Pakistan are imparting military training to their students.<sup>3</sup>

<sup>1</sup>President Parvez Musharraf's address to the senior officers at GHQ on 11 November 2001.

<sup>2</sup>Ministry of Interior, Government of Pakistan, as quoted in *Friday Times*, January 7-13 2004.

<sup>3</sup>Statement of Brigdier Cheema, former head of the National Security Cell in the Ministry of Interior, Government of Pakistan.

But what is more significant is the fact that these *madrassas* follow a very restricted syllabi, which is confined to religious subjects only. Students passing out of these schools are unable to get jobs in the open market. They are semi-educated and unemployed. Brought up in an atmosphere of intolerance and fed with hatred for the western nations, who have occupied Muslim lands, they become victims of those who want to wage wars, not only against America and Israel but also against their own government, who they believe to be toeing the American line.

### **Ethnicity**

Karachi, the commercial capital of Pakistan, has been ridden with ethnic strife since a long time. Target killings in that city have disrupted the life of its inhabitants. The Hazaras are demonstrating against the name of Kyber Pukhtunkwa, as they have been ignored in deciding a new name for the NWFP. Southern Punjab is clamouring for a new Sareki province. The Balochis, maintain that they are being denied their due share of the natural resources their province possesses.

When ethnic groups in any country begin to demand their rights and become violent in their protests. Conflicts between the government and the protestors occur. In South Asia intra-state conflicts have been raging since independence. They have now assumed dangerous proportions. India is faced with secessionist movements in North East India.

Sri Lankan Tamils had been struggling for an independent state in the north east corner of the island.

### **Territorial Dispute**

India and Pakistan have fought three wars and a number of low intensity conflicts over the disputed territory of Kashmir, since they gained their independence. Because of the lingering territorial dispute over Kashmir India and Pakistan are forced to maintain large armed forces. The rising defence expenditure in both countries is keeping millions of people in both countries below the poverty line.

### **Lack of Trust**

There is a lack of trust between the two rival nations in the subcontinent. Each of them believes that its enemy will use the military instrument to achieve its political objectives. The acquisition of state-of-the-art weapons to brow beat the adversary are all manifestations of lack of trust and a perceived threat to each others sovereignty and independence. It results in a set back to their economic development.

### **Corruption**

Corruption is another cause of conflicts. It has increased manifold in Pakistan.<sup>4</sup> From the lowly policeman to the grade 22 bureaucrat, corruption seems to be seeped into their blood. Cronyism and favouritism is of common occurrence in this land of the pure.

Politicians have taken huge amount of loans and have defaulted without any of them being punished. Fake degrees have surfaced. Those involved in this corrupt practice have got out of it lightly. Illegal wealth is stacked away in foreign banks.

<sup>4</sup>Transparency International report in 2010.

Even aid received from donors is not spared. Reportedly the contractors, siphon off most of the aid received from the aid giving agencies. When the needy do not get any benefit from the aid they turn towards militancy. It might be of some consolation to know that Pakistan is not the only country, which is blamed for corrupt practices. According to a security analyst “World’s biggest threat is corruption, not nuclear weapons.”<sup>5</sup>

### **Injustice**

People get frustrated and angry when they are denied justice. The *thana* culture prevails. Complainants find it difficult to register their complaints at police stations. Those responsible for the protection of others use brutal methods to obtain false evidence. The high and mighty feudal landlords can get away even when they commit serious crimes against their tenants. Telephone calls from those holding important positions in the government compel the police to leave the criminal.

Speedy and cheap justice is denied to people. Cases drag on for years. The worst sufferers are the poor who cannot afford to pay the lawyers nor can they offer monetary benefits to those who administer justice. Injustice leads to anger and resentment against the established authority.

**When Survival is at Stake.** People take to violence when they are pushed to the wall and their very survival is at stake. They are prepared to kill and get killed in the hope that their enemy would not be able to bear the cost of continuing the conflict and will give them their due right. Fear and hatred becomes so ingrained that opposing groups cannot imagine living in peace with each other.

### **IMPACT OF THE WAR ON TERROR**

Pakistan was in the eye of the storm immediately after 9/11. President Parvez Musharraf was facing the most difficult situation in the two years of his rule. He was aware that the United States would attack Afghanistan and seek Pakistan’s support. He also was informed that India was prepared to offer its bases and logistic support to the United States in this hour of need. Yes or No was the question rattling in his mind. There was no half way.

Two days after the fateful day of September 11, US Secretary of State, Richard Armitage placed before Pakistan’s Director General of the Inter Services Intelligence Directorate, Lt. Gen. Mahmood Ahmed, who was in Washington at that time. The paper contained the points, which Washington expected Pakistan to provide to the United States in its war against the Taliban regime in Afghanistan.

The important point mentioned was Pakistan will assist USA in ways to destroy Osama Bin Laden and his al Qaeda network. Pakistan was required to give blanket over flight and landing rights to USAF planes.

On the same day at 11.30 pm Pakistani time US Secretary of State Colin Powell, rang up President Musharraf and conveyed the same demands. Musharraf responded by saying “Pakistan would support the United States in each of the seven actions.”<sup>6</sup>

<sup>5</sup> *Washington Post*, 26 May 2010.

<sup>6</sup>Woodward, Bob, *Bush at War*. Simon and Shuster, London, 2004, p.59.

Musharraf also acceded to provide logistic support to the United States in its war against Afghanistan.

Some segments of the society in particular the religiously-oriented political parties did not agree with Musharraf's U turn. Foreign Minister Mehmud Ali Kasuri said in a TV interview that a debate had already started over continuing the support to the Taliban regime or not because of their extremist views of Mullah Omar and the Afghan religious *shoora*. What ever be the reason for accepting the demands of the United States a major shift in Pakistan's foreign and domestic policy was taking place. The decision of President Musharraf to join the US War on Terror was going to have far reaching implications for the security of the country.

He should have been aware that forsaking the Taliban would be strongly criticised by the religious right. The possibility of they using violent tactics to put pressure on the government should also have been take into account.

**Refugee Influx.** The immediate impact of the carpet bombings of Afghan population centres by USAF was the mass movement of Afghan refugees into Pakistan. This added a further economic burden of looking after the already existing 3 million Afghan refugees in Pakistan.

**Tribal Areas become a Safe Haven for the Afghan Taliban.** The additional refugee problem could have been absorbed but what affected Pakistan's security was the arrival of Anti US Afghan Taliban who vowed to push the Americans out of their country and began to use the tribal areas as a safe have from where they could mount attacks against the US and NATO forces in their country.

This resulted in drone attacks by the United States, which not only violated Pakistan's sovereignty but also resulted in a lot of co-lateral damage and turned those affected directly and indirectly against the government.

#### **FORMATION OF THE TEHRIK-TALIBAN— PAKISTAN (TPP) IN PAKISTAN**

The continued American bombings against a Muslim neighbour and the perceived pro-American policies of the government helped in the establishment of the Tehrik-Taliban-Pakistan (TPP) with the added demand of the imposition of Shariah in the country.

#### **Army's Involvement in the Tribal Areas**

The Army moved into the Tribal areas on the directive of the civilian government. It has deployed a substantial force, for the first time, in that lawless region of Pakistan. Its objective is to root out the militants, who have been carrying out attacks all over Pakistan.

**Rise in Militancy.** There has been a steady rise in militancy over the years. There were 16 suicide cases in 2006; it rose to 56 in 2007 and 72 in 2008. The figure of militancy went up to 130 in 2009.<sup>7</sup> Most of the attacks were against security personnel since Pakistan joined the War on Terror. GHQ, the most guarded military establishment, has come under attack. Military convoys in the tribal areas have been ambushed. NATO

<sup>7</sup>The News 18 March, 2010.

supply vehicles bound for Kabul have been destroyed. Not all militancy was the result of the War on Terror. Sectarianism; ethnic killings; kidnappings for ransome; paid mercenaries and outside involvement have complicated the picture.

### **US Concerns of Pakistan's Nuclear Assets Falling into the Hands of Terrorists**

The US *mantra* of 'do more' has two objectives, First to prevent the anti-US militants in the tribal areas from providing safe haven to the Afghan Taliban opposed to the presence of US troops in Afghanistan and second to ensure that Pakistan's nuclear assets do not fall into the hands of terrorists.

### **Economic Costs of Conflicts**

The Soviet Union collapsed because it could not support conflicts beyond its borders. The emphasis on security by expanding its spheres of influence beyond its borders led to it disintegration. Moscovites had to stand in line for hours to buy a essential commodities as they were in short supplies. The Soviet citizens were gradually become frustrated and angry at being denied the fruits of their labour as resources were being diverted towards military build up and supporting client stats. Heightened security had made life of the common citizen even government officials very hard indeed.

I recall my visit to Moscow in 1987. Although, I was invited by the Soviet academia they could not find a place to entertain me in a restaurant because permission had to be taken from the Soviet Secret Service to enter into an ordinary public eating place. I witnessed the long lines of men and women in front of shops in Moscow who had come to buy a pair of shoes, which had just arrived in the shop window. I saw the shop assistant on some days standing behind empty counters. My Soviet conducting officer could not get married because he had not yet been allotted a two room apartment, which could take another year or so.

The misadventure into Afghanistan was one of the factors for the disintegration of the Soviet Union but more than that was the frustration of being denied the fruits of one's labour that brought about the downfall of communism in the Soviet Union.

Afghanistan and our tribal areas reflect most vividly the connection between conflict, security and development. This unfortunate country along with the adjacent tribal areas of Pakistan have witnessed turmoil, lack of security, death and destruction and virtually and absence of economic development since three decades.

The inability of the US forces to suppress the Taliban in Afghanistan prevents them from carrying out economic development or nation building in that country even if they sincerely believe in doing so. Terrorist attacks on NGOs working in Afghanistan hamper their efforts towards economic recovery, reconstruction and rehabilitation in Afghanistan.

The same can be said of the tribal areas, where conflicts between the militants and security forces continue. Where the US drones seek out targets and destroy them irrespective of the collateral damage being caused. There are areas still in the tribal belt where the writ of the government does not prevail. It is no wonder, therefore, for the much trumpeted ROZs to remain in limbo. Even if the US Congress finally gets its act together and releases the funds required for the establishment of these reconstruction

opportunity zones in the tribal areas, till such time the local people and the foreigners feel safe working in the tribal areas, not much can be expected in the way of development in that region.

Conflicts also occurred in the Khyber Pakhtunkhwa between the security forces Maulvi Fazullah who had assumed complete control of Swat. He was enforcing his interpretation of Islamic tenets by force. Music and CD shops were closed, men were compelled to sport beards; barbers lost their jobs, girls were prevented from going to school. Their schools were destroyed. Public building including rest house were burnt down His FM radio broadcast hatred against the government daily.

When Civil and para-military forces failed to ensure the writ of the government in Swat the army was called in aid of civil power. A military operation became necessary. This resulted in the displacement of hundreds of thousands of civilians to safer places.

The cost of the war on Terror increased manifold. Looking after the internally displaced persons cost a lot of money. Rebuilding and reconstruction of the damaged property and infrastructure drained way precious resources.

Security related pressures on the economy compelled India's Prime Minister, Man Mohan Singh to say that peace with its neighbours was essential for India to achieve its economic potential. Even the United States believes that if tension prevails between India and Pakistan it will not be able to redirect its soldiers and military resources to fighting the Taliban. Washington's self-imposed conflicts in Afghanistan and Iraq and its paranoi about home land security against perceived attacks by al Qaeda and the Taliban continue to cost the US tax payer billions of dollars a day.

Although the cost of both the conflicts are still bearable because of the strong US economy but even the mightiest country in the world is now beginning to feel the impact of supporting lingering conflicts in far off lands and within its own country. Its economy is being adversely affected. The American dream is likely to be shattered due to the expanding military expenditure to deal with conflicts in Iraq and Afghanistan.

Former Prime Minister, Shaukat Aziz was not wrong when he stated "economic interests build people together and that cooperation and development are a tool to promote peace goodwill and fellowship". Economic interests play a critical role in building and cementing relations between people. It expands the size of the cake, which allows each group to get a larger share. Building peace through economic development should be the goal of every government. Pakistan today is facing an economic crunch making it difficult for it to take care of its own security need. The millions of people who live below the poverty line are liable to join the other disgruntled lot and take up arms against the state.

The hotel industry is also suffering because foreigners have been advised to keep their visits to Pakistan to the minimum. The occupation of hotels is down to 40 percent Their earnings have been reduced. On the other hand the costs have gone up as more security guards have been employed because of the security threat. Extra walls have constructed; splinter proof cylinders have been emplaced, Concertina wire has been added. Sniffer dogs have been bought. All this has added to the cost of running the hotels due to the rise in militancy.

