



PENSION SYSTEM REFORMS FOR PAKISTAN: CURRENT SITUATION AND FUTURE PROSPECTS

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PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS

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and Future Prospects**

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EXECUTIVE SUMMARY

The study deals with pension system reforms for the Pakistan economy and highlights the current situation and future prospects.

The study presents an overview of the problems prevailing in current pay-as-you-go pension system, empirical evidence on pension system reforms, the strengths and weaknesses of the pension system of Pakistan and the major issues in pension system reforms. Furthermore, Serrano's (1999) overlapping generation model is used to explore the effects of pension system reforms on capital accumulation, poverty, income distribution and fiscal position of government in Pakistan.

The simulation analysis shows that pension system reform will increase the level of physical capital in the economy but the increase will be larger, the larger the fraction of population composed of poor individuals and higher the level of human capital owned by the poor. Under all the parametric assumptions considered the effect of reforms on the present value of lifetime earning of poor individuals is positive but this improvement is larger, the larger the fraction of total stock of effective labour owned by poor agents who have relatively lower human capital per person.

The study also finds that for some initial distribution when access to the financial system is restricted to poor individuals, the income distribution may improve due to reforms. Moreover different initial distributions will have different effects on fiscal policy needed to finance transition cost of the reform. The income tax rate required to keep the level of debt unchanged increases with increase in the fraction of population represented by rich agents and with increase in the fraction of population having access to the financial system. Furthermore, the income tax rate required to keep the level of debt unchanged is also higher if the endowment of human capital owned by rich agents is higher.

Chapter 1

INTRODUCTION

Pension systems are intended to give an income support to those individuals who bear a loss in earning capability during old age, incident of disability or death of wage earner in the family. Thus, pension systems aim to reduce poverty among the old individuals and strive to smooth consumption between the working years and the retirement years, in such a way that individuals do not bear a massive drop in living standards when old age and disability reduces their earning ability. The former objective is obtained through non-contributory pension system and the later through contributory pension system.

Most formal pension systems around the world are publicly managed, pay defined benefits, and are financed by payroll taxes on a pay-as-you-go basis. In pay-as-you-go pension system current workers' contributions are used to pay pension benefits to current retirees.

Schwarz (2006) argued that life expectancy disparity between income classes has a tendency to make the defined benefit scheme regressive. Higher income groups will receive higher total benefit even if monthly pension is identical, as they will collect benefits for a long period of time because of their longer life expectancy. In most of the countries coverage under the pay-as-you-go pension system is not complete and fiscal resources are collected from a broader population to cover pensions for the minority, usually the higher income group.

The existing public pay-as-you-go pension system is expected to become fiscally unsustainable in near future. The most important threat comes from the changing demographic structure. The continuous fall in fertility rates coupled with rising life expectancy leads to a decline in the proportion of children and an increase in the proportion of elderly. The number of pensioners per worker is increasing continuously; hence higher wage taxes are required to provide pension benefits to growing number of retirees. So, the growth of large implicit pension debt coupled with financing gap makes the current pay-as-you-go pension system unsustainable in many countries.

If safety measures are not undertaken in response to aging of population then it is expected that the existing pay-as-you-go pension system will become insolvent in many countries. In order to avoid the dangers associated with pay-as-you-go pension system, the World Bank

has recommended a multipillar pension system. These new arrangements contain three pillars [Holzmann (2000), Holzmann, *et al.* (2005), James (1998)]:

- A mandatory, publicly managed, tax-financed pillar for redistribution,
- A mandatory, privately managed, fully funded pillar for savings, and
- A voluntary pillar for people who want more protection in their old age.

The most important of these arrangements is the second pillar. So, in this study we explore the characteristics of fully-funded pension system. In fully-funded pension system workers make contributions to their own accounts and pension benefits at the time of retirement are determined by the amount that individuals have in their accounts. In this system workers' contributions are invested and investment earnings form an important part of pension benefits provided to the individuals.

In order to avoid the dangers associated with pay-as-you-go pension systems, several Latin American, OECD, and transition countries have reformed their pension systems. These pension reforms can be grouped into at least two different categories involving minor reforms and major reforms. Minor or parametric reforms involve changes in parameters of current pension system such as contribution rate, structure of benefits and eligibility criteria whereas major or systematic reforms involve introduction of a new type of pension system like fully funded pension system to replace or complement the existing system.

Parametric or minor reforms do not provide a permanent solution to fiscal problems of pay-as-you-go pension system as these just postpone the fiscal burden for a short period of time and open the door for yet more reforms. In almost all cases parametric reforms in current pension system will reduce the level of pension or require greater contributions and thus put elderly in risk of poverty.

Systematic reform in pension system provides permanent solution to fiscal problems of pay-as-you-go pension system. Many countries in the past two decades have shifted from pay-as-you-go defined benefit system to fully-funded defined contribution system or to a mixed system having both components.

Large payroll tax increases that are needed in pay-as-you-go pension system with population aging can be avoided in fully-funded pension system. In this system governments are not required to make promises that they will be unable to fulfill tomorrow. Moreover, it

avoids unintentional intergenerational transfers from young to older persons. In fully-funded pension system contributions to pension system are saved as capital and contribute to capital accumulation process, which is not possible in pay-as-you-go pension system.

However, the economy undertaking a shift from pay-as-you-go to fully-funded pension system has to incur the transition cost for shifting to a fully funded pension system because the government must continue to pay pensions to current pensioners even if workers start to put part or all of their contributions into individual defined-contribution accounts.

The regressiveness of the system will increase during the transition period because government will pay pension to the covered minority by collecting general revenues from the whole population. However, keeping in view the rising cost of pay-as-you-go pension system, there is a need to consider this regressiveness as a temporary cost essential to remove regressiveness in the system on permanent basis.

Objective of the study is to explore: the following.

- Whether there is a need for reforms in the pension system of Pakistan?
- Are we facing or are expecting to face in the next 20 or 30 years the same problems in our pay-as-you-go pension system as faced in several other developing countries?
- In case we are facing the same problems then should we substitute defined-benefit pay-as-you-go system by fully-funded defined contribution system based on individual account with minimum pension guarantee provided by government?
- What effects a transition from pay-as-you-go pension system to fully-funded system may have on income distribution, poverty, government's fiscal position and capital accumulation?

The remaining portion of the study is organised as follow. In chapter 2 we present the problems prevailing in current pay-as-you-go pension system. In chapter 3 we present empirical evidence on pension system reforms. In chapter 4 we review the strengths and weaknesses of the pension system of Pakistan and discuss the major issues in pension system reforms. In chapter 5 we use Serrano's (1999) overlapping generation model to explore the effects of pension system reforms on capital accumulation, poverty, income distribution and fiscal position of the government in Pakistan. Finally, chapter 6 concludes the study.

Chapter 2

PROBLEMS IN PENSION SYSTEMS

2.1. Introduction

Most of the systems of old age security are publicly managed schemes and financed by payroll taxes on a pay-as-you-go basis. Pay-as-you-go public pension system is under increasing strain throughout the world. Schwarz *et al.* (1999) and James (1998) pointed out that over the next 35 years, the fraction of world's population that is above 60 would roughly double, from 9 percent to 16 percent. Rising life expectancy and declining fertility rates are resulting in problem of population ageing. More and more countries are facing this problem.

High wage taxes are required in order to provide pension benefits to growing number of retirees and this situation results in high evasion and pushes labour into informal sector. So the burden on public treasury increases and public spending on projects that enhance growth and development including investment in infrastructure, education, or in health services for the young is also squeezed.

Keeping in view all these pressures to change the existing systems, a large number of countries around the world are undertaking pension reforms. However, all reforms that are taking place around the world may not provide a permanent solution to the above mentioned problems. Most of these reform options are just intended to delay the looming crises for a few more years [Schwarz (2006) and Schwarz *et al.* (1999)].

It is now widely recognised that publicly managed pay-as-you-go pension system generates many problems. In this chapter we discuss the problems prevailing in old pay-as-you-go pension system, which accelerated the process of pension system reforms around the world. In section 2 we discuss different forms of pension system, in section 3 we discuss the problems that are prevailing in current pay-as-you-go pension system and in section 5 we discuss the alternative approaches to managing these problems.

2.2. Forms of Pension System

Pension system provides an income support to those individuals who endure a loss in earnings capability because of old age or incident of disability or death of wage earner in the family. The details of different forms of pension system are given below.

2.2.1. Contributory Pension Systems

Contributory pension systems are the most important forms for providing income support to elderly. Contributory pension systems are distinguished either by the financing mechanism or by benefit structure.

Financing methods are in general of two types.

- Pay-As-You-Go mechanism
- Fully-funded mechanism

2.2.1.1. Pay-As-You-Go Mechanism

In pay-as-you-go pension system current workers make contribution based on their current earnings. The contributions collected through this system are instantly used to pay pensions to current retirees. The government only makes a promise to current workers who make contribution that it will pay benefits related to these contributions when the workers become eligible for pension.

2.2.1.2. Fully-Funded Mechanism

In the fully-funded pension system workers make contribution to their own accounts. In this system workers' contributions are invested rather than paying pension to current retirees. The investment earnings are essential part of benefits finally paid to workers. These investments can be administered by monopolistic public agency or competitively with the involvement of private sector.

Benefit methods are also of two types.

- Defined benefit mechanism
- Defined contribution mechanism

2.2.1.3. Defined Benefit Mechanism

Under the defined-benefit mechanism, the benefit provided is specified in some way. According to Schwarz (2006) pension received under the defined benefit system is usually a function of income, articulated as a fraction of income per year of contribution. However, it may also be defined in some other manner. Either the government in a public plan or the employer in an employer-based plan is responsible to give the pensions.

2.2.1.4. Defined Contribution Mechanism

Under the defined contribution mechanism, the contribution is defined as a percentage of wages, and rates are also defined for employees, employers, and for the government. The final pension is

determined by the amount that the individuals have in his pension accounts at the time of retirement. The pension that an individual receive at the time of retirement depends on both the contributions and the investment earnings on these contributions.

In general defined benefit systems are of the pay-as-you-go type, and defined contribution systems are of the fully funded type.

2.2.2. Noncontributory Pension Systems

The purpose of noncontributory pension is poverty reduction among the elderly. Even in the presence of contributory system, there will always be some people who do not participate regularly to qualify for pension benefits or whose lifetime incomes depart them with less pension benefits. All these types of people are at risk of poverty in old age. Most high and middle-income countries with contributory systems also offer minimum benefits or noncontributory benefits for those who do not meet the criteria for contributory pensions. These minimum benefits can occur in the form of a demogrant such that everyone above a certain age receives the benefit conditional on citizenship requirement in countries like Nepal and New Zealand, or it can also take the form of means tested whereby only those aged people with incomes below a certain threshold level are entitled to collect the benefits.

2.3. Problems in Pay-As-You-Go Pension System

In pay-as-you-go pension system today's workers pay the pensions for those who have retired. A variety of problems exist in pay-as-you-go pension system around the world. These problems are found in most countries, both industrial and developing. The detail is given below.

2.3.1. International Demographic Trends

The age structure of the population around the world is changing with increasing life expectancy and declining birth rates. Such demographic change will result in larger proportion of older people. Demographic characteristics of different regions around the world are presented in Table 2.1 and Table 2.2.

Table 2.1 shows that in 2000 high income OECD countries had the highest percentage of population above the age of 60, whereas Africa and Middle East had the youngest population.

Table 2.2 shows the ratio of the working age population between the ages of 20 to 59 relative to the population above 60. The projected demographic trends in the high-income developed countries imply that over the next three to four decades, the number of workers relative to

retired individuals will contract to a large extent. It demonstrates that the working population of countries providing financial support for the public pay-as-you-go pension systems will shrink relative to the number of retirees being supported by the system.

Table 2.1

Percentage of Population Over Sixty Years Old, 2000-2040

Economy	2000	2010	2020	2030	2040	Percent Change 2000-40
High-income OECD	19.6	22.4	26.5	30.7	32.6	65.79
Latin America and the Caribbean	9.0	9.9	12.3	16.3	20.0	121.76
Eastern Europe and Former Soviet Union	15.7	16.8	20.5	23.3	25.9	64.80
North Africa and the Middle East	6.5	8.0	11.4	14.3	17.0	159.65
Sub-Saharan Africa	5.0	5.0	5.6	7.0	8.9	76.29
Asia	7.2	8.4	11.3	14.8	17.5	142.03

Source: Zychowicz (2003).

In the year 2000 the ratio of working age population between the ages of 20 and 59 to citizens older than 60 was highest in Sub-Saharan Africa and North Africa and the Middle East at 8.6, whereas in Latin America and Asia this figure was 6.2 and 7.3, respectively. For the Eastern European countries, the ratio of working age individuals to those above 60 was on average 3.8.

Table 2.2

Population Aged 20 to 59 Divided by Population Over 60 Years Old

Economy	2000	2010	2020	2030	2040	Percent Change 2000-40
High-income OECD	2.9	2.5	2.0	1.6	1.4	-50.87
Latin America and the Caribbean	6.2	6.1	5.2	3.8	2.9	-53.70
Eastern Europe and Former Soviet Union	3.8	4.0	3.1	2.5	2.1	-44.42
North Africa and the Middle East	8.6	7.4	5.8	4.5	3.7	-56.82
Sub-Saharan Africa	8.6	9.5	9.2	8.2	6.9	-20.13
Asia	7.3	6.7	5.6	4.4	3.7	-49.58

Source: Zychowicz (2003).

The two tables show that current and projected demographic trends in Africa, Asia, Latin America and the Middle East may have the potential for sustaining retirement programs on a pay-as-you-go basis. But with decreasing fertility rates and rising life expectancy (see Figures 2.1 and Figure 2.2), the ratio of workers available to support growing number of retirees will also shrink. Therefore,

assessment about the pension system reforms capable of facing these changing demographic trends are also important for emerging market countries.

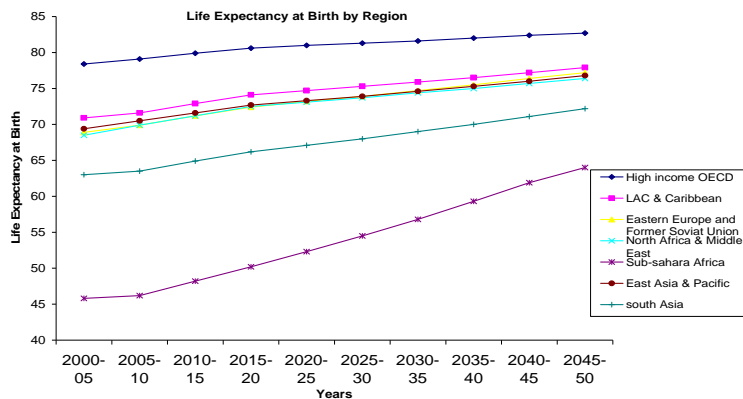
So the analysis shows that the OECD countries at present have the oldest populations as on average the ratios of people between the ages of 20 and 59 to individuals above the age of 60 is lowest. On the other hand, demographic projections for the next four decades point out that the utmost percentage increases in older people will take place in North Africa and the Middle East, coupled with the largest percentage declines in the number of young workers accessible to support those individuals who are above the age of 60. So the demographic projection shows that the current pay-as-you-go pension system will become financially unsustainable in the near future.

2.3.2. Budgetary Conditions of Public Pension Schemes

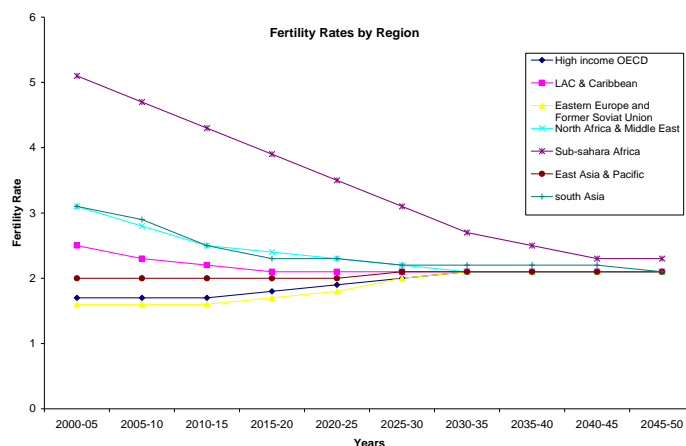
The most important problem that sets in motion the process of pension reform is the fear that financial equilibrium of public pensions will be in severe threat. The most apparent danger comes from the changes in age structure of population and subsequent ageing process, with its overwhelming effect on pension budgets.

According to the Cross sectional analysis presented in James (1998), expenditure on public pension plans raises exponentially as population ages. In some industrial countries, for example, it is now more than 15 percent of gross domestic product and similarly many countries will reach at that stage as demographic change proceeds

Fig. 2.1. Life Expectancy at Birth by Region (2000-50)



Source: WDI (2006).

Fig. 2.2. Total Fertility Rates by Region (2000-50)

Source: WDI (2006).

Schwarz (2006) pointed out that pension system deficit could be large relative to gross domestic product and the overall fiscal deficits of a country. In Brazil in the late 1990s, for example, three-fourths of the government fiscal deficit of 8 percent of gross domestic product directly came from social security. In countries like Serbia, pension funds deficit runs to 7 percent of gross domestic product. Such large deficits are clearly harmful for the entire economy

The entire list of countries where uncertainties about future sustainability and affordability of public pension systems are adequately influential to stimulate governments to put pension reform on the schedule cannot be presented here. Some important examples are Japan, The United States, Switzerland and several other countries of western and Eastern Europe, Australia, New Zealand and others [Tamburi (1999)].

Table 2.3 shows that on average, the public pension system in Eastern Europe has the highest pension tax burdens as percentage of gross wage whereas Sub-Saharan Africa has the lowest. Moreover, the major portion of the public pension tax burden falls on employers. The total pension tax as a percentage of gross wages is 19.4 percent in the high-income OECD countries. Total pension taxes on average are lower in Latin America, Asia and the Middle East.

Table 2.4 shows that high income OECD countries have the highest degree of pension expenditure as percentage of GDP where on average it is about 10 percent whereas the public pension expenditure of the East European and Former Soviet Union countries is 7.11

percent. The available statistics illustrates that the Sub-Saharan countries have the lowest amount of pension expenditure as percentage of GDP.

Table 2.3

Pension Tax as Percentage of Gross Wage

Region	Employer	Employee	Total
High-income OECD	11.4	8.1	19.4
Latin America and the Caribbean	6.6	5.1	11.7
Eastern Europe and Former Soviet Union	26.2	4.9	30.6
North Africa and the Middle East	8.0	5.4	13.4
Sub-Sahara Africa	6.0	3.5	9.6
Asia	7.9	5.7	13.6

Source: Zychowicz (2003).

2.3.3. Labour Market Distortions

James (1998), Sarrapy, *et al.* (1996) and Corsetti, *et al.* (1995) argued that one setback of pay-as-you-go defined benefit systems is that the high payroll tax will possibly direct to labour market inefficiencies (resulting from distorted decision about labour force participation, age of retirement, hours worked, choice of job and location, degree of effort, and so on), whereas the contribution in fully-funded defined contribution system will be considered as saving rather than as a tax. High and growing payroll taxes boost the cost of labour that may increase unemployment. Firms react to higher pay-as-you-go labour costs by adopting less labour-intensive techniques of production or by moving to informal sector.

Table 2.4

Pension Spending as Percentage of GDP

Region	Pension Spending as Percentage of GDP
High-income OECD	10.01
Latin America and the Caribbean	3.47
Eastern Europe and Former Soviet Union	7.11
North Africa and the Middle East	3.07
Sub-Sahara Africa	0.66
Asia	1.98

Source: Zychowicz (2003).

2.3.3.1. Growing Informal Sector

High and rising payroll taxes results in evasion and escape to the informal sector, where efficiency is lower. Corsetti *et al.* (1995) through simulation analysis shows that a payroll tax rate of 20 percent could lead to a substantial (47 percent) swing to the informal sector, thus reducing the economy-wide growth by more than one percent annually.

In developing countries the distortionary labour market effects of pay as you go pension system may be larger because flight to the informal sector is easier there. Productivity in the informal sector may be lower because of less access to product and credit markets. Moreover, a wedge is created between wages and productivity in the formal versus the informal sectors because there are proper rules and regulations that set a minimum wage and other benefits in the covered formal sector.

2.3.3.2. Reduction in Supply of Experienced Labour

According to Wise (1997), the labour force participation rate of elderly people is highly responsive to the implicit social security tax on labour, due to the absence of penalties on early retirement. The fear to lose generous defined benefits during years when they continue working encourages most workers to stop working and take early retirement before they reach age 60. Early retirement reduces the supply of experienced labour, thereby placing the economy at a position below its potential.

2.3.4. Misallocation of Public Resources

As mentioned earlier, rising life expectancy and declining fertility rates are resulting in the problem of population ageing. So higher wage taxes are needed to provide a constant level of debt to the growing number of retirees. This situation results in enhancing the burden on public treasury. So pay-as-you-go public pension system results in misallocation of public resources as scarce tax revenues are used for pensions rather than for health, education, or infrastructure.

Most governments, such as those in Brazil, Mexico, and Turkey, have reacted to fiscal stresses in social security by compressing other expenditures [Schwarz (2006)].

2.3.5. Unintended Intergenerational Transfers

Pay-as-you-go public pension system results in unintended intergenerational transfers, especially to high-income groups. In an

unfunded system, intergenerational transfers take place routinely as a result of the aging and maturation process. For example, the early generations to be sheltered (including its rich members) gain, whereas later generations (including its poor members) lose, even though they did not have an opportunity to take part in the political choice that shaped this agreement [James (1998) and Schwarz (2006)].

2.3.6. *Lost Opportunities to Increase Long Term Savings*

The main feature of pay-as-you-go pension system is that, it is a transfer system between different generations. In pay-as-you-go pension system contributions to the system are not saved as capital, instead these are directly paid as pensions to current old people. So in pay-as-you-go pension system, contribution collected from current workers cannot be used to build long term savings because government use these contributions to finance the pension benefits of retirees. So these savings cannot be used in capital accumulation process.

2.3.7. *Low Coverage*

Goswami (2002) and Gillingham *et al.* (2001) stated that the most serious trouble with the current pension system is that it fails to get in touch with the vast majority of population and no safety net is available for those who are not covered under the system. The coverage is further shrinking due to the stronger growth of informal sector.

2.4. Alternative Approaches to Managing the Transition

The main reason for pension reforms has been to address the fiscal problems of pay-as-you-go pension system. From distributional perspective, this is the most important issue, given the incomplete coverage and the possibility for regressive distribution from un-covered lower-income groups to the covered higher-income groups.

Pension reforms can be classified into two different categories: parametric reforms or minor reforms, which involve changes in parameters of current pension systems, and systemic reforms or major reforms, which involve introducing a new type of pension system to replace or complement the existing system.

2.4.1. *Parametric Reforms*

Pension systems rely on three parameters including contribution rate, the benefit structure and eligibility criteria for receiving pensions. Many parametric reforms involve changes in these parameters. In general various pension reforms that are taking place around the world

in reaction to fiscal problems of pay-as-you-go pension system falls into this category.

According to Schwarz (2006), parametric or minor reforms, particularly in defined-benefit pay-as-you-go pension system will reduce the level of pension benefits and thus possibly pull more elderly persons under poverty line or necessitate larger contribution from workers, consequently putting people at risk of poverty.

Although parametric reforms provide solution to some of the fiscal burden but such problems still reappear in the long run. Parametric reforms provide a temporary solution for maintaining affordability and sustainability of pay-as-you-go pension system.

2.4.2. Systematic Reforms

To avoid problems of pay-as-you-go pension system, the World Bank has been recommending multipillar pension system. Many countries have been moving toward this system in which individuals' pensions are supported by privately managed pre-retirement savings. The new system contains three pillars [Holzmann (2000), Holzmann *et al.* (2005), James (1998)]:

- A mandatory, publicly managed, tax-financed pillar for redistribution;
- A mandatory, privately managed, fully-funded pillar for savings; and
- A voluntary pillar for people who want more protection in their old age.

The first pillar is like existing public pension plans, but it mainly focuses on redistribution. It provides a social safety net for the old whose lifetime income is low.