The Prime Minister disclosed recently that Pakistan has suffered 30,000 casualties and US \$50 billion worth of losses in property and infrastructure. Washington has

provided Coalition Support funds and other financial assistance but the amount promised does not compensate for the loss of lives, the damage to the infrastructure and the wear and tear of the military hardware. The continuing use of force by the security forces also has its negative impact on the civil military relations because of the co-lateral damage that is bound to occur. All of this hurts the economic development of the country as well.

India too is increasing its defence expenditure due to insecurity within its country. After the Mumbai attack by some militants India has stepped up its homeland security. India will invest US \$12.3 billion into the private sector industry by 2016; Air port security has projected over US \$43.2 billion. Home land security has allotted 100 million for city security. Chindambaram, India's Home Minister, says the budget for security has increased by 35 percent to over 29.52 billion by 2009-2010.

Every thing must be done to avoid violence. Conflict could be the result of internal differences or waged from outside sources to achieve their own objectives, driven by geopolitics. When aid does not filter down local truces do not work; peace accords do not last. Ethnic language regional conflicts enhances differences between rich and poor; between rural and urban and between provinces. This hampers economic development.

### WHAT NEEDS TO BE DONE?

#### *Madrassas*

Our intelligence agencies must identify those *madrassas*, which are spreading hatred against others and motivating young minds to kill the 'kafirs' to earn a place in heaven.

These should not only be banned but action should be taken against those who run such religious places of learning.

All *madrassas* should be encouraged to broaden their syllabi to include subjects, which would give the students an opportunity to get jobs and become useful citizens of the state. Some half-hearted attempts have been made by previous governments in this regard.

What is needed is to seriously take up this matter and ensure that the mind set of the students is changed. They should be allowed to come out of the cuckold in which they are trapped.

#### *Jihadi Out Fits*

It appears that the *Jihadi* out fits, who allegedly carry out suicide attacks in the country, are both an asset and a liability. A few of these non-state actors are presumably keeping the pot boiling in Indian Held Kashmir. But they are also against the presence of US forces in Afghanistan and hence turn their guns against the government, which they believe is acting on the directive of the United States. How to run with the hare and hunt with the hound is a problem which needs careful handling.

#### **Corruption**

According to some reports we are the most corrupt country in the world. Corruption cannot be totally ruled out. It exists in all countries, but steps should be taken to reduce the amount of corruption in the country. It has to start from the very top. It is

only when people have honest and selfless leadership that those below them will not fall to the temptation of accumulating ill-gotten wealth.

### **Remove Sense of Alienation**

The blowing up of electric pylons and gas pipelines or target killings against individuals are all because of a sense of alienation and deprivation felt by some groups. This is particularly serious in Balochistan, which has been neglected for far too long despite the fact that Balochistan provides the rest of the country with natural gas and some minerals.

The Balochis rightfully demand that they too should benefit from their own resources.

The steps agreed upon and announced by the government for the economic development of Balochistan should be seriously implemented.

### **Good Governance**

The regime in power must ensure good governance, which includes administrative ability; rooting out corruption; building and maintaining stable institutions; ensuring the sanctity of the constitution; avoiding clashes between the four pillars of the state and justice for all; the organs of the state remaining within their constitutional role, establishing stable institutions and avoidance of one-man rule and most importantly providing justice to all.

### **Increase Rate of Literacy**

Education alone, however, is not the answer. Education, which will give jobs, which will enhance the country's economy is what is needed. That would reduce the widening gap between the rich and the poor somewhat.

### **Reduce Economic Disparities**

Economic disparities lead to conflicts. Equal distribution of resources is not practical but the un-equalities in resource distribution should be analysed and sincere efforts must be made to keep this to the minimum within the constraints of economic development of far-flung areas.

### **Diplomatic Skill**

Diplomatic efforts must continue to be made in order to reduce the external threat both from across our eastern and western borders. Needless to say this should not be at the cost of ensuring that our vital national interests are not jeopardised. A great deal of resources could then be made available for the economic development of the socio-economic development to ensure.

### **Security**

All countries of the world, big or small, developed or under developed, give the highest priority to its integrity and national independence. But the responsibility to

provide security to the state does not lie only on the armed forces. Military strength alone cannot guarantee security. Internal harmony; economic strength; support of the people and a friendly neighbourhood are some of the other factors, which help in maintaining security at home.

### **CONCLUSION**

Political analysts are not wrong when they opine that there is no scientific formula for resolving conflicts. Each country has to find solutions keeping in mind its own peculiar internal and external environment.

When stronger nations begin to dictate policies to a government, which is receiving financial assistance from them, the people turn against their rulers. Foreign aid then becomes counter-productive.

It is also true that we are living in a global village. There is no such thing as absolute sovereignty. Developing countries in particular, have to accede to conditions placed by financial institutions and donor countries. The only way to get out of the trap of obtaining loans and grants to oil the governmental machinery is to become as much self sufficient as possible. For this to happen internal security, absence of conflicts and working towards achieving friendly borders is necessary.

The economic well-being of the citizen of Pakistan should remain the prime concern of every government. Unfortunately self interest has been placed before national goals. One must admit that with the best of intentions and even if the nation is blessed with good leaders there are many difficulties which come in the way of economic progress in Pakistan.

The economic health of the nation depends indeed on a host of factors including good governance, sound fiscal policies, high savings rate, and a judicious use of external financial assistance however, economic development will be severely hampered unless we can achieve internal harmony and work towards a peaceful neighbourhood.

Domestic disorder poses a more serious threat to the integrity of the state. Political confrontation has created a measure of uncertainty in the country. Prolong social injustices have resulted in frustration amongst the people. Disparity in the economic development has led to some disgruntled elements talking about separation

Religious extremism and intolerance has resulted in conflicts and in the use of violence to settle differences.

To put back our house in order the three issues of conflicts, security and economic development must be tackled together.

## Conflicts, Security, and Development

TARIQ OSMAN HYDER

There is no disagreement on the propositions; that development is a vital priority for all countries and societies; that a secure internal and external environment is needed for this purpose as an enabling environment, and; that where external and internal conflicts and potential conflicts exist, despite the alleged and controversial spin off from defense spending and its associated R+D, they act as a break on development and mitigation strategies are required.

For Pakistan the parameters of the situation are bound by disputes with a larger India on one side, on the other side an ongoing conflict in Afghanistan between the Extra Regional Forces of the USA/ISAF/NATO and Afghan factions with its physical and ideological spill over accentuating internal conflicts with terrorist and extremist forces.

All these situations and potential conflicts present mitigation challenges if we hope to give development the attention it deserves.

How have we been faring, what is our scorecard, how can we do better? These are the fundamental questions posed by the subject of this Panel.

On the first external front it is clear that the history of bilateral relations between Pakistan and India since the independence in 1947 has been beset by mistrust and characterised as a most difficult relationship. This has led to significant defense expenditure by both countries. It is clear that if relations can be improved or at least better managed in this age where globally confrontation is being increasingly replaced by cooperation, the “peace dividend” would be in the interest of both countries and improve the lot of their peoples a significant portion that live in conditions of poverty or on the margins of poverty. In this context since the peace process begun in 2004 through the composite dialogue process constituted an important element for managing this relationship and towards efforts for its improvement.

The eight agenda items of the Composite Dialogue are: (i) Peace and Security including Confidence Building Measures (CBMs); (ii) Jammu and Kashmir; (iii) Siachen; (iv) Sir Creek; (v) Wullar Barrage; (vi) Terrorism and Drugs Trafficking; (vii) Economic and Commercial Cooperation; and (viii) Promotion of Friendly Exchanges.

While India froze the peace process after the November 2008 Mumbai terrorist incident, it is worth assessing what was and what was not achieved to assess the utility of trying to restart the process in its entirety rather than through pick and chose, presently the hallmark of the Indian approach.

Tariq Osman Hyder, Member Oversight Board for Strategic Exports Controls, Ministry of Foreign Affairs, Islamabad.

Meaningful CBMs were reached in a number of key areas. On Jammu and Kashmir which is a core issue for Pakistan which remains committed to a peaceful resolution, based on the Security Council Resolutions supporting the right of self determination of the Kashmiris a number of inter Kashmiri CBMs were implemented to bring some relief to the lives of the Kashmiri people. The Muzaffarabad–Srinagar and the Rawalakot–Poonch Bus Services and an inter Kashmir trade service were initiated. The age-old linkage between the Kashmir people and their brethren in Pakistan was restored to some degree. Kashmiri liberation leaders were able to visit Pakistan.

Nuclear and Conventional CBMs agreements were reached on Pre-Notification of Flight Testing of Ballistic Missiles and on Reducing the Risk from Accidents Relating to Nuclear Weapons. A hotline between the Foreign Secretaries was started and the hotline between the two Director Generals of Military Operations was upgraded. Both countries recognised that the nuclear capabilities of each other, which are based on their national security imperatives, constitute a factor for stability. They reaffirmed their commitment to uphold the ceasefire along the LoC; implement the 1991 Agreement on Air Space Violations in letter and spirit; not to develop new posts and defence works along the LoC; to speedily return inadvertent Line Crosses, and; to periodically review existing CBMs. A hotline between the Indian Coast Guards and Pakistan Maritime Security Agency was initiated.

While India has frozen the composite dialogue it is important to note that the above CBMs continue to be observed.

On the economic and commercial side bilateral trade increased from US\$ 181 million to US\$1956 in 2007-2008. While trade balance was in favour of India significant quantities of cement were exported from Pakistan to India and the Pakistani positive import list expanded. The Pakistan India Joint Commission which had been dormant since 1989 was revived and meetings held on Agriculture; Tourism; Information Technology and Telecommunications; Health, Information; Environment, Science and Technology; and Education. Important areas where both countries face similar challenges. People to people contact increased.

However overall despite some amelioration of the plight of the Kashmiri people there was no substantive move forward by India on the core issue of Jammu and Kashmir. Similarly, on Siachen and Sir Creek despite the availability of a framework for their resolution India kept to its adamantly to its negative positions.

On the Indus Water issue, India's tactics reflected an attitude to use its upper riparian position to circumvent its solemn obligations under the Indus Waters Treaty and to try to build up a capability to pressure Pakistan.

At a time when terrorism is a major threat to both countries, India has used the unfortunate Mumbai attack not only to freeze the peace process but also to halt the two mechanisms putting place for counter terrorism discussion and cooperation namely the meetings of the Interior Secretaries and the Joint Anti-Terrorism Mechanism. While Pakistan has taken all possible measures on its side in relation to the Mumbai attack, India is short sightedly trying to use this incident to polemicise against Pakistan.

In fact there is strong evidence that India is using Afghanistan territory to mount subversive and destabilising operations against Pakistan particularly in the border regions.

When the two Prime Ministers met in Sharm El Sheikh in July 2009 both agreed that the two countries will share real time, credible and actionable information on future terrorist threats and that dialogue is the only way forward. Action on terrorism was not to be linked to the Composite Dialogue process. However, India went back on this understanding. The recent meeting of the two Foreign Secretaries last month in New Delhi continued the impasse with India only interested in discussing terrorism issues.

The Government of Pakistan has sincerely and continuously tried to restart the peace process in its entirety through the Composite Dialogue process. Many Pakistanis disillusioned with the Indian response have called on the Government to halt such efforts.

However, the peace process showed that while movement on vital issues was painfully slow, a potential window towards resolution had been opened and in some areas particularly in inter Kashmiri contacts and on Nuclear and Conventional CBMs which are important between the two nuclear neighbours some progress had been achieved to manage this difficult bilateral relations.

Recent statements made by Indian military leaders of their objective to be able to mount aggressive actions against Pakistan under a nuclear overhang demonstrate a gearing differential between India's professed peaceful intentions in regard to Pakistan at the political level and the reality of its strategic build up and objectives.

Conventional and strategic instabilities are threatening to undermine strategic stability which has preserved the peace between the two countries since both became nuclear powers.

Two developments are crucial to move from adverse relations and potential conflict towards resolution of disputes particularly the core issue of Kashmir and the Indus Waters issues and cooperation for the benefit of the two peoples. The first is for a fundamental realisation by India that it has more to gain through better relations with all its neighbours rather than through a coercive and hegemonic approach. China, for example has tried its best to develop good relations with all its neighbours and to solve territorial border issues in a generous manner. India on the other hand has extremely difficult relations with all its neighbours what to talk of Pakistan.

Secondly, since peace and stability in South Asia is so important in the entire region and beyond, the international community has to play its part in persuading India to pursue a policy to meaningfully engage with Pakistan and to work for the maintenance of stability in South Asia which will also permit Pakistan to pursue its major global role against terrorism.

On the Afghan external front there are too many powerful external actors to permit us to shape the environment in as favourable a manner as we would like although we are doing the best we can. The occupation of Afghanistan has enhanced terrorism and extremism in Pakistan and if the USA can implement an exit strategy it will facilitate our task of overcoming our internal counter terrorism challenges.

We should limit our objectives in Afghanistan to having a government which does not allow its territory to be used against Pakistan and gives the Paktuns and other communities their due political and other weight and not have any favourites. Stability on our western border, which we should fence, our increasing trade with Afghanistan and our vital access to Central Asia and also its energy supplies depends on a stable Afghanistan at peace within itself and with all its neighbours.