The second pillar is different from the traditional pay-as-you-go pension system. It associates benefits actuarially to contributions as in a defined contribution plan. This pillar is fully funded, and is privately and competitively managed. In such a system the contribution is defined as percentage of wages and the future pension is determined by accumulated contributions plus investment earnings on these accumulations.

A third pillar, voluntary saving and annuities, offers additional retirement income for people who want more protection in old age by having generous old age pensions.

The most important of these arrangements is the second pillar, so it is important to examine the underlying principle for its characteristics.

The justification for mandatory fully funded pension system is workers' myopia. A large number of people possibly will be shortsighted, might not save sufficient amount of money for their old age on a voluntary basis, and possibly will turn into a burden on society when they become old.

Lindbeck *et al.* (2003) argued that the individuals anxious about future needs tend to discount the near future at a much higher rate than the distant future (i.e. the retirement period). At each point in time, individuals would be concerned to save for retirement, but he constantly delayed inauguration of that saving until the next period (like a smoker who decides to quit smoking tomorrow rather than today). A person of this category lacks self-discipline; therefore he/she is well served by a mandatory pension system.

The rationale here for defined contribution system is that the close association between contributions and benefits in this new arrangement will discourage evasion, escape to the informal sector, and other labour market distortions because in this system people do not consider their contribution as a tax.

The justification for fully funded pension system is that in fully-funded pension system countries are not required to make promises today that they will be unable to fulfill tomorrow and it prevents large payroll tax increases that are required in a pay-as-you-go system with the problem of changing demographic structure. Furthermore it avoids large unintended intergenerational transfers from younger to older generations.

The characteristic of privately managed pension system implies that the investment strategy will be determined by the economic objectives instead of political interest. This produces the best allocation of capital and the highest return on savings. It helps countries develop their financial markets.

Several Latin American, OECD, and transition countries have already adopted multipillar systems, and many other countries are seriously thinking about the new system. Countries with large implicit pension debts are having difficulty in overcoming political opposition and transition costs. However, developing countries can choose a multipillar system almost from the start because they are at a relatively early stage.

Chapter 3

EMPIRICAL EVIDENCE ON PENSION REFORMS

In the decade of 1980s the public finance literature saw a sudden surge of interest among economists in economics of old age security especially public and private pension schemes. The literature mostly remained focused on managing huge old age dependence problem that the USA would be facing at the time of retirement of baby boomers after turn of the of 20th century.

The analysis of pension system reform was further intensified in the 1990s after the apparent success of Chilean model of pension. The rising costs of pay-as-you-go pension system forced many countries to reassess the formal programs that provide income maintenance support to the elderly population in the form of transfers. The major thrust of the model was a swing from pay-as-you-go pension system to fully funded pension system.

Reforming the current pay-as-you-go pension system is a major policy initiative offered by governments around the world to ageing populations fed up by failing old age security provisions. The pension system reforms are taking place at a growing speed and it ranges from Latin America (Chile 1981, Mexico 1991, Peru 1993, Argentina 1994 and Columbia 1994) to OECD countries (Switzerland 1985, Australia 1992, United Kingdom 1986, Italy 1996). Moreover, debates on major reform options are in process in other Latin American countries, some OECD countries, and many developing countries in Asia and Eastern Europe [Madrid (2002), Queisser, *et al.* (1997), Disney, *et al.* (2000), Schieber, *et al.* (1996)].

In the past, various studies have been conducted by researchers on the analysis of pension system reforms and measuring the efficiency gains from the policy initiatives. Most of the studies used the framework of Auerbach and Kotlikoff [1987] to explore the macroeconomic effects of pension system reforms. Empirical evidence on efficiency and growth effects of pension reform, mostly from Chile, supports the existence of positive economic growth effects resulting from increased labour market efficiency, mobilisation of long term saving and financial market development [James (1998)]. In this chapter, we discuss the existing theoretical and empirical literature on pension system reforms. We are unable to find any relevant theoretical or empirical study with reference to Pakistan.

Pension system reforms are usually necessitated by changes in demographic structure and the consequential financial unsustainability of many public systems. It is technically and politically complex to reform the public pension systems but more and more countries are now thinking to deal with the problem. The question is whether the reforms that will eventually be undertaken will be parametric or systematic that will not only protect elderly and lower income workers but also bring benefits to the macro economy.

Aiyer (1997), Schwarz (2006) and Chand (1999) stated that parametric or minor reforms involve changes in eligibility criteria such as retirement age, the rate of contribution or the structure of benefits. These changes are representative of many pension reforms that are taking place around the world. Countries in the Latin American region have been at the front compared to other countries in initiating systemic major reform from pay-as-you-go defined benefit to fully funded, defined contribution pension plans.

Schwarz *et al.* (1999) have pointed out that most of the reforms taking place are in response to fiscal problems. It would be preferable to initiate a reform strategy that can fix the problem, thereby put off the need for yet another reform in five-year time. Although parametric or minor reforms alleviate some of the fiscal burden but fiscal problems reappear in the long run. The study concludes that the only way to effectively solve the pension system issue on a permanent basis is to move toward the fully funded system currently underway in Latin America, Australia, Poland, and Kazakhstan and under consideration in a number of other countries.

There is widespread and extensive practice around the world for partial or complete shifts from pay-as-you-go pension system to fully funded pension system. Each country that initiates such a shift confronts unique problems depending on its demographic structure and economic situation.

According to Feldstein *et al.* (1996), the actuarial projection that the Social Security trust funds will be exhausted by the year 2030 in the U.S.A has promoted interest in alternatives to shift from the pay-as-you-go system to a funded or privatised system. The analysis shows that shifting to a funded system would permit the existing 12.4 percent payroll tax to be replaced in the long run by a payroll tax of about two percent because a funded system has a much higher rate of return than the implicit rate of return in a pay-as-you-go unfunded Social Security program.

According to the estimates provided in Boldrin *et al.* (1999), the existing public unfunded pension plans in most European countries are

expected to become fiscally unsustainable in about 15 to 25 years. This outcome is determined by a number of reasons including demographic trends, the rapidly increasing number of elderly in the population, the rapid decrease in labour force participation of men, the slow increase in participation of women, persistently high unemployment rate, the policy of increasing the real value of outstanding pensions at the rate of labour productivity growth rate, and the policy of increasing incentives for early retirement by people aged 55 and over.

James (1996) pointed out that the current social security systems in many OECD countries were implemented when real wages and population were growing swiftly. With these conditions, publicly managed payroll-tax-financed pay-as-you-go system was appropriate. But in the past 40 years, real wage growth has slowed down and population growth has stopped in OECD countries, so there is a need to increase taxes for the sustainability of pay-as-you-go pension system.

The study concludes that shifting partial responsibility to privately managed plans that are funded and that make a close link between benefits and contributions is likely to improve economic growth. Developing countries have the benefit that they can gain knowledge from this experience and take advantage from the improved international capital market. But they are required to learn quickly, given the rapid rate of demographic aging they face in the near future. The pension system that seemed right for OECD countries 40 years ago is simply not appropriate for developing countries today.

Feldstein (1997), Mitchell *et al.* (1997) and Carpio *et al.* (2002) argued that in many countries around the world the transition from unfunded pay-as-you-go pension system to fully funded pension system is now taking place. The specific rules and transition arrangements are different in all these countries but they all have the common feature of creating individual accounts. The recognition of two pillar movement (the first for redistribution and the second for savings) across the Latin American region suggests that separating the first and the second pillar of an old age retirement has great appeal. It paves the way for the old-age retirement system to handle redistribution and accumulation and gives workers a sense of ownership in their retirement accumulation

In the new fully-funded pension system mandatory savings are accumulated in individual accounts and invested in private financial assets to finance retirement benefits. The studies conclude that if transition is not made to fully funded or partially funded system then the increased longevity of the population in every country implies that the alternative to such a transition is a pay-as-you-go system coupled with a much higher tax rate than currently prevails.

Edwards (1996) made the analysis of Chilean pension system reforms. The study concludes that the reform has effectively substituted an inefficient, inequitable, insolvent pay- as-you-go system with a well functioning privately managed system. The reform has important effects on the functioning of the economy. The most important is that it has contributed to the extraordinary increase in the country's saving rate from less than 10 percent in 1986 to almost 29 percent in 1996. In the Chilean capital market the largest institutional investors are pension funds with assets exceeding 40 percent of GDP as compared to 0.9 in 1981. Moreover, the reform also has an important effect on labour market. First, pension reform reduced the cost of labour by reducing payroll taxes, thereby encouraged employment creation. Second, through capitalisation system, it has reduced significantly the labour tax element of retirement system. After the reform most workers tend to perceive their contributions as deferred compensation, rather than tax.

Sarrapy *et al.* (1996) analysed the Mexican pension reform of December 1995. The reform substituted a defined benefit pay-as-you-go system with a fully-funded system based on individual accounts with minimum pension guarantee provided by government. The study shows that the reform would have significant favourable effect on savings and this would increase the possibility of financing long-term investment projects in Mexico and would also enhance efficiency in the financial sector. Moreover, reforms will reduce the labour market distortions as benefits become more closely related to contributions.

The reform in pension system of Hungary was undertaken in 1998. Orban, *et al.* (2005) has performed simulation exercise to reassess and reconsider the financial sustainability of the reformed Hungarian pension system with a particular focal point on whether the introduction of the fully-funded pillar in 1998 has resulted in improvement of the sustainability of the pension system. The results show that the pension system, in its present form, is unsustainable with net implicit public liabilities in the system around 240 percent of GDP, unless corrective measures are taken. The funded pillar can reduce net implicit liabilities conditional upon the transition cost being supported by budgetary adjustments.

While analysing pension system reforms, Feldstein (1997) argued that fully or partially-funded systems could provide a considerable decline in taxes while maintaining or increasing retirement benefits. The fully-funded system keeps away from the political risks of progressively more costly and unfavourable pay-as-you-go program. The analysis shows that although the returns on a funded portfolio are also risky, the unfavourable cost of the variation in asset prices can be evaded by a moderately little increase in obligatory

saving rate. The retirement income of the poor can be protected at relatively low cost given the high rate of return on funded assets. The key ingredient missing in view of the author is the political will to impose the short run costs that would produce such large long-run benefits.

Feldstein (2005) made a detailed analysis of how a mixed system could work in practice and how a transition to such a system could be achieved. The study concludes that transition to such a mixed system can be done step by step in a way that does not require large deficits, a tax increase, or a decrease in expected retirement incomes. The administrative cost of the mixed system would be small if the system is managed properly. The risk of the mixed system could be eliminated by the continued role of the government, by rules governing personal retirement accounts investment, and by private market guarantees for individuals willing to give up some expected yield for greater certainty of future benefits.

According to Kotlikoff (1996) and Kotlikoff, *et al.* (1998) privatising social security system can offer extensive long run economic gains but these gains are neither free nor immediate. Some transitions have to face higher fiscal pressures. The personal social security system could be made more progressive if government provides matching contribution financed by consumption tax to individuals who make smaller contributions to their personal account. This policy achieves an equally progressive long run distribution of welfare relative to flat minimum benefits. But it leads to much larger long-run levels of capital stock, labour supply, output and welfare.

Mitchell *et al.* (1996) presented a balanced analysis of advantages and disadvantages of a move towards a fully-funded system. The main advantages of fully-funded system are reduction in political risk, increase in household portfolio choice and improvement in work incentives. The main disadvantages are diminished redistribution and increased administrative costs.

Kotlikoff (1996) used simulations to show efficiency gains from social security privatisation. The results show that privatisation of social security can generate substantial long run increase in output, capital stock and real wages in spite of the fact that initial elderly are compensated for their higher fiscal burden arising from the consumption tax.

According to simulation exercise presented in Kotlikoff (1995), privatising social security can lead to major-long increases in output and living standards. The simulation result further show that the accurate size of efficiency gains depends on the existing tax structure, the linkage between benefits and taxes under the existing social

security system, and the choice of tax instrument used to finance benefits during the transition period. When the initial tax structure has a progressive income tax, the existing system's benefit-tax linkage is low, consumption tax is used to finance social security benefits during the transition period and existing generations are fully compensated for their privatisation losses then there is a 4.5 percent simulated welfare gain to future generation from privatisation.

Corsetti, *et al.* (1995) found much larger and sustained effects of replacing a pay-as-you-go pension system by a fully funded system in the framework of an overlapping generation model with endogenous growth and formal-informal production sectors. The simulation results of the model suggest that substituting the pay-as-you-go system with a fully-funded system could significantly raise long-term growth rates by eliminating evasion and escape to the informal sector. The econometric evidence suggests that Chile's pension reform in 1981 could be contributing toward Chile's increase in private saving.

In a similar study, Nishiyama, *et al.* (2005) simulated a stylised partial privatisation scheme to investigate efficiency gains or losses in the framework of an overlapping-generations economy with elastic labour supply and idiosyncratic wage shocks and longevity uncertainty. The study found that the privatisation of social security produces efficiency gains in a representative-agent economy without wage shocks (or, equivalently, assuming that these shocks are insurable). In a heterogeneous agent economy with idiosyncratic and uninsurable wage shocks, however, the overall efficiency of the economy is reduced by the stylised privatisation because the existing social security system provides a source of risk sharing through its progressive benefit formula.

According to Samwick (2000), pension reforms provide a prospect to increase national savings. If the transition deficits are financed by taxes rather than debt and capital markets are imperfect then saving is likely to increase. Moreover, the lower distortionary taxes lead to welfare gains and potentially higher savings. Empirical evidence suggests that no country other than Chile that moved to a system based on defined contributions during the sample period experienced an increasing trend in saving rates after the reform. Moreover the cross-sectional evidence points to lower saving rate in countries with pay-as-you-go pension systems, in particular, if the pay-as-you-go system covered a great fraction of the population.

The transition from pay-as-you-go pension system to fully-funded system will effect capital accumulation, income distribution and fiscal policy. Serrano (1999) by using heterogeneous agent model

showed that pension reforms would boost the level of physical capital in the economy. Moreover, for some initial distributions when access to the financial system is restricted to some individual, income distribution may perhaps improve with shift to fully funded pension system. The study also found that taxes needed to pay for transitional workers' pension will be higher when the portion of the population with access to the financial system in the pay-as-you-go system is higher.

The above empirical evidence on pension system reforms makes it clear that reforming the current pay-as-you-go pension system is inevitable in the light of changing demographic structure and to control the rising financial burden of public pension schemes. Several Latin American, OECD and transition countries have reformed their pension systems and many others are thinking to take initiative. The analysis of all these studies indicates that countries have to bear the short-term cost for reforming their pension system but the long-run benefits tend to outweigh the short-term costs. Furthermore, fully-funded pension system provides permanent solutions to fiscal problems of pay-as-you-go pension system and it will enhance economic growth and development through its positive effects on savings, capital accumulation and financial market development.

Chapter 4

OLD AGE PROTECTION IN PAKISTAN: CURRENT STATE AND FUTURE PROSPECTS

4.1. Introduction

The debate on pension reform is gradually intensifying in Pakistan. The current pension system in Pakistan can be referred to as pay-as-you-go (PAYGO) system, which is hampering the economic performance of many developed countries e.g. those included in OECD[Disney (2000)]. Pakistan does not have a complete population wide-old-age income security system. Majority of old people continue to rely on support from their children for obtaining consumption in old age. A number of problems plague the pension system in Pakistan, including the following.

- There is a need for strengthening the formal channels of retirement savings because of the ongoing collapse of the traditional old age support mechanism and the rise in the elderly population.
- The existing pension system has low coverage, favouring the organised workforce while informal sector growing in size.
- The financial situation of government pension scheme is worsening because of rising system expenditure.
- Private sector workers are treated unfairly vis-à-vis public sector employees.
- Private annuity market is quite underdeveloped.
- Finally, the lack of proper and well covering pension scheme has hindered growth in saving rate, so crucial for promoting economic growth without reliance on external borrowing.

Major retirement saving schemes in Pakistan like provident and pension funds have coverage for workers in the organised sector. Most of the workers are engaged in the unorganised sector and have no access to any formal system of old-age security. Moreover, pension reforms are needed because of the fragmented nature of the existing benefit schemes. The existing retirement schemes have created great inequality between public and private sector workers. Public sector employees are honored with generous pension provision whereas workers in the private sector are either not getting any pension or

pension granted to them is not sufficient to meet their old-age requirements.

In recent years, there have been some attempts to solve these problems. However, these efforts have largely been insignificant. The miscellaneous and conflicting set of problems faced by the pension system of Pakistan requires a more serious and consistent approach. On the one hand, there is a need to watch the growing expenditure on public pension programs despite a need to extend the coverage to the unorganised sector. Various government initiatives in the recent years such as suggested parametric reforms by the pay and pension committee and introduction of voluntary pension scheme by the Security Exchange Commission of Pakistan are inadequate, and further underline the need for an early and lasting reform of the current system.

The remainder of this chapter is organised as follows. The next section reviews the structure of the current pension system. In section 4.3 motivations of reforming the current system are discussed. The recent institutional developments pertaining to pension are described in section 4.4. Section 4.5 highlights the major issues that need to be addressed for the comprehensive reforms of the pension system in Pakistan and, finally, in section 4.6 we discuss the major issues in system design.

4.2. Pension Structure in Pakistan¹

Pakistan, like most other developing countries, does not have a wide pension system to care for the elderly population against economic deprivation and difficulties. Perhaps the main hurdles in introducing a payroll-tax finance public pension system for each and every citizen attaining old age are the persistently high rates of poverty and unemployment. Instead Pakistan has adopted a pension policy that is restricted to cover the organised sector workers and ignores the vast majority of the work force in unorganised sector.

The present pension system in Pakistan was introduced in 1954 in the form of pension-cum-gratuity scheme, 1954 and has since been adjusted from time to time. Its main features are as follow.

- Retirement age is 60 years.
- Voluntary retirement is possible on completion of 25 years of service.
- No pension shall be given to a government servant who resigned from government job before completion of 25 year service; however gratuity may be payable.

¹ The discussion in this section is partly based on information taken from The World Bank (1998) and Raziq (2005), *Year Book (2007) of Finance Division*.

- Pension rate is 70 percent of the last drawn salary on completion of 30 years service.
- If service is less than 30 years, proportionate reduction in pension is made.
- Commutation is restricted to 35 percent of gross pension whereas the remaining is paid in the form of net pension.

The pension system prevailing in Pakistan can be referred to as pay-as-you-go pension system. Under the pay-as-you-go pension system the pension contributions of active workers are used to finance the pension benefits of current retirees. A specified pension on retirement is provided to workers who contribute for a certain period of time, equal to a certain fraction of their salary.

According to Raziq (2005), Pakistan's present pension scheme for its public servants is a defined benefit in nature. Pension is determined as a percentage of final salary and length of service. There are no contributions to the scheme and the system is maintained on an unfunded basis, that is, presently there is no pension fund. Government of Pakistan exclusively finances the expenditure by obtaining a provision in the yearly budget for this purpose.

Employees having the government service of 30 years but not less than 25 years, retire with a pension of 70 percent of the value of basic pay plus certain other emoluments. Pension is not systematically indexed for inflation, though pension scales are revised occasionally to compensate pensioners for some of the loss of purchasing power caused by inflation. On the other hand, the provision of commutation facility at the time of retirement practically doubles the lifetime value of pension [World Bank (1998)].

Our analysis in this chapter concentrates on pension because it is the main source of income support for civil service retirees. But as stated in World Bank (1998) and Raziq (2005), civil service retirees in Pakistan also receive several additional benefits including the following.

Gratuities to Short-service Employees

An employee receives 1 month's pay for every year served in case of having less than 10 years of service, or in case of job being abolished before 25-year minimum entitlement period, or 1.5 month's pay in the case of death or disability.

Family (Survivor) Pensions

The widows of pensioners collect 50 percent of the pensions at the time of death, to be paid for life or till remarriage.

Mandatory Savings Accumulated in General Provident Fund

It is mandatory for employees to contribute to this fund against which borrowings can be made during one's working career. Government does not contribute to this account but pays an interest rate higher than market rates.

Survivor Benefits Provided by the Benevolent Fund

Employees must contribute 2 percent of pay to this fund, which pays a widow (or widows) generally 35 percent of wages for premature death or disability up to age 70.

Life Insurance Provided by the Group Insurance Fund

This fund contributes about 2.5 times the annual salary. Government pays premiums for the lower-grades employees only, while the higher-grade employees pay their own premiums.

Access to Health Facilities

Retired government servants are entitled and permitted to medical treatment at government expense at parity with facility accessible to the serving government employees. They also have the facility of reimbursement of medical charges.

To sum up, the government employees are provided with a broader social safety net than is available to population in general. Private sector workers are less fortunate in this regard. Under the current law, all employers with 10 or more workers are required to register themselves in Employees Old Age Benefit Institution, (EOBI), an old age, disability, and survivor benefit program. Employers are required to contribute five percent of the first Rs.3000 of an employee's wage per month to EOBI. However, most of the private sector employers do not register themselves in EOBI to avoid contribution that they have to make for the provision of old age security to their employees. This situation results in the growth of informal sector in Pakistan.

Hasan (2005) pointed out that at present in Pakistan the retirement savings tools and instruments are not adequate and a small number of them available are also not fully utilised because majority of the workers are self-employed. Public sector, which has vast coverage of pensions, is also a large employer. As a result, a greater part of the pensions given is by the government and these are typically defined benefit in nature. The defined benefit pay-as-you-go pension system generates a liability and burden for the government. Moreover it also

diminishes the motivation to save more than the requirement of the scheme. The employees miss the chance of getting pensions if they leave or switch to private sector too early.

Hasan (2005) argued that the most common and familiar forms of private occupational saving schemes in Pakistan are gratuity funds and provident funds. With these schemes the contributed 'savings' can be used by participants as they change their jobs instead of retirement, so these schemes cannot be considered and classified as pension schemes. Presently, private occupational savings schemes, including pension funds, gratuities and provident funds are not being regulated by any agency [Finance Division Year Book (2007)]. There is no registration of occupational pension and saving schemes, nor are their statistics published on the number, assets, memberships or any demographics of pensions.

A number of tax advantages are provided to the employers, participants of pensions and invested assets holders under the regulation of private occupational pension and saving schemes documented by CBR. So CBR can be seen as a regulator of these schemes.

The Security Exchange Commission of Pakistan is trying to develop a regulatory framework for private occupational pension and saving schemes in order to develop a uniform system of pensions in the country. The Commission has recently introduced voluntary pension system (VPS). This is a voluntary defined contribution system in which anyone in Pakistan over the age of 18 years (salaried or self employed) with a valid National Tax Number is eligible to participate.

The VPS involves several tax incentives to make it attractive to potential participants. Under the VPS those individuals who are not covered under any pension scheme would also be capable to save for their old age by making tax-free contributions. Under the new system the contributions as well as the gains from investing them will be tax-free and tax shall be levied at the time of withdrawal of money. The most important advantage of VPS over defined benefit system is portability. Under this system people will have the power to make decision regarding the amount of investment, type of investment; moreover their savings would remain with them even if they change jobs. The participants in VPS would also have the choice to change their pension fund managers if they are not satisfied with the performance of their existing fund managers.

The formal old age income security in Pakistan can be classified into two categories. The first category consists of statutory pensions with provident funds for the organised sector employees and the second

category consists of voluntary pension system for self employed and unorganised sector workers.

4.3. Motivations for Pension Reforms²

There are several compelling reasons that call for major reforms in the pension system in Pakistan to make it an efficient, equitable and ethically desirable social security system, thus fulfilling its goals in the long run. These motivational factors are discussed as under.

4.3.1. Population Ageing

The process of population ageing is a product of demographic transition caused by reduced mortality and fertility levels. The continuous fall in the fertility levels coupled with improvement in the mortality rate leads to a decline in the proportion of children and an increase in the proportion of population in higher ages, resulting in ageing of population. With increasing number of elderly population (consisting of those aged 60 years and above), the issue of evaluating pension and social security system has attained greater importance at both regional and global levels. It becomes essential for policy makers to adjust their pensions and social security systems according to the ageing population.

The population-ageing problem has recently gained greater importance across the world. The process of population ageing is more severe for developed region of the world. The developed region of the world has already experienced demographic transition, consequences of rising dependency ratio and the related challenges of developing pension systems. However, in many developing countries the problem of population ageing is in process.