On the internal terrorism front, a significant challenge by itself, external involvement by India and events in Afghanistan have complicated our task which has been compounded by years of neglect and errors of omission and perhaps commission.

While on the military front public, media and parliamentary support have provided the essential support needed from the Swat operation onwards, much more needs to be done.

The international community has to put its money where its mouth is to fund infrastructural and educational programmes throughout the country and particularly in the most deprived areas including FATA and the other border regions. The inability to implement the ROZs project highlights how much needs to be done.

Our counter terrorism efforts are characterised by a top down approach rather than strengthening the basic unit of the Thanna upwards. Explosives security remains poor. Intelligence coordination needs improvement.

Our ability to mitigate external challenges and potential conflicts as well as internal conflicts rest on two fundamental requirements.

First of all acting on the recognition that without provision of justice and equal opportunity, improving education and infrastructure we can not develop and progress in any direction.

Secondly that implementation of any mitigation strategy to meet external and internal challenges requires much better governance starting with political maturity and planning and going down to delivery by the bureaucratic structure which needs to be urgently revitalised. We have always been good at planning and formulation but weak in implementation.

Knowing what needs to be done is not the problem, rather getting it done.

## **Resolving the Kashmir Dispute: Blending Realism with Justice**

SYED RIFAAT HUSSAIN

### **INTRODUCTION**

The resumption of India-Pakistan peace dialogue after a hiatus of nearly eighteen months resulting from the Mumbai terrorist attacks, has revived interest in different formulas, proposals and options that have been made from time to time to resolve the Kashmir dispute, the root-cause of “unending conflict” between the two nuclear-armed neighbours. This paper attempts to make a contribution towards this ongoing exploration of feasible ideas by highlighting the relevance of the Difference Principle expounded by John Rawls in his Theory of Justice as a key component of a lasting India-Pakistan peace deal on Kashmir. The paper begins with a brief account of the historical background of the Kashmir dispute, its evolution and a summary of the competing Indian and Pakistani claims to the disputed territory. Section two of the paper provides a descriptive account of the various solutions that have been proposed and the attempts made by India and Pakistan to resolve the Kashmir dispute. The last section of the paper offers a summary of the main tenets of Rawls’s theory of Justice and examines the relevance of the Difference Principle as a guide to finding a just resolution of the Kashmir dispute.

### **SECTION I**

#### **A. Historical Background**

The state of Jammu and Kashmir (J&K), a landlocked territory, lies in northwestern part of Indian subcontinent. It became a disputed territory after the partition of the Indian subcontinent in 1947. Bounded on northeast by the Uygur Autonomous Region of Sinkiang and Tibet (both parts of the Peoples Republic of China), it is surrounded by the Indian states of Himachel Pradesh and Punjab on the South; on the northwest by Afghanistan and on the west by Pakistan.

The territory’s total area is 85,806 square miles (222,236 square km), of which 31, 643 square miles (81, 954 square km) is controlled by India. The modern state of J&K evolved from the Dogra heartland in Jammu, as the home of many different ethnic groups

Syed Rifaat Hussain <rifaathussain@gmail.com> is Professor and Chairman, Department of Defence and Strategic Studies, Quaid-i-Azam, University, Islamabad.

and a diverse set of cultures.<sup>1</sup> In 1834, Ladakh was conquered and incorporated into the state. Baltistan was conquered and annexed by the Dogras in 1840. The Valley of Kashmir joined in 1846, when the British sold it to the Sikh ruler Gulab Singh for 7.5 million rupees. In 1935, Gilgit was leased to the British for 60 years. The British terminated the lease in 1947. Aksai China came under the Chinese control in 1962 following the Sino-Indian War that year. Poonch joined the state in 1936, as the result of a judicial settlement.<sup>2</sup>

The Kashmir Valley's inhabitants were predominantly Muslims, with a small community of Sikhs and Kashmiri Pandits; Jammu had a Dogra Hindu majority with a significant Muslim component; the western strip from Muzaffarabad to Mirpur had a majority of Punjabi Muslims; Gilgit, Skardu, and Kargil were also inhabited by Muslims; and a majority of Ladakh's residents were Lamaistic Buddhists.<sup>3</sup>

At the time of the partition of the Indian subcontinent in 1947 the State of Jammu and Kashmir was one of the 564 princely states that faced the choice of either joining India or Pakistan in accordance with the twin principles of geographical contiguity and self-determination following the lapse of British paramountcy. Although J&K had a Muslim majority (77 percent in the census of 1941), and shared a long border with the new state of Pakistan, the Maharaja refused to opt for Pakistan.

His reticence stemmed both from his desire to remain independent and from agitation by his predominantly Muslim subjects against his brutal rule. Faced with the armed revolt by Muslims from Poonch in June 1947, the Maharaja retaliated with brutal force against them. The revolt then spread to the other areas of Jammu and Kashmir. To stabilise the situation, the Maharaja signed a standstill agreement with the new state of Pakistan. The situation deteriorated during August and September of 1947, as the Kashmiri Muslims openly revolted. Their fellow tribesmen from Pakistan's Northwest Frontier Province joined in this armed insurrection. By late October, 1947, the tribesmen-led rebellion succeeded in capturing several towns, massacred large number of civilians, and advanced within four miles of the capital, Srinagar.

To forestall his imminent overthrow by the advancing rebel troops, the Maharaja requested military aid from India, and approved the annexation of Kashmir to the Indian Union on October 26, 1947. The Indian Government accepted Maharaja's accession, while stipulating that it should ultimately be ratified by popular consultation. India's military intervention on behalf of the besieged Maharaja led to the first India-Pakistan war over Kashmir. India aired the dispute before the United Nations, calling for international intervention in the matter.

After their first war over Kashmir in 1947-48, India and Pakistan signed a cease-fire agreement on January 1, 1949. India and Pakistan went to war over Kashmir again in 1965, and the resulting line of control divided old Jammu and Kashmir into four political units:

<sup>1</sup>Mushtaqur Rahman, *Divided Kashmir: Old Problems, New Opportunities for India, Pakistan, and the Kashmiri People*. (Boulder: Lynne Rienner, 1996), p. 17.

<sup>2</sup>*Ibid.*

<sup>3</sup>*Ibid.*

(1) Ladakh and Jammu and Kashmir Valley (Indian-occupied Kashmir); (2) Azad Kashmir (Pakistan-occupied Kashmir); (3) the Northern Area, administered by Pakistan; and (4) Aksai Chin, controlled by China.<sup>4</sup>

## **B. Indian and Pakistani Perspectives on Kashmir**

The Indian Approach: At the core of Indian position on Kashmir is New Delhi's claim that the decision of the Maharaja Hari Singh to accede to the Indian Union, regardless of its circumstances, is "final and legal and it cannot be disputed." If there is any "unfinished" business of partition it is the requirement that Pakistan relinquish control of that part of Jammu and Kashmir that it illegally occupies. India further maintains that the UN Resolutions calling for the will of the people to be ascertained are no longer tenable because Pakistan has not fulfilled the precondition of withdrawal from the territory it occupied through aggression. New Delhi further maintains that after Pakistan's attempts to alter the *status quo* by force of war in 1965, Islamabad has forfeited the right to invoke the UN Resolutions. The will of the people does not need to be ascertained only through a plebiscite. The problem of Kashmir, according to India, is one of terrorism sponsored by Pakistan. The targets are Muslims in Kashmir, belying Pakistan's argument that it is concerned about the welfare of Muslims in Kashmir. While India wants to resolve all outstanding issues with Pakistan through a process of dialogue, the integrity and sovereignty of India cannot be a matter for discussion.

The Indian policy towards Kashmir operates at three distinct levels: local, bilateral and international. At the local level, the principal Indian goal is to crush the Kashmiri resistance by massive use of force on the one hand and by manipulating the differences among different Kashmiri resistance groups on the other.

At the bilateral Indo-Pakistan level, India, while expressing its willingness to discuss all outstanding issues with Pakistan, has tended to avoid conducting any meaningful dialogue with Pakistan regarding Kashmir that involves a movement away from the stated Indian position that Kashmir is an integral part of India. Although India's principal purpose in maintaining a posture of dialogue with Pakistan is to gain time to consolidate its hold over in Kashmir by pacifying the Kashmiri resistance, independent analysts believe that "already in possession of the larger and most prized section of the state and aware of the difficulty that would face any effort to pry Pakistan loose from the rest," New Delhi would be willing to "accept conversion of the LoC...into a permanent international boundary."<sup>5</sup>

At the international level, Indian policy on Kashmir is primarily aimed at three objectives: deflecting the Pakistani campaign alleging human-rights violations in Kashmir; emphasising that the Simla agreement provides the only viable forum to settle the Kashmir issue; and discrediting the Kashmiri resistance movement as a "terrorist activity" sponsored by Pakistan.

<sup>4</sup>*Ibid.*

<sup>5</sup>Robert G. Wirsing, *India, Pakistan, and the Kashmir Dispute: on Regional Conflict and Its Resolution*. (New York: St. Martin's Press, 1994), p.219-20.

### ***The Pakistani Approach***

Historically, the Government of Pakistan has maintained that J&K has been a disputed territory. The state's accession to India in October 1947 was provisional and executed under the coercive pressure of Indian military presence. The disputed status of J & K is acknowledged in the UN Security Council resolutions of August 13, 1948 and January 5, 1949, to which both Pakistan and India agreed. These resolutions remain fully in force today, and cannot be unilaterally disregarded by either party.<sup>6</sup>

- (1) Talks between India and Pakistan over the future status of J & K should aim to secure the right of self-determination for the Kashmiri people. This right entails a free, fair, and internationally supervised plebiscite, as agreed in the 1948-1949 UN Security Council resolutions.
- (2) The plebiscite should offer the people of Kashmir the choice of permanent accession to either Pakistan or India.
- (3) Talks between India and Pakistan in regard to the future status of J&K should be held in conformity both with the Simla Agreement of July 1972 and the relevant UN Security Council resolutions. An international mediatory role in these talks may be appropriate.

## **SECTION II**

### **A. Proposed Solutions to the Kashmir Dispute**

During the last five and a half decades, a number of solutions have been proposed by analyst to resolve the Kashmir dispute. These possible solutions can be roughly categorised into four major groups, each group expanding on a particular method.<sup>7</sup> These groups are as follows:

#### **1. Plebiscite**

- (a) Hold a plebiscite for the entire state of Jammu and Kashmir under the auspices of the United Nations. The plebiscite should conform to the original commitment between Lord Mountbatten and the Maharaja, which was repeatedly supported by Indian Prime Minister Pandit Jawaharlal Nehru in the wake of Partition.
- (b) Hold a U.N. supervised partial plebiscite in only the Kashmir Vale, and agree to partition the remainder of the state.
- (c) Hold a (limited or comprehensive) plebiscite on some future date under the supervision of neutral and impartial international observers.
- (d) Hold a (limited or comprehensive) plebiscite under the joint supervision of India and Pakistan.

<sup>6</sup>In defence of the continued validity of the UN resolutions on Kashmir see Ijaz Hussain, *Kashmir Dispute: An International Law Perspective*. (Rawalpindi: Services Book Club, 2000), Ch.V.

<sup>7</sup>This categorisation has been suggested by Prevaiz Iqbal Cheema. See Pervaiz Iqbal Cheema, "Solution for Kashmir Dispute?" *Regional Studies* (Autumn 1986), pp. 3-15.

## **2. Partition**

- (a) Partition the state on the basis of communal composition, apportioning the Muslim majority areas to Pakistan and non-Muslim territory of J&K especially Jammu and Ladakh to India.
- (b) Partition the state along the UN cease-fire line.
- (c) Partition the state along the Line of Control (LoC) with minor adjustments with a view to straighten the border.
- (d) Integrate Azad Kashmir and Baltistan with Pakistan; Jammu and Ladakh with India; and hold a plebiscite in the Kashmir Vale. The UN will govern the plebiscite and its subsequent implementation. Partition the state in congruence with an agreed upon formula, keeping the strategic needs of both Pakistan and India in mind.
- (e) Integrate Azad Kashmir and Baltistan into Pakistan; Jammu and Ladakh into India; and accord independent status to the Kashmir valley, to be guaranteed by India, Pakistan, and the great powers.

## **3. Independence**

- (a) Award independent status to the entire state of Jammu and Kashmir, to be respected and guaranteed by both regional and global powers.
- (b) Make the Kashmir Vale an independent state, and integrate the rest of the territories with India (Ladakh and Jammu) and Pakistan (Azad Kashmir and Baltistan). International guarantees are necessary for this solution.
- (c) Make both Azad Kashmir and occupied Kashmir UN trust territories. Grant independence after a decade of UN-supervised rule.
- (d) Make only the Kashmir Valley a UN trust territory, and allow Pakistan to integrate Azad Kashmir and Baltistan, giving India defacto control over Jammu and Ladakh.