In Pakistan, the process of demographic transition had started in early 1990s. A number of studies in the recent years have shown consistent decline in mortality with resultant rise in life expectancy and a reduction in total fertility rate in recent years [Sathar *et al.* (1998), Ali *et al.* (2001) and Hakim *et al.* (1998)]. So the proportion of elderly is expected to increase in coming years due to rising life expectancy and declining fertility rates. Figure 4.1 and Figure 4.2 about future projections shows rising trend in life expectancy at birth coupled with falling trend in fertility rate in Pakistan [WDI (2006)].

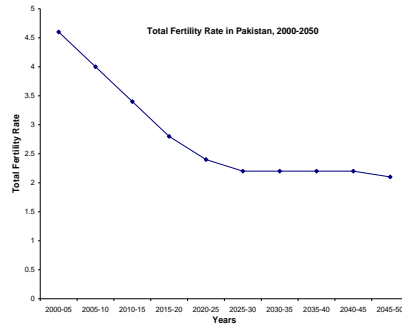
In Pakistan the proportion of elderly is still relatively low like some other developing countries that have recently started their

² The discussion in this section is partly based on information taken from Kanwer *et al.* (2005), The World Bank (1998) and Kardar (2006).

demographic transition, but they have large number in absolute term because of the large population base. According to *Population Censuses 1998*, the proportion of elderly has ranged between 5.5 and 7 percent. The absolute number of elderly population has increased from 1.9 million in 1951 to 7.3 million in 1998 [Shresth (2003)].

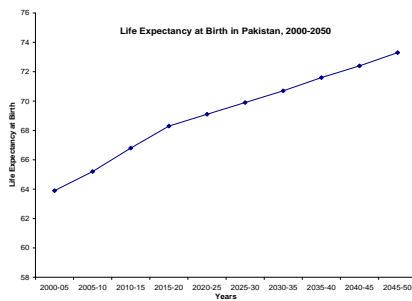
According to Palacios (1996) the proportion of elderly population in Pakistan is expected to increase further, to 12 percent by the year 2020. The study focuses on the demographic indicators including the percentage of population over 60, 65, and 75, the ratio of old to working age population and dependency ratio. In most cases the old age dependency ratio is defined as the ratio of persons over 60 years old to persons aged 20-59. The study has also chosen this ratio over other possible combinations based on the observed age distribution of contributors and pensioners in most public pension schemes around the world. Table 4.1 and Table 4.2 show the projections of demographic indicators for Pakistan presented in Palacios (1996).

Fig. 4.1. Future Projections for Total Fertility Rate at Birth in Pakistan



Source: WDI (2006).

Fig. 4.2. Future Projections for Life Expectancy at Birth in Pakistan



Source: WDI (2006).

Table 4.1

Projected Percentage of Elderly Population in Pakistan

Years	Percentage of Population Aged 60 and above	Percentage of Population Aged 65 and above	Percentage of Population Aged 75 and above
1990	4.6	2.8	1
2000	4.7	3	1.1
2010	4.9	3.1	1.4
2020	6.3	3.8	1.9
2030	8.4	5.3	3
2050	14.2	9.3	6.3
2075	22.8	16.9	11.1
2100	26.7	21	12.7
2125	28.8	23.21	13.7
2150	29.8	24.2	14.2

Source: Palacios (1996).

Table 4.2

Projected Percentage of Dependency Ratio

Years	Population Aged 65 and above / Population Aged 15 to 64	Population Aged 65 and above / Population Aged 20 to 64	Population Aged 60 and above / Population Aged 20 to 59
1990	5.3	6.6	11.3
2000	5.5	6.8	11
2010	5.2	6.4	10.3
2020	6.1	7.2	12.4
2030	7.9	9.2	15.5
2050	13.7	15.3	25.5
2075	26.7	29.7	44.7
2100	34.7	38.7	54.9
2125	39.4	43.9	61
2150	41.7	46.4	64

Source: Palacios (1996).

The tables show rising proportion of elderly, rising dependency ratio and falling support ratio. If the dependency ratio is defined as the ratio of persons over 60 years old to persons aged 20-59 then population-ageing problem is expected to become severe for Pakistan after the year 2010. Approximately the same situation prevails if we change this ratio with other possible combinations.

In Pakistan majority of the labour force is engaged in the informal sector. As a result most of the old people do not have access to any formal pension or social security scheme. So, in the situation of rising poverty in Pakistan, it is expected that older people will have to face more difficulties in life. This is because the old values and traditions of providing care and respect to older people are becoming uncommon due to rapid modernisation, urbanisation, and the resulting economic and financial pressures.

In view of the expected rising proportion of elderly in Pakistan, it becomes important for policy makers to amend their pension and social security system according to the ageing population. Moreover, given the continuing trend of declining informal support channels for older people, this population ageing emphasises the need for proper formal system for old age economic security.

4.3.2. Breakdown of Traditional Support Mechanism

Pakistan is experiencing the breakdown of traditional support mechanism for older people based on strong family institution. In the past elderly were able to live with their children and derive support from them but now the breakdown of joint family system side by side with pressures of urbanisation and migration are leading to deteriorate the traditional means of support for elderly population.

4.3.3. Low Coverage and Focus on the Organised Sector

Existing pension system in Pakistan covers the organised sector workers, constituting less than 10 percent of aggregate labour force. The pension system covers close to 3.5 million government employees (of whom 0.6 million are in armed forces. Pension payments to them account for more than 45 percent of total pension expenditure), representing a mere two percent of the population and under 10 percent of labour force [Kanwar *et al.* (2006)].

4.3.4. Inequity within the Organised Sector

The current pension system has been highly fragmented because of the unequal benefit levels within the organised sector as public employees are treated generously and liberally in comparison to private organised workers. A prominent feature of current pension system is the difference in range and levels of benefits within the organised sector. In addition to a self-contributory provident fund, generous defined-benefit pension privileges, which provide protection against long life and possibly the inflation risk, are given to public employees.

On the other hand, in the private sector either the workers are not getting any pension benefits or the pension benefits given to them are not adequate to meet their old age requirements.

Under the current law, all employers of 10 or more workers are required to contribute five percent of the first Rs. 3,000 of monthly wage of each employee to the Employers Old-Age Benefits Institution (EOBI), an old age, disability, and survivor benefit program. Majority of the employers in the private sector do not register themselves in EOBI leading to evasion of contribution to EOBI, which by law is compulsory on them in order to provide old age protection to their employees.

4.3.5. Rising Financial Burden of Public Pension Scheme

The expenditure pattern of the noncontributory, unfunded pay-as-you-go public pension program is exerting pressure on budgetary allocations. There is rising trend in pension expenditure of Pakistan and it is expected to increase further as more and more civil servants retire.

Figure 4.3 shows moderately rising trend in pension expenditure of federal civil servants pension. The public sector encompasses provincial, municipal as well as central governments. It also includes military pension spending, but information on provincial, municipal and military authorities cannot be displayed due to complications in data availability.

Palacios (2006) stated that in large countries with federal system of government, the magnitude involved in provincial and local governments can be substantial. In some cases like India, Mexico, and Pakistan, the number of civil servants in sub-national government are greater than those at federal level. In most countries, pensions paid to retired soldiers encompass a major part of pension bill. This is especially true in India Jordan and Pakistan, having large armies.

Figure 4.4 shows military verses civil servants pension expenditure in India and Pakistan during the period 1993-2004. In case of Pakistan expenditure on defense pension has been more than the spending on civil servants pensions. If military pensions continue to be financed on a pay-as-you-go basis and early retirement is allowed then the ratio of pensioners to contributors will increase. Consequently the required contribution rate will grow rapidly ³over time to finance pension benefits. Moreover, military pensions that begin to be paid

³However, in case of United States, military pensions during 2000 were about 9 percent of total pension spending on state and federal civil servants [Palacios *et al.* (2006)].

when retired soldiers are young are not consistent with the objectives of pension system that are established to deal with old age.

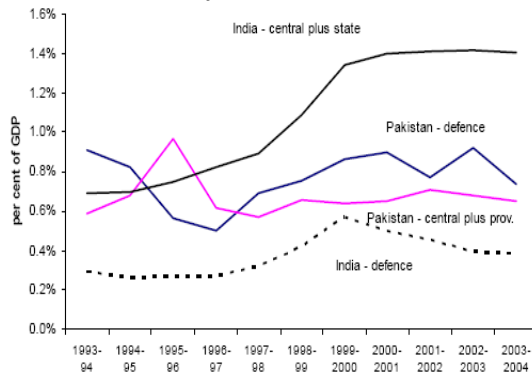
The annual federal civil servants pension payments have increased from rupee 12 billion in 1991-92 to rupee 46 billion in 2006-07 and the system is threatening to become unmanageable as more civil servants retire. If attempts are not made to control pension expenditure then in the near future it can be harmful for Pakistan economy because the increment in pension expenditure would lead to increase in indirect taxes, reduced development expenditure or increased government borrowings. Moreover, the most interesting fact of pension system in Pakistan is that in armed forces there are more pensioners than active workers. As life expectancy increases, this situation will become even worse.

Fig. 4.3. Actual Expenditure on Civil Servants Pension as Percentage of GDP, 1991-2007



Source: Based on data taken from AGPR Pakistan and various issues of *Economic Survey*.

Fig. 4.4. Pension Spending for Civil Servants and Military in India and Pakistan, 1994-2004



Source: Palacios *et.al* (2006).

4.3.6. *Problems with Provident Fund*

Employees are required to contribute to this fund while the government does not contribute. However, government pays interest at a rate higher than the market rate. Provident fund is the only funded financial saving for civil servants, which pays a much high interest rate. The contribution to provident fund are not used for the purpose they are deposited; instead these are used for financing government expenditures. It means that government pays the interest from its budget at a rate that is not attainable in the market. Under this situation the liabilities of the government are further increasing because of the mismanagement of these funds.

Moreover, a serious shortcoming of this system is the failure to insure that the lump-sum payments are used to provide old age protection. The majority of the workers having low wages have a small amount of extra savings. They spend a lot of the lump-sum amount on meeting indispensable needs after retirement. Furthermore, the facility to have early and non-refundable withdrawals from the provident fund to meet various needs during the employment period reduces the benefits at retirement.

4.3.7. *Commutation Facility to Government Employees*

Civil servants are given a facility called commutation, under which they can commute 35 percent of their pension in lump-sum form at the time of retirement. Lump-sum provisions are also available around the world. But the terms and conditions under which commutation facility is available to government employees in Pakistan are unique in the sense that commutations, which in essence all advance payments, are available without discounting. However, in other pension system the amount paid is discounted to reflect the time value of money. So, in Pakistan the entire interest cost associated with commutation is borne by the government. The payment of commutation without discounting doubles the government's long-term and unfunded fiscal liability for such pensions. So, in Pakistan the current commutation facility is more generous than it should be. It is subject to the following major problems.

4.3.7.1. Pensions as Insurance

The fundamental function of pension is to provide insurance against long life. There is no reliable way to assess longevity of government employees. The long-lived person could be at risk of outliving his or her assets. The losses on long-lived persons can be offset by savings on those who die earlier. So, with practice of

commutation the employer's ability to pool longevity risks is reduced and the cost of pension provision is increased for the government because both long-lived and short-lived persons receive large portion of their pension payments on the day of retirement. Moreover, there is greater possibility that pensioners may outlive his or her assets, because people who receive a big amount once in life face the risk of making mistakes with this money. Ultimately, we can say that the current practice of commutations is more generous and risky for its beneficiaries.

4.3.7.2. Complications in Reforming Compensation Package

The practice of commutation creates hurdles in reforming compensation package as a whole. For example, government cannot consider monetising certain in-kind pay and allowances without revising the structure of commutation because doing this would mean that government pension liabilities would explode. There can be the possibility that pension payments would exceed the pre retirement compensation.

4.3.8. *Early Retirement*

In other countries employees who want to retire before the normal retirement age have to accept reduced benefits, calculated on the basis of their life expectancy, to reflect the longer period during which they will collect benefits. But the system prevailing in Pakistan is unique in the sense that employees who want to retire earlier reap higher benefits because the practice of commutation allows them to get half of a larger number of year's benefits in lump sum form. This situation will further explode the government pension liabilities in future due to population aging.