## **4. Condominium/Confederation**

- (a) Establish a condominium of both Pakistan and India over the whole of Kashmir, with maximum autonomy for the state. This solution implies joint management of the state's external and defense affairs by India and Pakistan.
- (b) Grant only the Kashmir Valley condominium status, and partition the rest of the state between India and Pakistan.
- (c) Establish a condominium of SAARC (South Asian Association for Regional Cooperation) for either the entire J & K or the Kashmir Valley alone.
- (d) Form a confederation of Pakistan, India and Kashmir, with maximum autonomy to each of the constituent unit.

## **B. Summary of the Major Proposals Advanced since 1947**

What follows is a chronological account of the various proposals put forth to resolve the Kashmir dispute. This account is divided into five phases, each covering ten years. Table One contains a summary of these proposals, categorised by the solution's nature, source, basic principles, status, responses by India, Pakistan and the Kashmiri people and their pros and cons.

### C. Chronological Account of Proposed Solutions

#### *The First Phase: 1947-57*

##### **United Nations Resolution and Owen Dixon's Proposal**

The UN Security Council Resolutions of August 13, 1948 and January 5, 1949, proposed the plebiscite option for settling the Kashmir dispute. These resolutions laid down the principles and procedures for a free and impartial plebiscite under UN auspices. Both India and Pakistan accepted these resolutions but later clashed over the interpretation of various clauses especially those pertaining to the demilitarisation of J&K. In 1950, the Security Council nominated Sir Owen Dixon, as the UN mediator. He attempted to address the Azad Kashmir territory by suggesting that administrative responsibilities be assigned to the local authorities. These district magistrates would be supervised by United Nations officers. India rejected this proposal.

Sir Dixon then suggested establishing a single government for the whole State of Jammu Kashmir during the period of the plebiscite. This coalition government could be composed of the two hitherto hostile parties; a neutral administration by trusted persons outside politics; or an executive constituted of United Nations representatives. Even this alternative was rejected by India and Pakistan.

Stymied by Indian and Pakistani opposition, Sir Owen proposed two alternative plans. The first entails taking a region-by-region plebiscite, allocating each area to either Pakistan or India, according to the vote. One variation on this suggestion was to allot to Pakistan and India those areas for which a regional vote would have a foregone conclusion, limiting the plebiscite to the Valley of Kashmir.

Pakistan objected to this proposal on the ground that India had previously committed to hold a plebiscite in the State of Jammu and Kashmir as a whole. India indicated a willingness to consider a plebiscite, but only one limited to the Kashmir Valley and some adjacent areas. However, Indian suggestions as to the allocation of other territories among Pakistan and India were unworkably biased. Sir Owen recalled that Indian proposals "appeared to me to go much beyond what according to my conception of the situation was reasonable." Pakistan refused to budge from its position, though it was amenable to straight partition if it was given the valley. This, however, was unacceptable to India.

As a last resort, Sir Owen Dixon presented both governments with another proposal which called for a partition of the country and a plebiscite for the Valley. The plebiscite, which would be conducted by an administrative body of United Nations officers, would require complete demilitarisation. Pakistan rejected this proposal.<sup>8</sup>

#### *The Second Phase: 1958-68*

##### **India—Pakistan Statement of Objectives (1963)**

During the second round of Ministerial-level talks held in New Delhi, from January 16-19, 1963, Pakistani Foreign Minister Zulifkar Ali Bhutto and his Indian counterpart, Swaran Singh, signed a joint statement of objectives. According to this

<sup>8</sup>For details, see Josef Korbel, *Danger in Kashmir*. (New Jersey: Princeton University Press, 1966).Chapter Seven.

“secret” joint statement, both sides had agreed to the following points as a basis for potential solution to the Kashmir problem:

1. “To explore political settlement of the Kashmir dispute without prejudice to basic positions of parties.
2. Agree to examine proposals for honourable, equitable and final boundary settlement taking into account:
  - A. India and Pakistan seek delineation of international boundary in Jammu and Kashmir.
  - B. Pakistan delegation urged territorial divisions taking into account composition of population, control of rivers, requirements of defense, and other considerations relevant to the delineation of international boundaries and acceptable to people of state.
  - C. Indian delegation urged that any territorial readjustments necessary on national basis take into account geography, administration, and other considerations and involves least disturbance to life and welfare of people.
3. Disengagement of Indian and Pakistani forces in and around Kashmir is essential part of settlement.
4. Settlement should also embody determination of two peoples live side by side in peace and friendship and to solve all other problems peacefully and to mutual benefit.
5. Ways and means of removing other major irritants and developing practical cooperation between two countries should be considered...<sup>9</sup>
  - D. Delineating an equitable international boundary in Jammu and Kashmir.

Because of the failure of Bhutto-Swaran Singh, this joint statement ultimately proved merely aspirational.

### ***The Tashkent Declaration***

Following the 1965 India-Pakistan war, President General Ayub Khan and Prime Minister Lal Bahadur Shastri were invited to Tashkent, Uzbekistan, by the Soviet government. After protracted negotiations brokered by Moscow, both sides agreed to issue a declaration in January 1966. The Tashkent Declaration did not propose any concrete solution to the Kashmir problem, but merely stated that the “interest of peace in the region and particularly in the Indo-Pakistan sub-continent and indeed the interests of the peoples of India and Pakistan were not served by continuance of tensions between the two countries. It was against this background that Jammu and Kashmir was discussed and each of the sides set forth its respective position.”

### ***Sumit Ganguly Proposal***

Sumit Ganguly, a leading Indian-American scholar, has argued that “any option that fails to recognise the fundamental territorial integrity of India will not meet the test

<sup>9</sup>Louis Smith and Glenn W. LaFantasie (eds.) *Foreign Relations of the United States, 1961-1963*. Vol XIX South Asia. (Washington, United States Government Printing Office, 1996), p. 478.

of political feasibility. No government in India will concede Kashmir, even if it entails continuing losses in blood and treasure...<sup>10</sup>“ This structural constraint, he points out should not discourage New Delhi from initiating a dialogue process with Islamabad. Such a dialogue has become imperative for both sides as “war could break out, through a combination of misperception and inadvertence.” In the proposed negotiations, India should offer Pakistan a “package of concessions”, “in three areas of contention: Sir Creek, the Wullar Barrage, and the Siachin Glacier,” along with “limited territorial concessions along the LoC in Kashmir.” In return for these concessions, New Delhi would expect Pakistan to end its “active support for the insurgency,” and this would enable the Indian government to start negotiations with the insurgents for a political deal in which “independence” and “merger with Pakistan” will remain non-negotiable.<sup>11</sup>

***Selig Harrison’s Proposal: The Trieste Model***

Selig Harrison, a noted American scholar, has suggested that Kashmir under Indian control should be partitioned. Jammu and Ladakh should become part of the Indian union, while the Kashmir valley would be “united with sizable Muslim pockets in Jammu and Ladakh.” India may give to this “new state,” according to Harrison, “far-reaching autonomy as part of a Trieste-type solution,” and in return, Pakistan would “grant the same degree of autonomy to Azad Kashmir. These new entities will be autonomous in all areas except defence, foreign affairs, communication, currency, foreign aid and trade.

Both India and Pakistan would withdraw their armed forces under UN supervision, retaining the right to reintroduce them under specified circumstances. Pakistan would terminate its support of Kashmiri insurgents. The present LoC will become an international border. As in the Trieste settlement, it would be a porous border, with Kashmiris free to travel back and forth without Indian and Pakistani visas. Gilgit, Hunza and Baltistan would remain part of Pakistan, thus retaining Pakistan’s access to China.

As the first step, India would have to split the state, integrating most of Jammu and Ladakh with the Indian Union, while giving special autonomous status to a new state uniting the Kashmir Valley and the sizable Muslim pockets in Jammu and Ladakh. India could then offer to give this new state far-reaching autonomy as part of a Trieste-type solution, under which Pakistan would grant the same degree of autonomy to Azad Kashmir.

Both New Delhi and Islamabad would surrender authority to these new entities, except in the area of defense, foreign affairs, communications, and currency. The new regions would gain the right to conduct independent foreign aid and foreign trade dealings.

This settlement, if accompanied by large-scale economic inputs, would be acceptable to many Liberation Front leaders and a growing number of war-weary Kashmiris. However, India shows no signs of moving in this direction, as its current policy aims to militarily crush the insurgency before pursuing a political solution.

<sup>10</sup> Sumit Ganguly, *The Crisis in Kashmir: Portents of War, Hopes of Peace*. (Harvard: Cambridge University Press, 1997), p. 145.

<sup>11</sup> *Ibid*, p. 148.

New Delhi fears that giving Kashmir special autonomous status would set a precedent for demands by other potentially secessionist states. The controversy over what to do in Kashmir is part of the developing debate over whether the entire Indian federal system should be more decentralised. This debate is directly linked to the sensitive problem of Hindu-Muslim relations in India. Nominally, India is a secular state, but the secular principle is under attack from the Hindu right. Advocates of secularism fear that an autonomous, Muslim-majority Kashmir would end up seeking independence or accession to Pakistan, thus exposing the 90 million Muslims in other parts of India to continuing attack as potential traitors.<sup>12</sup>

### ***The Third Phase: 1969-79***

#### **Simla Agreement**

Following the third India-Pakistan war in 1971, both countries signed the Simla Accord in July 1972. Clause (ii) of the Article VI of the Simla Agreement stated that “In Jammu and Kashmir, the line of control resulting from the cease fire of December 17, 1971, shall be respected by both sides without prejudice to the recognised position of either side. Neither side shall seek to alter it unilaterally, irrespective of mutual differences and legal interpretations. Both sides further undertake to refrain from the threat of the use of force in violation of this line.” Article VI of the Simla Agreement further committed both sides to “discuss further modalities and arrangements for the establishment of durable peace and normalisation of relations, including...a final settlement of Jammu and Kashmir and resumption of diplomatic relations.

### ***The Fourth Phase: 1980-90***

#### **Robert Wirsing’s Proposal for Constructive External Engagement**

Robert Wirsing, a leading American security expert has suggested that the 1948-49 United Nations resolutions possess little relevance in the wake of the upheavals, insurgency, spread of nationalism and Islamic militancy in Kashmir.

The objective conditions that gave legitimacy to the original notions of plebiscite and self-determination have changed, yet neither India nor Pakistan recognises this. Instead, both remain glued to their traditional positions. Meanwhile, since the breakup of the Soviet Union, the Cold War rivalry of super powers has diminished.

These changes now provide an excellent opportunity for international mediation. Given changes in both the internal situation of Kashmir and the external environment, Wirsing suggests that now ‘international pressure’ can be applied ‘more deliberately, consistently and evenhandedly’, to resolve the Kashmir issue.

Wirsing links the international mediators’ ‘evenhandedness’ with ‘regional reconciliation’. Unless all parties in the dispute—Indian, Pakistani and Kashmiri—are willing to show signs of compromise and the spirit of give-and-take, no resolution of the problem is likely. He argues that the Kashmir conflict has had a powerful impact on the relationships of both India and Pakistan with the United States. Most conspicuous over the years, perhaps, has been its impact on Washington’s decisions in regard to arms transfers to the region. From 1947 onward, these transfers could not be made without

<sup>12</sup> Selig S. Harrison, “South Asia and United States: A Chance for a Fresh Start”, *Current History*. Vol. 91, No. 563 (March 1992), p. 102.

factoring in their probable consequences for the region's most bitter territorial rivalry. The conflict has had equally broad impact, however, on a whole range of long-term U.S. policy efforts in the region, including nuclear non-proliferation. A series of crises have threatened, moreover, to escalate into a full-scale war that could, in turn, force the unwilling involvement of the United States. Like its Indian and Pakistani clients, the United States was thus in some respects held hostage to the Kashmir problem. This problem could be neglected, perhaps, but not avoided.<sup>13</sup>

### ***The Fifth Phase: 1991-2001***

#### **Bhartiya Janata Party's proposal for Kashmir Annexation**

Radical demographic change has been proposed by the Bhartiya Janata Party (BJP) in India and many other Hindu nationalist organisations as a solution to the Kashmir problem. Specifically, the BJP has called for the revocation of Article 370 of the Indian Constitution. Article 370 gives special status to Kashmir among the Indian states; non-Kashmiris may neither seek residence nor purchase property in Kashmir. By abrogating such restrictions and opening Kashmir to Hindu and Sikh settlement, India could transform Kashmir into a Hindu-Sikh majority state. The 1998 BJP manifesto not only clearly stated that India's "sovereignty over the whole of Jammu and Kashmir" was unequivocal, but also committed the BJP to seize control of all areas that were "under foreign occupations".<sup>14</sup>

#### **The Jammu and Kashmir Liberation Front's Proposal for an Independent Kashmir**

According to the JKLF,<sup>15</sup> a Pakistan-based Kashmiri Organisation, a single solution of the Kashmir issue is at once the most peaceful, practicable, equitable, legitimate, democratic and permanent. The JKLF proposes to re-unite the divided Jammu-Kashmir State and make it an independent country, with a democratic, federal and non-communal system of government. The country would maintain a neutral foreign policy modeled after Switzerland's, aiming toward maintaining friendly relations with both India and Pakistan. After 15 years, there would be a referendum under UN (or IKC) auspices. This referendum could determine whether the State will retain its independence forever, or if it instead becomes part of India or Pakistan. A popular verdict will be accepted by all concerned quarters as a legitimate final settlement, and will therefore be most faithfully implemented.