While early retirement can be used to have rapid changes in workforce than could be achieved through natural phenomena but the government should be careful not to commit the mistakes that some countries have made. In this regard the examples of Hungary and Poland are notable. Both countries are now paying a significant share of their budgets and GDP for retirement benefits and are unable to finance many needed expenditures notably on improvement in health and education [World Bank (1998)].

4.3.9. *Income Security Gaps to Civil Servants*

Civil servants are still facing income security gaps both during their work careers and after retirement. The current pension system ignores short service employees. Any employee who serves less than

25 years receives no pension, although a gratuity might be payable. Employees are entitled to disability pensions after meeting the criteria of at least 10 years of service.

4.3.10. Lack of Indexation

Pension benefits are not systematically indexed for inflation. Although retirees receive only half of their pension in annuity form but inflation will quickly erode the purchasing power of pensions. Though occasional increases have compensated pensioners for some of the losses in purchasing power caused by inflation but these occasional increases depend entirely on the will of government. Therefore, employees face further threats to their income security after retirement.

4.3.11. Pension Related Obstacles to Job Mobility

The current pension system does not serve the interest of emerging markets. Government employees are facing pension related obstacle to job mobility. They cannot leave their jobs before reaching pension eligibility because of the cost of losing their pensions even if better job opportunities are offered to them. Most of the government employees getting better job opportunities take leave from their government jobs and perform their duties in private sector. Because of this situation both the government and economy at large are worse off.

4.3.12. No Private Annuity Market

In Pakistan there is no formal private annuity market. Lack of pension annuities further complicates old age economic security. The insurance companies do offer something but at a very high cost, as they have very high administrative cost [Kanwer *et al.* (2005)]. Therefore, some incentives are needed to provide equity exposure to the investors at a feasible cost.

4.4. Recent Trends in Pension Reforms⁴

The government of Pakistan is gradually thinking to reform the pension system to reduce government's rising pension bill that has increased enormously during the last several years.

The Pay and Pension Committee of 2001 observed the above issues, and recommended a number of changes to pension system that were later implemented. It recommended that a new Defined

⁴The discussion in this section is partly based on information taken from Kanwer, *et al.* (2005), Raziq (2005), and Hasan. (2005).

Contributions (DC) system should be introduced for new employees. In the year 2002, Cabinet took the decision that a contributory pension scheme be launched for employees entering the service after a set date.

Keeping in view the Cabinet decision, the federal government recognised an Actuarial Office (AO) under the Ministry of Finance (MoF) at the end of the year 2002. The AO took the responsibility of estimating the existing liability of pension payments and suggesting different alternatives to reform the pension system.

In 2004, Government of Pakistan established a special Pension Reform Working Group (PRWG) to assess different proposals and to develop recommendations for reforming the pension system in the country. PRWG consisting of the members from the Ministries and Actuarial Office presented its report to the Pay and Pension Committee in March 2005.

On the basis of suggestions of the PRWG, Actuarial Office and Pay and Pension Committee of 2004, the government has now been considering introducing Defined Contributions (DC) scheme for workers who joined the service after 1st July 2006.

Furthermore, parametric reforms were suggested to reform the existing Pension Scheme for the existing employees. The Government of Pakistan took into account these recommendations during the finalisation of the Budget proposals for the FY 2005-06. However, government only reduced the commutation percentage by 5 percent, keeping in view the affordability and other factors.

The existing pensions system, which is also being reformed for the existing employees, is recommended to be withdrawn for future employees to reduce the government pension liabilities. The Pay and Pension Committee pointed out that if the pension reforms were not introduced instantly, the pension bill would rise enormously in the years to come, thus becoming the main burden after defense spending. The pay and pension committee recommended that new employees should be covered under a new Defined Contributory Scheme after which existing pension and commutation schemes would not be available for the new employees.

The previous pay and pension committee had also recommended the eradication of distortions in the pension system. The committee had clearly pointed out that existing pension scheme should be discarded and replaced either by a restructured affordable scheme or by a gratuity scheme.

To reduce the pension cost under the first option it suggested measures like alteration in pension formula, discouraging early retirement, reduction in commutation, discontinuation of the extra benefits given on occupation related disability, suspending the policy of

indexing the pension. In the second option, it was suggested that the most preferred alternative, which would significantly reduce the cost, was to replace the pension facility by a gratuity scheme for all existing employees and new entrants in future.

However, Pay and Pension Committee had observed that no serious attempt had been made to take action now in order to prevent the situation from becoming out of control in near future.

While discussing the recent trends in pension reforms, it is worth noting that Pakistan has taken a step forward in pension reforms by introducing Voluntary Pension System. The Security Exchange Commission of Pakistan has designed a new Voluntary Pension System (VPS) under the Voluntary Pension System Rules, 2005. The new Voluntary Pension System is based on several tax incentives and it is also flexible in terms of contribution, asset allocation choice and, above all, portability.

Under the VPS those individuals who are not covered under any pension scheme would also be eligible to save for their old ages. The main argument for the introduction of private pension system in Pakistan is that it provide an option for old-age security to the large number of people that are not covered under any pension scheme. As the contributions into the pension fund are tax free in VPS, the tax inducement in private pension system is expected to boost both investment and saving.

4.5. Key Issues for Reform

The preceding section point out certain limitations of the current pension system and bring some serious issues related to reforms in focus. The deficiencies of the existing pension scheme highlight the need to commence some reformatory steps. The most important is how to compose the reform and what are the critical issues that need to be considered. The following issues come out from the previous discussion.

- Firstly, the instant challenge for Pakistan is to propose and put into practice a reform strategy that can restore the long-run financial feasibility of public pension schemes. There is a need to control rising trend in the expenditure pattern of the defined-benefit, pay-as-you-go, public pension program. Generous pension benefits coupled with health benefits provided to the retirees can threaten the financial sustainability of public pension scheme. A reassessment of the benefit and contribution structures can make certain the fiscal sustainability of the public pension schemes.

- Secondly, without reforms in investment policies, the provident and pension funds cannot provide sufficient replacement rate to elderly people. Moreover policies pertaining to withdrawal of accumulated balances need to be reviewed. The current provision of liberal non-refundable withdrawal often results in insufficient stipulation during old age. Thus, limited withdrawal services coupled with some form of compulsory annuitisation is essential for adequate provision in old age.
- The most important issue of extension of coverage to control poverty among the aged population needs to be considered. It is not feasible to move towards a universal, publicly managed social security system covering every citizen attaining old age. There are a number of reasons for this. First, public pension schemes are already under great financial stress due to generous and liberal benefit structure. Second, massive poverty, unemployment, low tax base, and tax evasion entail that capacity and eagerness to contribute in a joint system may have narrow scope in Pakistan.

So, there is a need for adopting a realistic approach to expand pension coverage in Pakistan. This approach basically necessitates a right strategy to strengthen the second and third pillars (the second pillar for mandatory savings and the third for voluntary retirement savings) of pension system. Coverage can be expanded through introducing mandatory, individual account based, defined contribution pension schemes and voluntary retirement saving schemes to enhance the retirement income. The recent introduction of Voluntary Pension System in Pakistan suggests that Pakistan is moving in the right direction.

4.6. Issues in System Design

4.6.1. Difficulties in Adopting Universal Mandatory System

Many countries around the world have adopted population-wide mandatory pension systems. These systems operate on mostly pay-as-you-go basis, where taxes are imposed on the young and revenues collected are used to finance pension benefits of old people. This system can be successful with a young demographic structure, but becomes extremely difficult to sustain as the proportion of elderly in total population increases.

The question is whether it is possible for Pakistan to adopt a universal mandatory pension system. There are various constraints in choosing such a strategy; which are discussed as under.

- In the defined benefit system, there is political risk that in response to rising dependency ratio government might choose to raise benefit rates, or cut contribution rates, and thus increase taxes to collect revenues. The demographic projections for the future show that a solvent population-wide pay-as-you-go defined-benefit system for Pakistan will necessitate raising tax rates or cutting benefit rates. If such decisions are not taken in proper time, the system will become difficult to sustain.
- At present the administrative capacity to collect mandatory contribution and correctly pay out benefits on large population-wide scale does not seem to exist. There is considerable risk of deception and dishonesty in payouts, e.g., paying out benefits to deceased people, paying benefits many times to some individuals.

These arguments suggest that mandatory, population-wide pension system is presently not feasible in Pakistan.

4.6.2. Disjointing Fund Management and Annuities

The pay-as-you-go defined benefit pension system results in vertical integration between two activities:

- Fund management in accumulation phase
- Paying annuities in benefit phase

There is strong consensus that these two activities should be decoupled [Shah (2005)]. The main advantage for this division is the elimination of assurance about the amount of pension that will be paid in future. Promises about monthly pension payments are made only at retirement date based on the switching of stock of pension assets into flow of annuities calculated on the basis of mortality projections and interest rate that will then prevail. So, the key aspect of modern pension design is the separation of the accumulation phase from the benefit phase. In the accumulation phase the employee requires fund management services from the institution where he is working and in benefit phase the pensioner has need of a life insurance company to sell him/her an annuity.

Hence, the decoupling of accumulation phase from benefit phase requires a pension regulator that deals with all the problems of pension system, from the date a person start his/her job career until the date annuity is purchased.

4.6.3. *Function of Individual Accounts*

An individual account, in defined contribution system gives significant choices to participants regarding risk exposure. The main advantage of individual account is that the participants consider their account balances as personal wealth. This creates incentives for the individual participants to take interest in governance issues and functioning of the system.

Since individuals make choices regarding risk exposure and the choice of fund manager/investment type, the system necessitates condensed efforts in terms of good governance. Moreover, the system of individual accounts provides security against the political risk that people have to face in pay-as-you-go defined-benefit system.

4.6.4. *Administrative Cost*

The most important issue with individual account is administrative overhead and transactions costs, especially when contributions or account balances are small [Whitehouse (2000)]. This issue is particularly important in developing countries like Pakistan where average contribution and average account balance would be small. So large transaction cost can adversely and negatively affect the pension accumulation.

The Old Age Social and Income Security Committee had proposed that centralisation of record keeping, at an agency called Central Recordkeeping Agency (CRA), could yield significantly lower transaction costs [Shah (2005)]. This formula has been experienced in countries like Mexico and Sweden. The CRA would have data about the pension accounts of all participants in the system. The contributions as well as the instructions for switching from one investment product to another would go to CRA. The net fund flows in or out of every investment product would be computed by CRA. In this way activities of asset manager would simplify to a large extent, as the manager would have to make an agreement with one CRA for receiving or paying out cash instead of making agreements with several participants.

4.6.5. *Redistributive Feature in Benefits*

The design of pension system should include a redistributive component for individuals who have assets below a certain threshold level. But without having a system of unique citizen identity number, it is not possible to have a redistributive component in pension system because without having this system individuals would have incentives to open more than one account and receive improved benefits.

Once this system is in full operation, it will become possible and feasible to think of redistributive mechanism, where the poor individuals in the pension system are provided with the financial help from state when they retired with scarce pension asset.

4.6.6. Strategy for Premature Withdrawals

Many low-income individuals in a pension system face credit constraints. So when faced with consumption shocks, they find it reasonable to look for some ways in which pension wealth can be used in consumption smoothing.

A system where there is no restriction on premature withdrawal is not realistic. In India, for example, withdrawals from Employee Provident Fund (EPF) are permitted. EPF uses a tax treatment where contributions, asset returns and premature withdrawals are all tax-free. This has resulted in high rates of withdrawals [Shah (2005)]. This policy is not desirable if objective is to provide old-age security.

As for as Pakistan is concerned, government employees have the facility of non-refundable advances from general provident fund to the extent of 80 percent of their balance in the fund on attaining the age of 45 years and 100 percent on attaining the age of 50 years [Raziq (2005)]. Government employees further have the capacity to obtain an advance against their credit in the fund, which is to be repaid in installment from their pays. This situation also results in high rate of withdrawals.

Besides, prohibition of premature withdrawal is also not realistic in a country with heterogeneous mortality. So the pension system which forces pension wealth to be illiquid until age 60 will not serve the need of each and every citizen. This situation suggests that the design of pension system for Pakistan should avoid complete illiquidity.

4.6.7. *Obligatory Annuities*

In many countries around the world pension system require a certain degree of mandatory annuitisation. This is because of the moral hazard problems that exist in extensive safety net [Walliser (1999)]. Individuals can deliberately fall back upon the poverty alleviation programs or minimum pension guarantees offered by the state for those individuals who have assets below a threshold level.

This issue is not prominent in Pakistan. The poverty alleviation programs that provide subsidies to old people are not prevalent in Pakistan. Therefore the mandatory annuitisation argument can be taken on paternalistic grounds, where individual are not trusted to make

rational decisions about their future consumption plans and the corresponding age profile of pension wealth from retirement date till their death.

4.6.8. *Simplicity in Pension System Design*

The issue of simplicity in pension system design is quite important due to a large number of unsophisticated users of pension system that we expect in Pakistan. Moreover, the design choices that support simplicity are also favourable in terms of lower transaction costs. The goal of simplicity is associated with having a small set of choices with special provisions to make it easy for unsophisticated users to engage in performance comparisons of investment product types and pension fund managers.

4.6.9. *Feature of Portability*

A key feature of new pension system is portability. There are two levels of portability:

- The first level of portability is related to the movement of individuals between government jobs and non-government jobs. The pension wealth of an individual should stay with him/her even if he/she leaves a government job and joins the other one, government or private.
- The second level of portability is related to shifting of pension accounts across job changes, portability of pension assets across multiple fund managers and investment products.

Chapter 5

MACROECONOMIC EFFECTS OF PENSION SYSTEM REFORM

5.1. Introduction

In this chapter we explore the effects that pension system reform or a transition from Pay-as-you-go (PAYG) pension system to fully-funded system might have on income distribution, fiscal position of government and capital accumulation.

In a fully-funded pension system each individual's pension benefit is financed by his/her own contribution. In general private pension systems are fully funded. While working, individuals make contributions to their accounts that are used to provide pension benefits in retirement. In Pay-as-you go pension system, on the other hand, the contributions collected from those working today are used to finance the pension benefits received by the elderly today.

The evidence from existing theoretical and empirical literature demonstrates that a fully-funded pension system leads to a higher steady state level of physical capital than pay-as-you-go system [Arrau (1990), Kotlikoff (1995) and Kotlikoff (1996)]. In a fully-funded system contributions to pension system are saved as capital whereas in a pay-as-you-go pension system contributions are directly paid as pensions to current old people. This is the main difference, on the basis of which we can distinguish the fully-funded pension system from the pay-as-you-go system.

In the fully funded pension system government invest the contributions collected from current workers as capital in period t and finance pension benefits of current old individuals with the contributions that were collected from them in past. Corsetti *et al.* (1995) while using an endogenous growth model stated that fully funded system leads to a higher level of capital because of its funded contribution.

Auerbach and Kotlikoff (1987) framework has been used by a large number of studies dealing with macroeconomic effects of transition to fully funded system. This is based on an overlapping generation model with representative agent living for 55 years. Realistic values are assigned to model's parameters to simulate the effects of transition to fully funded system on different macroeconomic variables.

In this chapter we use Serrano's (1999) overlapping generation model and apply simulations to draw some conclusion about Pakistan economy. We use this model to study the effects that a transition from pay-as-you-go pension system to the fully-funded system may have on capital accumulation, income distribution, poverty and fiscal position of the government.

The rest of the chapter is organised as follow. The next section presents the model. The comparison of both the systems is made in section 5.3 and in section 5.4 we discuss the effects of pension system reform on fiscal position of government.

5.2. The Model

Following Serrano (1999), we consider an overlapping generation model in which there are two types of agents in each generation and in every period of time two generations coexist.

5.2.1. Assumptions of the Model

The agents have different endowment of human capital.

- Agents of type 1 (rich) have a larger endowment of human capital, and therefore higher labour incomes than agents of type 2.
- Agents of type 2 (poor) do not have access to the financial system, so they do not receive interest payment on their savings.
- Each generation lives for two periods and individuals only work during the first period of their lives.
- Population grows at a constant rate n .
- The stock of human capital stays constant over time.

5.2.2. Economy Under Pay-as-You-Go Pension System

First we consider the economy under pay-as-you-go pension system. Under this system the contributions of current workers are used to finance the pension benefits of retirees. In the pay-as-you-go pension system contribution to pension system are not saved as capital; instead these contributions are instantly transferred to retirees as pensions.

The production function of the economy is of the form:

$$Y_t = K_t^\alpha (H^1 L_t^1 + H^2 L_t^2)^{(1-\alpha)}, \quad 0 < \alpha < 1 \quad \dots \quad \dots \quad (1)$$

Here H^i is the stocks of human capital owned by an agent of type i , which is assumed to be constant over time, L_t^i is the size of population of type i alive at time t and K_t is the stock of physical capital at time t .

Aggregate production takes place using physical capital and two different types of labour supplied by the two types of agents. Each type of agent owns different endowment of human capital and different type of skills that result in different levels of productivity. As a result the agents of type i provide, in period t , $H^i L_t^i$ of total labour input.

Total population is the summation of the number of agents of types 1 and 2. Of this total a fraction β , where $0 < \beta < 1$ is of type 1 and $1 - \beta$ is of type 2:

$$L_t = L_t^1 + L_t^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

$$L_t^1 = \beta L_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2a)$$

$$L_t^2 = (1 - \beta)L_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2b)$$

Population growth rate is given by n . Therefore

$$L_t = (1 + n)L_{t-1} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Agents of type 1 own a fraction γ of the total stock of human capital, while the agents of type 2 own the remaining fraction $1 - \gamma$. There are two different sets of skills through which workers can participate in the aggregate production process. It is assumed that agents of type 1 have a larger endowment of human capital, and consequently higher labour incomes than agents of type 2. Agents of type 1 are classified as rich agents and agents of type 2 as poor.

Total stock of human capital is the summation of the stock of human capital owned by agents of type 1 (rich agents) and type 2 (poor agents). That is,

$$H = H^1 + H^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

$$H^1 = \gamma H \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4a)$$

$$H^2 = (1 - \gamma)H \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4b)$$

It is assumed that $\gamma > 0.5$.

The representative agent of each generation has the following logarithmic utility function.

$$U_t^i = \ln C_{y,t}^i + \ln C_{o,t+1}^i \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Here $C_{y,t}^i$ is consumption of agent i when young at time t and $C_{o,t+1}^i$ his/her consumption when old at time $t+1$.

The budget constraint for each type of agent can be represented as follows.

$$C_{y,t}^1 + \frac{C_{o,t+1}^1}{(1+r_{t+1})} = (1-\tau_s)H^1w_t + \frac{\tau_s\phi Hw_t(1+n)}{(1+r_{t+1})} \quad \dots \quad (6)$$

$$C_{y,t}^2 + C_{o,t+1}^2 = (1-\tau_s)H^2w_t + \tau_s\phi Hw_t(1+n) \quad \dots \quad (7)$$

Where w_t is the wage rate per effective unit of labour, τ_s is the fraction of labour income contributed to pension fund, ρ is discount rate, r is the rate of interest.

Each agent maximises his/her utility function (Equation 5) subject to his/her respective budget constraint. From the first order condition we obtain consumption in each period for both types of agents:

$$C_{y,t}^1 = \frac{1+\rho}{2+\rho} \left[(1-\tau_s)H^1w_t + \frac{\tau_s\phi Hw_t(1+n)}{(1+r_{t+1})} \right] \quad \dots \quad (8)$$

$$C_{y,t}^2 = \frac{1+\rho}{2+\rho} \left[(1-\tau_s)H^2w_t + \tau_s\phi Hw_t(1+n) \right] \quad \dots \quad (9)$$

It follows that saving rate of each individual is given by:

$$S_t^1 = (1-\tau_s)H^1w_t - \frac{1+\rho}{2+\rho} \left[(1-\tau_s)H^1w_t + \frac{\tau_s\phi Hw_t(1+n)}{(1+r_{t+1})} \right] \quad \dots \quad (10)$$

$$S_t^2 = (1-\tau_s)H^2w_t - \frac{1+\rho}{2+\rho} \left[(1-\tau_s)H^2w_t + \tau_s\phi Hw_t(1+n) \right] \quad \dots \quad (11)$$

The equilibrium condition for the economy is:

$$K_{t+1} = S_t^1 L_t^1 \quad \dots \quad (12)$$

That is, total assets of the economy are equal to savings of young generation and in equilibrium assets must equal capital stock.

It can be shown that the following equation describe k_{PG} , the pay-as-you-go steady state value of capital per unit of effective labour in an implicit form [For details see Serrano (1999)].

$$k_{PG}^{(1-\alpha)} = \frac{(1-\alpha)}{1+n} \left[(1-\tau_s)\theta \frac{1}{2+\rho} - \frac{1+\rho}{2+\rho} \frac{\tau_s\beta(1+n)}{(1+\alpha k_{PG}^{(\alpha-1)})} \right] \quad \dots \quad \dots \quad \dots \quad (13)$$

5.2.3. Economy Under Fully-Funded Pension System

Under the fully-funded pension system individuals have their own accounts in which they deposit their contributions for pension. It is still mandatory for individuals to deposit a fraction τ_s of their labour income. On retirement they receive their total contributions plus an interest payment. So, in fully funded system each individual's pension is determined by his/her own contributions plus investment earnings. Moreover, the individual of type 2 that do not have access to financial system in the pay-as-you-go pension system now have access through the new pension system. Under new system it is mandatory for individuals to deposit minimum fraction τ_s of their labour income, but they can also deposit more in their pension accounts and, therefore, receive interest on all their savings.

An increase in the stock of capital is expected due to two factors. Firstly, the design of fully-funded system leads to an increase in capital accumulation because the contributions to the pension system are invested and become part of capital accumulation process instead of being transferred to retirees as happened in pay-as-you-go pension system. Secondly, the assumption that the reform will provide access to the financial system to poor individuals means that their savings will also be accumulated as capital (Serrano 1999).

Now the agents face different budget constraints than before. We can write the new budget constraint as:

$$C_{y,t}^i + \frac{C_{o,t+1}^i}{(1+r_{t+1})} = (1-\tau_s)H^i w_t + \tau_s H^i w_t, \quad i = 1, 2 \quad \dots \quad (14)$$

By solving the maximisation problem, we can obtain the optimal level of consumption in period 1 for both types of agents, which is given by:

$$C_{y,t}^i = \frac{1+\rho}{2+\rho} H^i w_t \quad i = 1, 2 \quad \dots \quad \dots \quad \dots \quad (15)$$

It follows that savings of each individual are:

$$S_t^i = (1-\tau_s)H^i w_t - \frac{1+\rho}{2+\rho} H^i w_t \quad i = 1, 2 \quad \dots \quad \dots \quad (16)$$

Total savings in the economy are:

$$S_t = L_t^1 S_t^1 + L_t^2 S_t^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (17)$$

The new equilibrium condition for the economy is:

$$K_{t+1} = S_t + D_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (18)$$

where $D_t = \tau_s w_t (H^1 L_t^1 + H^2 L_t^2)$ indicates the total value of contributions made by the young at time t . As Equation (18) indicates, in the fully-funded pension system the contributions to pension system are also saved as capital. Under this system the workers' contributions are invested in different investment products, thereby channeling into the capital accumulation process.