An eleven member committee called International Kashmir Committee (IKC) includes one member each from the 5 permanent members of the UNSC; one nominated by UN Secretary General; two members nominated by the Non-Aligned Movement (NAM); one by Organisation of Islamic Conference (OIC); and one member each from Germany and Japan. The IKC will be responsible for implementing the solution formula in co-operation with the governments of India and Pakistan; each of the State's three parts; and all of the Kashmiri political parties. The formula's implementation will be carried out in five phases.

<sup>13</sup>Robert G. Wirsing, *India, Pakistan, and the Kashmir Dispute*. (New York: St. Martin's press, 1994), p. 237.

<sup>14</sup>Mushtaqur Rahman, *Divided Kashmir: Old Problems, New Opportunities for India, Pakistan, and Kashmiri People*. (London Lynne Rienner publishers, 1996), p. 164.

<sup>15</sup>Dr Haider Hijazi, *JKLF Formula to Solve Kashmir Issue*. (Rawalpindi, 1992).

*The first phase:* will finalise the plan's details, discussing it through individual contacts and collective sittings with the governments of India, Pakistan, Kashmir's three parts, and all political parties and militant groups. The agreement will then be signed by all these stakeholders and registered with the United Nations. An agreement about the security and the safety of the frontiers of the State will also be signed and registered with the UN.

*The second phase:* will entail simultaneous withdrawal from the State by all civil personnel and armed forces of both India and Pakistan, as well as all non-Kashmiri militants.

*The third phase:* includes the disarming of Kashmiri militants, and repatriation of those Kashmiris who fled their homes and migrated elsewhere. Those who left between 1947 and 1989-90 will have to choose whether to return to Kashmir permanently or remain in the country where they have been since their migration from Kashmir.

*The fourth phase:* will begin the State's re-unification. This phase entails opening intra-state borders closed since 1949; forming an interim National Government and those for each of Kashmir's 5 provinces (Kashmir Valley, Jammu, Ladakh, Azad Kashmir and Gilgit-Baltistan); appointing a Constitutional Committee, framing an interim constitution, electing the National Assembly (House of Representatives) and the Upper House (House of Notables), as well as the provincial assemblies/councils under the interim government. General elections should be held after every 5 years or when decided by the government.

*The fifth and the final phase* will be the referendum to determine whether Kashmir should retain its independence or become part of India or Pakistan. It will be held 15 years after re-unification, under the auspices of the UN or IKC. Its resulting legitimacy will ensure that the popular verdict will be accepted as the final settlement and faithfully implemented.

### **The Kashmir American Council Proposal for a U.S. Brokered Tripartite Dialogue**

The Kashmir-American Council, a Washington-based organisation comprising largely of Kashmiri-Americans with pro-Pakistan leanings, has proposed an active U.S. mediation role in Kashmir. It suggests a dialogue among four parties: the U.S., Pakistan, India, and the 'Kashmiri People'.

As a first step, the area must be demilitarised. Indian and Pakistani troops must revert to their respective positions 'on the borders outside Kashmir'. A small police force must remain, but only in order to supervise the cease-fire line under UN observers. The proposal also advocates that, given India's violation of human rights in Kashmir, the U.S. should use its effective veto to stop the inflow of IMF and World Bank consortium funds to India.<sup>16</sup>

### **Asia Society Proposal for Shared Responsibility**

Asia society, an American think-tank based in New York, has floated the idea of India and Pakistan 'sharing responsibility' on the resolution of the Kashmir crisis. This framework suggests that India should give special status to Kashmir, as a step to build

<sup>16</sup>Saeed Shafqat (ed.) *Contemporary Issues in Pakistan Studies*. (Lahore: Azad Enterprises, 1998), p. 193.

trust between the populations of ‘both parts of Kashmir’ (India and Pakistan), as well as to stop external support to the Kashmiri militants. The Line of Control would then be converted into an international boundary between India and Pakistan. Building upon this framework in a rather optimistic fashion, it has proposed a ‘South Asia House’—a scheme of comprehensive cooperation between the countries of the subcontinent, perhaps leading to a confederation that would include Kashmir.

The society envisages a role for the international community. In particular, the U.S. and Russia could individually or jointly make efforts to bring India and Pakistan closer in resolving the issue. Through seminars, conferences, and by tabling resolutions in the United Nations, the international community can sensitize populations the world over to the need to seek solutions of the problem in Kashmir.<sup>17</sup> Although the Kashmir issue is bilateral, the international salience of the issue can no longer be ignored.

### **Divided Kashmir Proposal by Mushtaq Ur Rehman**

A leading Pakistani-American scholar has proposed to resolve the Kashmir dispute by dividing the state of Jammu and Kashmir following the precedence of the 1960 Indus Waters Treaty, which was based on a clear principle of division.

The Indus River originates in Tibet, crosses the Himalayas and cuts through Jammu and Kashmir in a northwest direction and flows through Ladakh. In this section, the proposed division of the Indus Basin runs diagonally from Chenab to Karakorum Pass.

The Jhelum river originates near Vernag Spring, not far from Zojila Pass. Below Kishinganga Junction, it forms the boundary between Jammu and Kashmir and the districts of Hazara and Rawalpindi. The basin of the Jhelum would fall within the exclusive domain of Pakistan.

The source of the Chenab is on the southern flank of the main Himalayan chain, about 150 miles south of Leh. In general, the river flows parallel to the Indus to the northwest, then turns southwest and passes through the extreme southern corner of Jammu and Kashmir to Pakistan. Below Akhnur, the river splits into smaller channels that could form the dividing line. Bilateral negotiations could amicably divide the Chenab Basin and address the question of Muslim majority districts in the area.

To resolve the continuing conflict, a revolutionary reformation of policies acceptable to all involved parties—India, Pakistan, and the Kashmiri people—must be developed. An alternative based on dividing the river system to mirror the water appropriation in the Indus Waters Treaty could be a real solution. Like the Indus Waters Treaty itself, a resolution for settling the political status of Jammu and Kashmir would likely find broad support in the international community. It would also mark a bold step toward normalised relations, and provide hope for a better future for the entire region.<sup>18</sup>

### **Kashmir Study Group (KSG) Proposal for Kashmir Entity based on Kashmiriyat**

A leading Kashmiri-American businessman, Farooq Kathwari, set up a Kashmir Study Group comprising leading American scholars, policy experts, and a retired Ambassador to explore ideas for a solution to the Kashmir problem. The KSG then

<sup>17</sup>*Ibid.* p. 192.

<sup>18</sup>Mushtaqur Rahman, *op. cit.*; p. 161.

visited India and Pakistan to engage in an extensive series of talks about the Kashmir dispute with leading individuals in several urban centres and with many sets of expertise, including backgrounds in government, politics, military, diplomacy, scholarship, journalism, business, and non-governmental organisations. After their visits to both India and Pakistan, KSG published its report in 1997. In September 1999 it published an expanded version of this report titled “Kashmir: A Way Forward.” These two reports argued that the best way to ensure progress towards the resolution of the Kashmir dispute was to reconstitute J & K on the basis of Kashmiriyat—the cultural traditions of Kashmir. The extent of the reconstituted<sup>19</sup> Kashmir would reflect the wishes of the residents of the parts of the former state of Jammu and Kashmir. “The portion of the State to be so reconstituted shall be determined through an internationally supervised ascertainment of the wishes of the Kashmiri people on either side of the Line of Control.” The implementation of KSG proposals would require the pursuit of following goals:

- Free access of a reconstituted Kashmir to and from both India and Pakistan, consisting of:
  - Freedom of individual movement, and
  - Free transit of people, goods, and services across residual Pakistani and Indian boundaries within Kashmir (e.g., the “Line of Control”) subject to tripartite arrangements.
- Demilitarisation of the area of the reconstituted Kashmir, except to the extent necessary for Pakistan and India to:
  - “maintain logistic support for forces outside the [reconstituted] State that could not otherwise be effectively supplied”, and
  - along either side of the LOC, “until such time as both India and Pakistan decided to alter it in their mutual interest”, but
  - “Neither India nor Pakistan could place troops on the other side of the Line of Control without the permission of the other state.”
- Pakistan and India would share “responsibility for the defense (external security) of the Kashmiri entity.”
- The reconstituted Kashmir “would itself maintain police and gendarme forces for internal law and order (internal security) purposes.”<sup>20</sup>

### **Sovereignty Association Proposal by Ayesha Jalal**

Ayesha Jalal<sup>21</sup> has suggested a sovereignty association within a political framework for a reunified and independent Kashmir. This option aims to address the fear and interest of both India and Pakistan as rival powers. For such an association to succeed, India and Pakistan would have to agree to extend the right of self-determination to all Kashmiris—Muslim, Hindu, and Buddhist. Plebiscites or referenda would be held

<sup>19</sup>The proposed reconstituted entity of Kashmir, in its essential features, would resemble the autonomous region of Andorra—the principality between France and Spain. The dispute between France and Spain over Andorra started in 803 AD and the solution was arrived in 1993.

<sup>20</sup>*Kashmir: A Way Forward, September 1999.* (Washington: Kashmir Study Group, 1999).

<sup>21</sup>Ayesha Jalal as quoted in Mushtaqur Rahman, *op. cit.* p. 165.

throughout Jammu and Kashmir, including Ladakh, to determine whether the people in that particular area wish to remain with India; choose independence; or seek a possible union with Azad Kashmir, which would not be included in the first round of voting. Jalal proposes that Indian and Pakistani troops be withdrawn, transforming Kashmir into a demilitarised zone with both countries guaranteeing its territorial integrity. The terms of a sovereignty association might allow India to maintain a limited military presence in Ladakh, and Pakistan at the Afghan border, in order to meet the strategic concerns of each country about potential threats emanating from outside the South Asian region.

### **Independent States Proposal by Raju Thomas**

Raju Thomas has proposed the creation of several independent states in South Asia delineated along ethnic and religious demarcations. As in Western Europe, countries of South Asia could share natural resources, defense, and economies, governed by treaties. Within a zone of autonomous states, including several states in Kashmir, the central government of India or Pakistan would deal only with defense, foreign affairs, communications, and currency.<sup>22</sup>

### **Partition Combined with Limited Plebiscite and UN Trusteeship Proposal by Pervaiz Iqbal Cheema**

A leading Pakistani scholar, Pervaiz Iqbal Cheema,<sup>23</sup> has proposed that the most feasible solution of the problem seems to be a combination of partition, limited plebiscite and UN trusteeship. Given the region's demographics, Azad Kashmir and Baltistan should stay with Pakistan, while Jammu and Ladakh should go to India. The Kashmir valley should be put under UN trusteeship for at least a decade to prepare the Valley for eventual plebiscite. Cheema argues that the UN Trusteeship Council should decide when the plebiscite would be held. However, there should a mandated time lag of at least one decade from the time the Valley is handed over the UN.

### **The Lahore Declaration**

In response to an invitation by the Prime Minister of Pakistan, Mr Muhammad Nawaz Sharif, the Prime Minister of India, Atal Behari Vajpayee, visited Pakistan from 20-21 February, 1999, on the inaugural run of the Delhi-Lahore bus service.

The two leaders held discussions on the entire range of bilateral relations, regional cooperation within SAARC, and issues of international concern. The two Prime Ministers ultimately signed the Lahore Declaration embodying their shared vision of peace and stability between their countries and of progress and prosperity for their peoples. The Lahore Declaration provided the following:

“Sharing a vision of peace and stability between their countries, and of progress and prosperity for their peoples;

Convinced that durable peace and development of harmonious relations and friendly cooperation will serve the vital interests of the people of the two countries, enabling them to devote their energies for a better future;

<sup>22</sup> Raju Thomas as quoted in Mushtaqur Rahman, *op. cit.* pp. 165–66.

<sup>23</sup> Pervaiz Iqbal Cheema, *op. cit.* p. 12.

Recognising that the nuclear dimension of the security environment of the two countries add to their responsibility for avoidance of conflict between the two countries;

Committed to the principles and purposes of the Charter of the United Nations, and the universally accepted principles of peaceful co-existence;

Reiterating the determination of both countries to implementing the proliferation;

Convinced of the importance of mutually agreed confidence building measures for improving the security environment;

Recalling their agreement of 23 September 1998, that an environment of peace and security is in the supreme national interest of both sides and that the resolution of all outstanding issues, including Jammu and Kashmir, is essential for this purpose;

Have agreed that their respective Governments:

- (1) Shall intensify their efforts to resolve all issues, including the issue of Jammu and Kashmir.
- (2) Shall refrain from intervention and interference in each other's internal affairs.
- (3) Shall intensify their compositior and integrated dialogue process for an early and positive outcome of the agreed bilateral agenda.
- (4) Shall take immediate steps for reducing the risk of accidental or unauthorised use of nuclear weapons and discuss concepts and doctrines with a view to elaborating measures for confidence building in the nuclear and conventional fields, aimed at prevention of conflict.

### **The Andorra Model**

The Andorra proposal involves creating an autonomous region like the principality of Andorra between France and Spain with India and Pakistan jointly guaranteeing autonomy. The dispute between France and Spain over the region started in 803 AD and the solution was arrived in 1993. The Andorra proposal relies on India and Pakistan overseeing the defence of the Kashmiri entity and jointly working out its funding.

### **The Aaland Islands Model**

With a population of 26,000 and the total land area of 1,552 Square kilometers the Aaland Islands took on an international dimension when, on a British initiative, the issue of their autonomy was brought before the League of Nations in Geneva in 1921. The Islands, together with Finland, belonged to Sweden until 1809, at which time Sweden, after losing a war with Russia, was forced to relinquish Finland, together with Aaland, to the victor.

Following the disintegration of the Czarist Empire in 1917, the Alanders launched a struggle for reunion with Sweden but the newborn state of Finland refused to give up part of its territory. In 1921, the League decided that the Åland Islands should belong to Finland but have autonomy that would guarantee their Swedish language and heritage. Ten states guaranteed the demilitarisation and neutralisation of the islands.

With their autonomy backed by international guarantees, they have been used a model for resolving minority conflicts throughout the world. The Åland Islands have legislative powers in such areas as social and health care, the environment, trade and industry, culture and education, transport, postal services, policing, radio and TV broadcasting and local government, but relatively little authority to levy taxes The

autonomy of the Åland Islands is enshrined in the Finnish Constitution (Article 120) in accordance with the Åland Autonomy Act, which has been passed by the Finnish parliament and may only be amended or revised by a joint decision of the Finnish parliament and the parliament of the Åland Islands. This means that each of the two parties can veto any changes it does not accept. The concept of the Åland Islands' autonomy is not based on the decentralisation of power but on an agreement of shared powers established with the help and under the auspices of an international institution, i.e. the League of Nations.

### **The Irish Model**

The Irish peace process based on the April 1998 Good Friday Agreement signed between the United Kingdom of Britain and the Republic of Ireland and eight political parties of Northern Ireland have been posited as a relevant model for resolving the Kashmir dispute.<sup>24</sup> The fundamental problem in Northern Ireland has been the violent thwarting of the desire of the Catholic nationalist minority living in six of its counties to seek union with the Republic of Ireland. The Protestant majority wants these areas to continue as part of the UK. The Good Friday Agreement brokered with the assistance of former US Senator Robert Mitchell offers the first tentative step on a long road to a complete and durable peace among the contending parties.<sup>25</sup> It has been suggested that the Irish model provides peer learning in at least two ways. One, it offers an analogy of structured and sustained course of dialogue/negotiation process supported by well-defined mechanisms—three strands—functioning quite satisfactorily. And, two, the resolution of the conflict is based on certain principles that may have some usefulness in determining the final settlement of the Kashmir conflict.<sup>26</sup> The similarities suggested between the Irish model and the Kashmir conflict include the following: The similarities include in governability of the territory; alienation of the population; rigged polls; question of sovereignty; discriminatory practices followed by the state; and use of oppressive laws allowing use of force with impunity.<sup>27</sup>

### **The Chenab Formula**

This plan envisages the division of Kashmir along the line of the River Chenab. According to the 'Chenab Formula', Pakistan may consider 'Doaba', a

<sup>24</sup>For an excellent comprehensive discussion of the potential applicability of the Irish model to the Kashmir conflict see Shaheen Akhter, "Irish Model and Kashmir Conflict: Search for a New Paradigm for Peace in South Asia," *Regional Studies*. Quarterly (Summer 2004).

<sup>25</sup>The area of Northern Ireland is just over 14,000 square km, with a population of over 1.6 million and is only 20 miles at the nearest point from Britain. Over 50 percent of the population is comprised of Protestants who wish to remain part of the United Kingdom and just under 50 percent are Roman Catholics (23) who wish to join the predominantly Catholic 3.5 million in the Republic of Ireland

The Island of Ireland is divided into the independent Republic of Ireland and the province of Northern Ireland, or Ulster, which is part of the United Kingdom. Northern Ireland had originally nine counties of which six comprise the present day-Northern Ireland. The other three, predominantly Catholic, became part of Ireland on its partition in 1920. The southern region subsequently cut all ties with Britain, becoming the independent Republic of Ireland in 1949. However, the six counties of Northern Ireland remained a part of the United Kingdom. Ulster's partition from the remaining 26 counties of Ireland in 1921 has caused conflict throughout the history of the region. See Shaheen Akhter, *Ibid.*

<sup>26</sup>*Ibid.*

<sup>27</sup>*Ibid.*

narrow strip of land between Chenab and Ravi in the suburbs of Shakargarh, stretching up to Chhamb, Dhodha and Rajwari districts as international border. Even the town of Kargil might go to India under this 'give and take' but from Kargil upward, India will have to agree to give territory to Pakistan," the sources claimed.<sup>28</sup> Most of the districts in Jammu and on the left bank of the Chenab are Hindu majority in the state of Jammu and Kashmir while in most of the districts on the western side of the Chenab, the Muslim are predominant. The 'Chenab formula' was for the first time discussed between India and Pakistan in 1962-63, but the negotiations could not make any headway. According to former foreign secretary Niaz A. Naik, the proposal had been discussed during the unofficial efforts to normalise relations between Islamabad and New Delhi, known as track-II diplomacy, and Indian Prime Minister Atal Behari Vajpayee "had also evinced interest in it". The Chenab formula attracted lot of attention in May 2003 when AJK Prime Minister Sardar Skiandar Hayat called upon India and Pakistan to seriously consider the division of J&K with River Chenab marking the boundary. Arguing that 'this is not a new theory, nor am I the first one to have floated it' he expressed the hope that "India and Pakistan will give a serious consideration to this proposal to end the sufferings of the Kashmiris in particular and of their own people in general and thus materialise the long cherished hope of durable peace in the region."<sup>29</sup>

#### **President Musharraf's Proposal for Demilitarisation of Seven Zones**

Addressing a group of newspaper editors at an Iftar dinner in Islamabad on October 25, 2004, President General Pervez Musharraf called for a national debate on new options for the Kashmir dispute. The necessity for this debate stemmed from the fact that demands for conversion of LoC into an international border and plebiscite were not acceptable to Pakistan and India respectively. To break the deadlock he suggested that identification of various zones of the disputed territory needs to be carried out followed by their demilitarisation and a determination of their status. He identified the following seven regions for this purpose. Two regions—Azad Kashmir and Northern areas—are under the control of Pakistan whereas five regions are under Indian control. The first part comprises Jammu, Sambha and Katwa where Hindus are in majority. The second part also comprises Jammu but the areas include Dodha, Phirkuch and Rajawri where Muslim population is in majority which includes Gujars, Sidhans and Rajas who are also associated with Azad Kashmir. The third part is the area of Kashmir Valley which also has Muslim majority. The fourth part is Kargil which has Shia and Balti population in majority and the fifth area is Ladakh and adjoining areas where Buddhists live.<sup>30</sup> President Musharraf further said that it was imperative that the linguistic, ethnic, religious, geographic, political and other aspects of these seven regions should be reviewed and a peaceful solution to the problem found. President Musharraf's call for open discussion on Kashmir was termed by the Pakistani Opposition parties as a "roll-back" and it was dismissed by India as unacceptable as it envisaged redrawing of the

<sup>28</sup>"Pakistan toying with Chenab Formula," *The Tribune* (June 23, 2001).

<sup>29</sup>"Sikandar defends Chenab Formula," *Dawn* May 23, 2003.

<sup>30</sup>Javed Rana, "Let UN oversee seven part Kashmir," *The Nation* (October 26, 2004)

territorial map in J & K.<sup>31</sup> President Musharraf's proposal for the creation of seven demilitarised zones in J & K was consistent with his earlier attempts to help create the much needed negotiating space for India and Pakistan that would allow them to move beyond their stated positions on Kashmir. In this context it is worth recalling that in a remarkable reversal of Islamabad's verbal strategy on Kashmir, President Pervez Musharraf publicly stated on December 17, 2003 that even though "we are for United Nations Security resolutions...now we have left that aside." To mollify New Delhi's concerns relating to the issue of alleged "cross-border" infiltration from Pakistan, President Musharraf categorically pledged in a joint statement issued in Islamabad following his meeting with the Indian Prime Minister, Atal Behari Vajpayee on January 6, 2004 that "he will not permit any territory under Pakistan's control to be used to support terrorism in any manner."<sup>32</sup> By dropping its longstanding demand for a UN-mandated plebiscite over divided Kashmir and by assuring New Delhi that Islamabad would not encourage violent activity in the Indian-held Kashmir, President Musharraf went a long way to help create much needed political space for New Delhi to have a substantive engagement with Islamabad on the Kashmir dispute.

As indicated by the above account of the various proposals and attempts aimed at resolving the Kashmir dispute, there is no dearth of ideas on how to resolve the Kashmir dispute. Based either on analogical reasoning or historical experience of conflict-resolution attempts involving other situations, most of these proposals emphasise the need for transforming the dynamics of India-Pakistan conflict from a zero-sum competition over Kashmir to a positive sum situation in which both sides would gain from a settlement of the dispute. It is in this context of the challenge of reframing of Indian and Pakistan positions on the Kashmir dispute that Rawls's advocacy of the Difference principle as a way of dealing with issues arising out of distributive justice in asymmetric conflicts like Kashmir becomes centrally relevant. The next section looks at some of the ways in which pursuit of Difference principle as a guide by India and Pakistan can help them evolve an approach to the Kashmir dispute in which benefits of peace-dividend will not only accrue to them but more importantly to the Kashmiris as well.

### SECTION III

#### A. Rawls's Theory

Justice, according to John Rawls, "is the first virtue of social institutions."<sup>33</sup> Its "primary subject" is "the basic structure of society, or more exactly, the way in which the major social institutions distribute fundamental rights and duties and determine the

<sup>31</sup>Making a suo motu statement in Indian Parliament on foreign policy related issues, Prime Minister Manmohan Singh said during his meeting with Pakistan President Pervez Musharraf in New York in September, 2004 they had agreed that "possible options for a peaceful, negotiated settlement of the J and K issue should be explored in a sincere spirit and a purposeful manner.

"I made it clear to President Musharraf that while we are willing to look at various options, we would not agree to any redrawing of boundaries, or another partition of the country," Singh said. "No Redrawing of Border: PM," *Press Trust of India* December 21, 2004.

<sup>32</sup>For the text of the January 6 Joint Statement see <http://in.news.yahoo.com/040106/137/2ar3r.html>

<sup>33</sup>John Rawls, *A Theory of Justice*. (Massachusetts: Harvard University Press, 1971), p. 3.

division of advantages from social cooperation.”<sup>34</sup> The central problem for a theory of justice is to identify the principles by which the basic structure of society can be appraised.<sup>35</sup>

Rawls attempts to resolve the problem of inequality by conceiving of the principles of justice as being drawn up by individuals in an “original position” of perfect equality, where a “veil of ignorance” operates to prevent them from maximising their own future positions by manipulating the terms of the social contract to their own advantage. What principles of social organisation would individuals choose in the original position? Rawls hypothesises two fundamental principles of justice that would get incorporated in the social contract. These are the general principles of maximum liberty and equal opportunity:

- (1) Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all.
- (2) Social and income equalities are to be arranged so that they are both:
  - (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and
  - (b) attached to the offices and positions open to all under conditions of fair equality of opportunity (p. 302).

Rawls regards the first rule of maximum liberty as lexically superior to the second, and within the second rule, he holds 2b, the fair opportunity principle, to be lexically superior to 2a, the difference principle. Rawls argues that the adoption of these rules by individuals in the original position is the logical consequence of their deliberations aimed at the formation of a single society dedicated to the common good.

These principles form the bedrock of Rawls’s “general conception” of justice defined as a situation in which “all social primary goods—liberty and opportunity, income and wealth, and the bases of self-respect—are to be distributed equally unless an unequal distribution of any or all of these goods is to the advantage of the least favoured.”<sup>36</sup> Rawls regards society as a “cooperative venture for mutual advantage.”<sup>37</sup> Society is “typically marked by a conflict as well as by an identity of interests.” There is an identity of interests since everyone shares an interest in having access to the various goods that social activity can provide. At the same time, people’s claims to these scarce goods may conflict. Principles are thus needed to for choosing among the various social arrangements which will fairly distribute the benefits and burdens of social life.<sup>38</sup> Rawls argues that based on the choices of individuals in the original position, the two principles of Equal liberty and the Difference principle will not only provide the “lexical ordering” of the principles of justice but also offer the most fundamental moral standards for their social institutions. Equal liberty will normally be inviolable and the Difference Principle

<sup>34</sup>*Ibid.*, p. 7.

<sup>35</sup>As he points out the principles of social justice “regulate the choice of a political constitution and the main elements of the economic and social system. The justice of a social scheme depends essentially on how fundamental rights and duties are assigned and on the economic opportunities and social conditions in the various sectors of the society.” *Ibid.*

<sup>36</sup>*Ibid.* pp. 302-3.

<sup>37</sup>*Ibid.* p. 4.

<sup>38</sup>*Ibid.*, p. 5.

cannot be sacrificed for the sake of greater efficiency.<sup>39</sup> According to Rawls, these principles of justice have several attractions. First, the Difference principle provides a determinate solution to the distributional problem—the *bete noire* of liberal welfare economics.<sup>40</sup> Second, since everyone's well-being depends upon a scheme of cooperation without which no one could have a satisfactory life, adherence to a social arrangement capable of generating allegiance from all persons will be in everyone's interest. Third, adherence to these principles of justice will minimise the "strain of commitment" in comparison with other sorts of moral principles. That is, while moral choices may always require a degree of personal fortitude on the part of the individuals those who adhere to these principles within the framework of just institutions, will have relatively less difficulty in putting their beliefs into action.

What is the relevance of these Rawlsian principles for resolving the Kashmir dispute? There are several features of the Kashmir dispute which make it a promising case for the application of Rawls's theory. The first is the centrality of the issue of justice underpinning the dispute. As noted by Sumantra Bose:

"The popular uprising for self-determination in Indian-administered Jammu and Kashmir has been caused by...the denial of democracy by the Indian state to its Kashmir citizens in the post-colonial period. Kashmiris rose in rebellion not because Muslims are constitutionally incapable of loyalty to a secular state, but because they saw no hope of redressal within the Indian state's institutional framework to the gross, consistent and systematic pattern of abuse of their rights as citizens and as human beings...For Kashmiris, Indian democracy and its institution is truly the God that failed and failed disastrously...the reason why they (Kashmiri Muslims) seem so insistent on freedom—which means, above all, freedom from Indian rule—is the conviction born of their experiences that their collective will for democratic, responsible and accountable government is incompatible with their presently coerced—as opposed to voluntary and freely consenting—status as integral part of India".<sup>41</sup>

The eruption of the armed uprising in the Kashmir Valley in 1989 marked the culmination of Kashmiri protest against years of injustice, repression and denial of their democratic rights by New Delhi. Any workable solution to the Kashmir dispute, thus, must address itself to the deep sense of injury felt by Kashmiris' due to prolonged Indian state-oppression. All previous attempts to resolve the dispute have miserably failed principally because they either excluded the Kashmiris as key stake holders in a settlement (1972 Simla Agreement being the prime example) or visualised settlements that were perceived as unjust by them. This is as much true of the UN Resolutions on

<sup>39</sup>*Ibid*, pp. 302-3.

<sup>40</sup>As he states: "This principle removes the indeterminateness of the principle of efficiency by singling out a particular position from which the social and economic inequalities of the structure are to be judged. Assuming the framework of institutions required by equal liberty and fair equality of opportunity, the higher expectations of those better situated are just if and only if they works as part of a scheme which improves the expectations of the least advantaged members of society. The intuitive idea is that the social order is not to establish and secure the more attractive prospects of those better off unless doing so is to the advantage of those less fortunate." *Ibid*, p. 75.

<sup>41</sup>Sumantra Bose, *The Challenge in Kashmir: Democracy, Self-determination and a Just Peace*. (New Delhi: Sage Publications, 1997), p. 115 and 9.

Kashmir as it is true of the many other proposals that have been put forth to resolve the dispute. While acknowledging their right to self-determination, the UN Resolutions unduly limited this right to a choice between India and Pakistan. The absence of the third option of Kashmir becoming a sovereign entity has had the unfortunate consequence of enabling both India and Pakistan to present the Kashmir question as an “entitlement issue”<sup>42</sup> before the world. India-Pakistan quarrel over Kashmir as an entitlement issue has distorted its essential character as a normative issue involving the ideal of self-determination.

Second, given the fact that Kashmiris’ are the most disadvantaged party to the dispute, their individual and collective rights in a future India-Pakistan peace deal can only be safeguarded if they are approached from the difference principle of Rawlsian theory. The difference principle requires that the least advantaged gain at least something as the more advantaged gain. In order for this to happen, the most advantaged obviously cannot be taking from the least advantaged for then the latter would lose not gain. This means that for all parties to the dispute to gain, they must seek a solution in which there is high regard for the interests of both Self and Other. The collective rational choice for all parties to the conflict—India, Pakistan and the Kashmiris—is to reach the win-win outcome through mutual cooperation. Here it may be argued that since Kashmir dispute is inherently an asymmetric<sup>43</sup> triangular conflict in which there is imbalance of power between India, the top dog, Pakistan, the middle dog, and Kashmiris, the underdog, no “win-win” outcomes are possible as resolving the conflict is not in the interest of the top dog power. Such reasoning ignores the fact that, while harder to resolve, asymmetric conflicts do impose significant costs on all parties. As pointed out by Hugh Miall:

“It is oppressive to be an oppressor, even if not so oppressive as to be oppressed. There are costs for the top dogs in sustaining themselves in power and keeping the underdogs down. In severe asymmetric conflicts the cost of the relationship becomes unbearable for both sides. This then opens the possibility for conflict resolution through a shift from the existing structure of relationships to one another.”<sup>44</sup>

Commenting on the costs of Kashmir conflict to India, *The Economist* wrote:

Kashmir has less self-government than any other Indian state. But depriving Kashmiris of political power has not obviously benefited the rest of the country: it has tied down hundreds of thousands of soldiers in an expensive occupation, turned many Kashmiris into potential traitors and damaged India’s reputation for political decency. If India is to regain Kashmiris’ loyalty and the rest of the world’s respect, it needs to give the state the autonomy that Jawaharlal Nehru, India’s greatest Kashmiri, long time ago promised.”<sup>45</sup>

<sup>42</sup>For an excellent discussion of Indian and Pakistan claims to Kashmir as an entitlement issue, that is, over original right to territory see Robert Wirsing, *India, Pakistan and the Kashmir Dispute: On Regional Conflict and Its Resolution*. (New York: St. Martin’s Press, 1994), ch. 1.

<sup>43</sup>In asymmetric conflicts, the root of the conflict lies not in particular issues or interests that may divide the parties, but in the very structure of who they are and the relationship between them. In such conflicts the structure is such that the top dog always wins, the underdog always loses. The only way to resolve the conflict is to change the structure of unbalanced relationships into peaceful and dynamic one.

<sup>44</sup>Hugh Miall, Oliver Ramsbotham, Tom Woodhouse, *Contemporary Conflict Resolution: The Prevention, Management and Transformation of Deadly Conflicts*. (London: Polity Press, 2000), p. 12.

<sup>45</sup>“The Kashmiris’ case,” *The Economist*. May 20, 1995.

These internal costs relating to governance problems for India pale into insignificance when one contemplates the devastation that would ensue from an India-Pakistan conflict over Kashmir turning nuclear. According to one estimate a limited counter-value nuclear exchange between the two countries could result in twelve million deaths.<sup>46</sup> The advent of nuclear weapons in South Asia not only has given both India and Pakistan a shared stake in war-avoidance over Kashmir but has also imposed a common obligation on them to avoid violent conflict behaviour marked by threats, coercion and destructive attacks against each other.<sup>47</sup>

The third factor that makes Rawlsian principles so promising for the Kashmir dispute is the stability value of the difference principle. "A system", according to Rawls, "is in equilibrium...when it has reached a state that persists indefinitely over time." A stable equilibrium exists when the system returns to its original state after external forces have impinged upon it, and it is unstable if these forces succeed in changing it permanently. Given Rawls's analysis of the least or most disadvantaged, one can ask how stable or unstable the equilibrium of a Kashmir settlement would be with regard to the distribution of advantages or disadvantages amongst all the parties. If pursued in earnest, the difference principle (providing that the least advantaged gain as a result of gain to the most advantaged) would serve as a stabilising force since all cases of gains for the most advantaged will concomitantly yield benefits for the least advantaged as well. If a settlement based on the difference principle can be stable in terms of gains for every body, then the obverse condition of a decline, wherein any loss to the least advantaged is matched by some loss to the most advantaged, should also have some stability value. This has been termed as "negative difference principle" by Midlarsky to reflect the negative sum of both losses in contrast to the positive sum of the Rawlsian statement."<sup>48</sup> The operation of the "negative difference principle" would cushion an agreed settlement against risks of failure as losses would accrue not only to the least advantaged but also to the most advantaged as well. The setting up of a formal mechanism for the institutionalisation of common losses would be a vital component for underwriting the stability of the settlement.

And finally, underlying principles of Rawlsian theory of justice have acquired a special significance for Kashmir dispute as issues of entitlement to and distribution of water resources between India, Pakistan and the state of Jammu and Kashmir become "securitised". Due to increase in water stress in India and Pakistan, the 1960 Indus Water

<sup>46</sup>The Natural Resource Defense Council estimate cited in Dr. Zulifqar Khan, "India Pakistan Nuclear Rivalry: Perceptions, Misperceptions and Mutual Deterrence," IPRI Paper No. 9 (Islamabad: IPRI, 2005), p. 36

<sup>47</sup>The January 6, 2004 joint statement signed by Pakistani President General Pervez Musharraf and the Prime Minister of India Atal Bihari Vajpayee during the SARRC Summit in Islamabad noted that "...in order to take forward and sustain the dialogue process, violence, hostility and terrorism must be prevented." It further said that "President Musharraf reassured Prime Minister Vajpayee that he will not permit any territory under Pakistan's control to be used to support terrorism in any manner." For complete text see *The News* (Islamabad) January 7, 2004.

<sup>48</sup>Manus I. Midlarsky, "Balance of Power as a "Just" Historical System," *Polity*. Vol. xvi, No. 2 (Winter 1983), p. 185. Viewing the negative difference principle as a condition for stability in domestic life, Midlarsky states: "Both sectors move in the same direction and a common fate or destiny is perceived throughout society. A strong destabilising condition develops, on the other hand, where the sectors move dissynchronously, where the most advantaged gain either at the expense of the least advantaged, or push forward without any gain at all to the least advantaged." *Ibid*.

Treaty has come under strain. The looming crisis of water scarcity in the subcontinent necessitates finding viable resource distribution principles. Here consideration of their water needs on the basis of the difference principle could be of immense help. Commenting on the need for standards of equity required in such matters of natural resource distribution as water, Charles R. Beitz says:

“...the resource distribution principle would function in international society as the difference principle functions in domestic society. It provides assurance to persons in resource-poor societies that their adverse fate will not prevent them from realising economic conditions sufficient to support just social institutions and to protect human rights guaranteed by the principles for individuals. In the absence of this assurance, these nations might resort to war as a means of securing the resources necessary to establish domestic justice, and it is not obvious that wars fought for this purpose would be unjust.”<sup>49</sup>

If nuclear-armed India and Pakistan have to avert the horrifying prospect of future water wars between them, then it is imperative that they find a fair formula that allows them to secure fair conditions for the development of their respective national schemes to deal with the critical problem of water scarcity. Rawlsian theory of justice which regards society as a “cooperative venture for mutual advantage” based on the difference principle offers them a way out of this bleak scenario.

<sup>49</sup>Charles R. Beitz, *Political Theory and International Relations*. (Princeton, New Jersey: Princeton University Press, 1979), pp. 141-142.

*Summary of the Proposed Solutions for Kashmir Dispute (1947–2005)*

| Period    | Source  | Nature of Solution                   | Basic Principles   | Status   | Responses                           |   |  | Comments  |   |
|-----------|---|--------------------------------------|--|--|-------------------------------------|---|--|---|---|
|           |   |                                      |  |  | India                               | Pakistan  | Kashmiris  | Pros  | Cons  |
| 1947-57   | Sir Owen Dixon's proposal   | Hold Plebiscite in Jammu and Kashmir | Kashmir belongs neither to India nor to Pakistan, rather it belong to Kashmiris.           | Awaiting implementation (World wary of self-determination) | India accepted, but later renegeed. | Favoured option, officially committed to pursuing it. | Supported by majority of Kashmiris, now including APHC | <ul style="list-style-type: none"> <li>- Values self-determination</li> <li>- Puts Kashmiris at the centre</li> <li>- Enjoys UN legitimacy</li> <li>- Practicable esp. in its regional form.</li> <li>- Goes beyond status quo</li> </ul> | <ul style="list-style-type: none"> <li>- Rejected in the past.</li> <li>- Does not allow third option</li> <li>- Ignores the ethnic, linguistic and religious complexity of the J &amp; K</li> </ul>                            |
| 1958-1968 | India-Pakistan Statement of Objectives (1963)   | Political, peaceful settlement       | Equitable, honourable and final boundary settlement  | Abandoned  | Agreed                              | Agreed  | Excluded   | <ul style="list-style-type: none"> <li>- Consensus statement</li> <li>- Addresses Indian and Pakistani concerns</li> </ul>  | <ul style="list-style-type: none"> <li>- Does not address present-day realities</li> <li>- Excludes Kashmiris</li> <li>- Suffers from the stigma of secrecy</li> </ul>  |
|           | Tashkent Declaration (1966)   | Status Quo                           | Status Quo   | Overtaken by events  | Agreed                              | Agreed  | Excluded   | <ul style="list-style-type: none"> <li>- Brokered by third party.</li> <li>- Addresses Indian and Pakistani concerns</li> </ul>   | <ul style="list-style-type: none"> <li>- Devoid of practical steps.</li> <li>- Out of step with current realities</li> </ul>  |
|           | Sumit Ganguly's proposal, first offered by Indian Prime Minister Lal Bahadur Shastri After Tashkent Declaration | Status Quo                           | Convert line of control into recognised international boundary between India and Pakistan. | Possible solution; under consideration                     | Favoured                            | Rejected  | Rejected   | <ul style="list-style-type: none"> <li>- Enjoys global support.</li> <li>- Accepts ground reality as truth</li> <li>- Avoids disruptive change</li> </ul>   | <ul style="list-style-type: none"> <li>- Violates self-determination</li> <li>- Divides Kashmiris</li> <li>- Not acceptable to Pakistan</li> <li>- Has not worked in the past.</li> <li>- Equates reality with truth</li> </ul> |

|           |  |                                   |  |  |                                      |                                     |   |   |  |
|-----------|--|-----------------------------------|--|--|--------------------------------------|-------------------------------------|---|---|--|
|           | Selig Harrison's Proposal discussed between President Ayub and Prime Minister Nehru in 1964. | A Trieste Solution                | In Italy and the Former Yugoslavia, residents of Trieste were given free access to the other side. The same solution was suggested for Kashmir, while giving a special autonomous status to the region. Defence, foreign affairs, communication and currency would be controlled by both India and Pakistan, leaving Kashmir independent in all other matters. | Possible solution; under consideration | Fall-back option                     | Opposes                             | Opposes   | <ul style="list-style-type: none"> <li>- Enjoys international support.</li> <li>- Seeks to transform the dynamics of Kashmir conflict</li> <li>- Offers incremental rather than abrupt change.</li> <li>- Has a people-centric perspective</li> </ul> | <ul style="list-style-type: none"> <li>- Ignores the end goals of the Kashmiri freedom movement.</li> <li>- Suffers from a flawed analogy.</li> <li>- Puts too much confidence in CBMs to deliver peace</li> </ul>                         |
| 1969-1979 | Simla Agreement  | Status-quo pending final solution | Bilateral approach, including mutually acceptable forms of mediation.  | Possible solution; under consideration | Favoured, with narrow interpretation | Favoured, with broad interpretation | Indifferent   | <ul style="list-style-type: none"> <li>- Provides a framework for achieving progress.</li> <li>- Forbids use of force.</li> <li>- Has int. support</li> </ul>   | <ul style="list-style-type: none"> <li>- Contested Indian and Pakistani interpretations.</li> <li>- Excludes Kashmiris.</li> <li>- Treats J &amp; K as a bilateral issue</li> </ul>  |
| 1980-1990 | Robert Wirsing's proposal  | International mediation           | Apply international pressure more deliberately, consistently, and impartially in order to resolve the dispute.   | Possible solution until recently       | Strongly opposed                     | Favoured                            | Divided; some segments support, while others oppose | <ul style="list-style-type: none"> <li>- Seeks global involvement.</li> <li>- Has advantages of third party mediation.</li> <li>- Focuses attention on Kashmir as a trouble spot</li> </ul>   | <ul style="list-style-type: none"> <li>- Assumes third parties are neutral players.</li> <li>- Opposed by India.</li> <li>- Takes the initiative away from Kashmiri's.</li> <li>- Gets Kashmir tangled in global power dynamics</li> </ul> |

*Continued—*

*Summary of the Proposed Solutions for Kashmir Dispute*

| Period    | Source  | Nature of Solution            | Basic Principles  | Status                                 | Responses   |                   |   | Comments   |   |
|-----------|---|-------------------------------|---|--|---|-------------------|---|--|---|
|           |   |                               |   |  | India   | Pakistan          | Kashmiris   | Pros   | Cons  |
| 1991-2001 | Proposal of BJP & other Hindu Nationalist movements | Demographic change in Kashmir | Opening Kashmir to Hindu and Sikh settlement to transform Kashmir into a Hindu-Sikh majority state. | Internationally rejected               | Divided; some segments support, while others oppose | Strongly opposed  | Strongly opposed                                    | -Favours settlement of J & K on Indian terms.<br>-Transforms current dynamics of Kashmir conflict by creating new facts on ground              | -Totally unacceptable to Pakistan and majority of Kashmiris.<br>-Puts Pakistan at an extreme disadvantage.<br>-Legitimises Indian hegemony over Kashmir |
|           | Jammu & Kashmir Liberation Front (JKLF)             | Independent Kashmir           | Recognition of fully independent and democratic state of Jammu and Kashmir                          | Remains a possibility                  | Strongly opposed                                    | Strongly opposed  | Divided; some segments support, while others oppose | -Puts Kashmiris at the centre stage.<br>-Broadens the scope of existing binary options.<br>-Unhinges Kashmir from India-Pakistan stranglehold. | -Opposed by both India and Pakistan.<br>-Marred by partisan advocacy.<br>-Contested option.   |
|           | The Kashmir American Council                        | Active US mediation           | Initiate step by step peace process through US-supervised negotiations                              | Possible solution; under consideration | Strongly opposed                                    | Strongly favoured | Favoured, with reservations                         | -Incremental approach.<br>-U.S-brokered deal.<br>-Advantages of third party involvement  | -Opposed by India.<br>-US not a neutral party.<br>-After 9/11 US credibility as honest-broker severely undermined                                       |

| Period | Source                          | Nature of Solution  | Basic Principles   | Status  | Responses        |                  |                             | Comments   |  |
|--------|---------------------------------|---|--|---|------------------|------------------|-----------------------------|--|--|
|        |                                 |   |  |   | India            | Pakistan         | Kashmiris                   | Pros   | Cons   |
|        | Raju Thomas's proposal          | Create several Independent states                               | Create several independent states in South Asia, along ethnic and religious lines  | Not valid; threatens to further enhance ethnic violence | Strongly opposed | Strongly opposed | Favoured, with reservations | -Treats South Asia as a potential security community<br>-Cognizant of the linguistic, cultural, ethnic and religious diversity of the region and that of J & K   | -Too idealistic<br>-Understates the force of integral nationalism in the region.<br>-Will encounter opposition from India and Pakistan.<br>-No clear road map for achieving stated goals.        |
|        | Pervaiz Iqbal Cheema's proposal | Combination of partition, limited plebiscite and UN-trusteeship | Azad Kashmir and Baltistan stay with Pakistan; Jammu and Ladakh with India and Kashmir valley should be put under UN trustee-ship for a decade or more until a final plebiscite. | Possible solution; under consideration                  | Opposed          | Opposed          | Mostly opposed              | -Takes a practical view of the situation.<br>-Seeks tripartite division of J & K along religious, cultural and ethnic lines.   | -Opposed by India.<br>-Not favoured by most Kashmiris.<br>-Variation on Dixon proposal – faces the same problems.  |
|        | Kashmir Study Group             | Shared sovereignty  | Trilateral Discussions   | Widely discusses  | Opposed          | Flexible         | Favoured with reservations  | -Taken seriously by India, Pakistan and the Kashmiris.<br>-Takes into account the ground realities of the Kashmir situation and also the national interest of India and Pakistan.<br>-Pedaled by a Kashmiri-American.<br>-Promotes Kashmiriyat | -Opposed by extremist Hindu parties in India.<br>-Tainted by its American origins.<br>-Falls short of full sovereignty for the Kashmiris.<br>-Is opposed by vocal sections in India and Pakistan |

| Period | Source                    | Nature of Solution               | Basic Principles  | Status                                | Responses  |                                    |   | Comments   |  |
|--------|---------------------------|----------------------------------|---|---------------------------------------|--|------------------------------------|---|--|--|
|        |                           |                                  |   |                                       | India  | Pakistan                           | Kashmiris   | Pros   | Cons   |
|        | Ayesha Jalal              | Create a Sovereignty Association | A sovereignty association within a political framework for a unified and independent Kashmir would accommodate the fears and interests of the two main regional powers. | Unlikely                              | Opposed  | Unconvinced                        | Unconvinced, though some segments demand unification and independence | -Seeks to change the status quo by changing thought patterns.  | -Too idealistic<br>-ignores ground realities.<br>-Ignores the force of Pakistani, Indian and Kashmiri nationalisms.  |
|        | Mushtaq ur Rahman         | Divided Kashmir                  | Indus Water Treaty as a model   | Hotly discussed                       | Acceptable as a fall-back position                           | Acceptable as a fall-back position | Unacceptable  | -Builds on past experience.<br>-Guards economic interests of India and Pakistan.<br>-Has greater chance of acceptance for its logical appeal | -Legitimises the status quo.<br>-Ignores self-determination and issues of justice.<br>-Treats J & K as a real estate issue and ignores its human and cultural dimensions |
|        | Lahore Declaration (1999) | Negotiated settlement            | Bilateral discussion  | Hotly discussed                       | Acceptable as a viable solution                              | Agreeable, with reservations       | Excluded  | -Builds on past experience.<br>-Calls for a negotiated settlement through dialogue   | -Opposed by right wing parties in Pakistan.<br>-No clear road map  |
|        | The Andorra Model         | India-Pakistan Condominium       | Bilateral discussion  | In circulation among American circles | Might be acceptable as an alternative to Independent Kashmir | Agreeable as fall back position    | Excluded  | -India-Pakistan joint control.<br>-Satisfying for both.  | -Variant on maximum autonomy and likely to be opposed by leading Kashmiri groups.<br>-Flawed analogy between Andorra and J & K   |

| Period    | Source                                  | Nature of Solution                                  | Basic Principles                         | Status   | Responses                       |   |  | Comments   |   |
|-----------|---|---|--|--|---------------------------------|---|--|--|---|
|           |   |   |  |  | India                           | Pakistan  | Kashmiris  | Pros   | Cons  |
| 2001-2005 | The Chenab Formula                      | Division of J & K                                   | Bilateral discussions                    | Discussed during Track II (Niaz A Naik- R.K Mishra Talks | Might be acceptable to Pakistan | Opposed by India                                  | Excluded   | -Addresses the water issues.<br>-Rationalised division of Kashmir on religious basis   | -Opposed by India.<br>-Legitimises status quo.<br>-Narrow focus<br>-Ignores larger dimensions of the problem  |
|           | The Musharraf Proposal                  | Division and demilitarisation on geographical basis | Bilateral discussions                    | Hotly debated in Pakistan                                | Acceptable to Pakistan          | Rejected by India                                 | Mixed reaction from Kashmiri groups                          | -Unfreezes the status quo.<br>-Marks a shift in Pakistani thinking on the Kashmir issue.<br>-Departure from stated positions   | -Opposed by India.<br>Opposed by religious parties in Pakistan.<br>-No clear road map.<br>-Variation on Dixon proposal  |
|           | The Aaland Islands Model                | Demilitarisation, limited autonomy                  | International involvement and guarantees | Seldom discussed   | Not acceptable to Pakistan      | Offered to Kashmiris as part of autonomy formulas | Mixed reaction from Kashmiri groups. Majority not in favour. | -Stabilises the status quo;<br>-Seeks international involvement;   | -Opposed by Pakistan;<br>-Flawed analogy with Kashmir due to differences in size, history, ethnicity and India-Pakistan stakes;<br>Presumes global willingness to help.             |
|           | The Good Friday Agreement (Irish Model) | Sustained and structured dialogue process           | Popular consent and self-determination   | Hotly discussed  | As a possible option            | Widely discussed                                  | Widely discussed without outright rejection                  | -Centrality of self-determination;<br>-Popular participation;<br>-Third party mediation:<br>-Ignores the fact that Kashmir is an international conflict while Ireland is essentially an internal issue of unification. | -Conflicts with stated Indian position on Kashmir;<br>-Presupposes institutionalised and structured dialogue process between India, Pakistan and the Kashmiri's which is not there. |

Copyrights reserved by Dr Rifaat Hussain. This table is part of a longer paper being written by the author. Not to be quoted or used without explicit permission of the author.