The steady state level of capital per unit of effective labour under the fully-funded can be presented as given below [The details can be seen from Serrano (1999)].

$$k_{ff} = \left[\frac{1}{(2 + \rho)} \frac{1}{(1 + n)} (1 - \alpha) \right]^{\frac{1}{1-\alpha}} \quad \dots \quad \dots \quad (19)$$

5.3. Comparison of the Two Systems in Steady State

5.3.1. Parametric Assumptions

In order to make a comparison of pay-as-you-go pension system with fully-funded pension system, we assign realistic values to model's parameter to get numerical solutions. These values are given in Table 5.1

Table 5.1

Assumed Values of Parameters

Parameter	Value
Capital's share in production	$\alpha = 0.30$
Discount rate	$\rho = 0.05$
Population growth rate	$n = 0.019$
Social security tax rate	$\tau_s = 0.00245$
Fraction of skilled Labour Force (rich agents)	$\beta = 0.2, 0.3, 0.4, 0.5$
Fraction of total stock of human capital owned by rich	$\gamma = 0.5, 0.6, 0.7, 0.8, 0.9$

We have taken the typical value of 0.30 for α after analysing a number of studies on empirical estimates of capital share in production [Young (1995), Collins *et al.* (1996) and Ismihan (2005)]. For the discount rate ρ , there exist a wide variety of estimates in the empirical literature [Auerbach and Kotlikoff (1987), Hubbard *et al.* (1995) and

Hansen *et al.* (1983)]. We choose $\rho = 0.05$ after analysing all these studies. The population in Pakistan has been expected to grow at an approximate 2 percent for the next 30 years [WDI (2006)]. And the value of social security tax rate that we choose is $\tau_s = 0.00245$, which has been calculated by using workers welfare tax. Finally, β and γ are respectively the fraction of labour force that is skilled (rich agents) and the fraction of total stock of human capital that they own. Different possible values have been used for both these parameters because of unavailability of empirical estimates.

5.3.2. The Steady State Level of Capital

The effects of pension system reform on capital per unit of effective labour and the capital-output ratio for different combinations of β and γ are shown in Table 5.2 and Table 5.3 respectively. The simulation results in Table 5.2 show that the effects of pension system reform on steady state level of capital are larger, the larger the fraction of population represented by agents of type 2, or higher the endowments of human capital owned by them, that is, the smaller the values of β and γ . In $\beta = 0.5$ and $\gamma = 0.5$ case, the stock of capital per unit of effective labour is 1.7 times larger in the fully-funded state than in the pay-as-go system.

Table 5.2

Steady State Level of Capital Per Unit of Effective Labour Under Pay-As-You-Go and Fully-Funded Pension Systems

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	k_{PG}	0.0209	0.0326	0.0501	0.0776	0.1235
	k_{FF}	0.2097	0.2097	0.2097	0.2097	0.2097
	Percentage change	901	543	318	170	70
$\beta = 0.3$	k_{PG}	0.0373	0.0546	0.0775	0.1083	0.1502
	k_{FF}	0.2097	0.2097	0.2097	0.2097	0.2097
	Percentage change	461	284	170	94	40
$\beta = 0.4$	k_{PG}	0.0563	0.0775	0.1027	0.1324	0.1675
	k_{FF}	0.2097	0.2097	0.2097	0.2097	0.2097
	Percentage change	272	170	104	58	25
$\beta = 0.5$	k_{PG}	0.0775	0.1006	0.1254	0.1517	0.1796
	k_{FF}	0.2097	0.2097	0.2097	0.2097	0.2097
	Percentage change	170	108	67	38	17

Note: k_{PG} and k_{FF} denote capital per unit of effective labour under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

Table 5.3

*Steady State Level of Capital Output Ratio
Under Pay-As-You-Go and Fully-Funded Pension Systems*

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$G = 0.9$
$\beta = 0.2$	k/y_{PG}	0.0668	0.0911	0.1231	0.167	0.2313
	k/y_{FF}	0.335	0.335	0.335	0.335	0.335
	Percentage change	402	268	172	101	45
$\beta = 0.3$	k/y_{PG}	0.1002	0.1307	0.167	0.211	0.2653
	k/y_{FF}	0.335	0.335	0.335	0.335	0.335
	Percentage change	234	156	101	59	26
$\beta = 0.4$	k/y_{PG}	0.1336	0.167	0.2033	0.2429	0.2863
	k/y_{FF}	0.335	0.335	0.335	0.335	0.335
	Percentage change	151	101	65	38	17
$\beta = 0.5$	k/y_{PG}	0.1669	0.2003	0.2338	0.2672	0.3006
	k/y_{FF}	0.335	0.335	0.335	0.335	0.335
	Percentage change	101	67	43	26	12

Note: k/y_{PG} and k/y_{FF} denote capital output ratio under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

Furthermore keeping γ constant at 0.5, the variation in β shows that the effect of pension system reform is larger at the smaller value of β , e.g. in case of $\beta = 0.2$ and $\gamma = 0.5$ the capital per unit of effective labour is 9 times larger in fully funded state than in pay-as-you-go pension system. On the other hand, in case of $\beta = 0.5$ and $\gamma = 0.5$ capital per unit of effective labour is 1.7 times larger in fully-funded pension system.

The reason behind these results is that the contributions to the pension system are accumulated as capital in fully funded pension system whereas in the pay-as-go pension system the contributions of current workers are used to finance the pension benefits of retirees. The simulation result indicates that the effect of pension system reform on capital per unit of effective labour is larger if larger fraction of population is represented by poor people or with smaller value of β . The reason behind is that in the new system poor people, who didn't have access to the financial system in the old pay-as-you-go pension system, would also be able to channel their savings through the financial system. So savings of these people also take part in the capital accumulation process.

According to simulation results keeping β constant at 0.2, the variation in γ shows that the effect of pension system reform on capital per unit of effective labour is larger at the smaller value of γ or if larger endowment of human capital is owned by agents of type 2 (poor agents), e.g. in case of $\beta = 0.2$ and $\gamma = 0.5$ the capital per unit of

effective labour is 9 times larger in fully-funded state while in case of $\beta = 0.2$ and $\gamma = 0.9$ capital per unit of effective labour is just 70 percent higher in fully-funded pension system as compared to the pay-as-you-go system. The reason behind might be that with larger endowment of human capital, the labour productivity of poor individuals will increase and consequently their labour earnings will increase out of which they would be able to save more and their savings are ultimately used in the capital accumulation process. So the economy will reach higher levels of capital after pension system reform even if saving rates as fraction of wages do not increase.

Further, the effect of pension system reforms on capital per unit of effective labour is decreasing with increase in both β and γ , e.g. if we take $\beta = 0.2$ and $\gamma = 0.5$ then capital per unit of effective labour is 9 times larger in fully-funded state than in pay-as-you-go pension system, while in case of $\beta = 0.5$ and $\gamma = 0.8$ it is just 38 percent higher in fully-funded state.

In all cases the reform in pension system lead to higher level of capital per unit of effective labour. However, the effect of pension system reforms on capital per unit of effective labour is more significant if a larger fraction of population is represented by agents of type 2 (poor agents) and larger endowment of human capital is owned by them, that is, with smaller values of β and γ .

The simulation results in Table 5.3 show that the effects of pension system reform on steady state level of capital-output ratio are larger, the larger the fraction of population represented by agents of type 2, or higher the endowments of human capital owned by them, that is, the smaller the values of β and γ . In $\beta = 0.5$ and $\gamma = 0.5$ case, capital output ratio is 101 percent higher in the fully-funded state than in the pay-as-you-go system.

Furthermore, keeping γ constant at 0.5, the variation in β shows that the effect of pension system reform on capital output ratio is larger at the smaller value of β e.g. in case of $\beta = 0.2$ and $\gamma = 0.5$ the capital-output ratio is 4 times larger in fully-funded state than in pay-as-you-go pension system. Whereas in case of $\beta = 0.5$ and $\gamma = 0.5$ capital output ratio is 101 percent higher in the fully-funded pension system.

According to the simulation results, further indicates that keeping β constant at 0.2, the variation in γ shows that the effect of pension system reform on capital-output ratio is larger at the smaller value of γ or if larger endowment of human capital is owned by agents of type 2 (poor agents) e.g., in case of $\beta = 0.2$ and $\gamma = 0.5$ the capital-output ratio is 4 times larger in fully-funded state while in case of $\beta = 0.5$ and $\gamma = 0.9$ capital-output ratio is just 45 percent higher in fully-funded state. Further, the effect of pension system reforms on capital-output ratio is

decreasing with simultaneous increase in both β and γ , e.g. if we take $\beta = 0.2$ and $\gamma = 0.5$ then capital output ratio is 4 times larger in fully-funded state than in pay-as-you-go pension system while in case of $\beta = 0.5$ and $\gamma = 0.8$ it is just 26 percent higher in fully-funded pension system.

5.3.3. *Income Distribution*

Generally it is argued that privatisation of the pension system will deteriorate income distribution, especially hurting the poor. Unless privatisation program contains some explicit redistributive system, income distribution may deteriorate [James (1997)]. In many countries around the world pay-as-you-go social security systems contain strong redistributive mechanism in their system designs. For example, in the United States this is one of the main reasons why authorities do not seriously consider the option of reforming the current system, even though the existing system is facing severe financial constraints because of its pay-as-you-go nature [Serrano (1999)].

The developing countries including Pakistan are lucky enough in this regard because they have not developed their pension and social security system to such an extent. Even then it is necessary to introduce an explicit redistributive mechanism in new pension design to protect the poor elderly with balance in their accounts not enough to have minimum pension.

Here we take into account the effects of pension system reforms on income distribution. Income distribution is measured as the ratio of rich agents' present value of life time incomes to that of poor agents. Serrano (1999) has shown that, under pay-as-you-go pension system the ratio of present value of lifetime earnings of rich agent to that of poor agent is given by:

$$\frac{(1+r_{PG})[\gamma(1-\tau_s)+\tau_s\varphi(1+n)]}{(1-\tau_s)(1-\gamma)(1+r_{PG})+\tau_s\varphi(1+n)} \quad \dots \quad \dots \quad \dots \quad (20)$$

Where r_{PG} is the steady state level of interest rate.

In the fully-funded case the ratio of present value of lifetime income of rich over poor individual is just [for details see Serrano (1999)]:

$$\frac{\gamma}{(1-\gamma)} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (21)$$

As the fully-funded system is not redistributive, having a larger endowment of human capital can result in higher lifetime

earnings. The reform of pension system will improve the distribution of income if the ratio of lifetime earnings between rich and poor agents is lower in fully funded state than in the pay-as-you-go pension system.

Table 5.4 shows the effect of the pension system reform on the ratio of rich to poor agents income for different values of β and γ . A negative change indicates more income equality between rich and poor agent. For example in $\gamma = 0.5$, $\beta = 0.2$ case, there is more income equality after the reform and $\gamma = 0.9$, $\beta = 0.5$ is the case in which income inequality gets worst, the ratio increases by 0.49 percent.

The simulation result indicates that keeping γ constant at 0.5, the movement across β shows that the distributional effect of pension system reform is decreasing with rising value of β , e.g. with $\beta = 0.2$ and $\gamma = 0.5$ the percentage change in the ratio of rich agents' present value of lifetime income to that of the poor agent is -0.204 percent while with $\beta = 0.5$ and $\gamma = 0.5$ the change is -0.160. The reason behind is that, larger value of β means lower increase in stock of physical capital and consequently higher interest rate in the fully-funded state. As a result, for any given difference in labour earning, the gap in capital earning will be larger.

Table 5.4

*Ratio of Rich to Poor Individual's Income
Under Pay-As-You-Go and Fully-Funded Pension Systems*

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	l_1/l_2_{PG}	1.002	1.502	2.334	3.998	8.981
	l_1/l_2_{FF}	1	1.5	2.33	4	9
	Percentage change	-0.204	-0.119	-0.043	0.043	0.21
$\beta = 0.3$	l_1/l_2_{PG}	1.0018	1.502	2.334	3.997	8.973
	l_1/l_2_{FF}	1	1.5	2.33	4	9
	Percentage change	-0.187	-0.104	-0.024	0.077	0.304
$\beta = 0.4$	l_1/l_2_{PG}	1.0017	1.501	2.334	3.996	8.964
	l_1/l_2_{FF}	1	1.5	2.33	4	9
	Percentage change	-0.172	-0.094	-0.009	0.108	0.396
$\beta = 0.5$	l_1/l_2_{PG}	1.0016	1.501	2.333	3.994	8.956
	l_1/l_2_{FF}	1	1.5	2.33	4	9
	Percentage change	-0.16	-0.0831	0.003	0.138	0.486

Note: l_1/l_2_{PG} and l_1/l_2_{FF} denote the ratio of rich agent's present value of lifetime income to that of the poor agent under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

Furthermore, if we keep β constant at 0.2 then the movement across γ indicates that the effect of pension system reform on income distribution is worsening with rising value of γ , e.g. with $\beta = 0.2$ and $\gamma = 0.5$ the percentage change in the ratio of rich agents' present value of

lifetime income to that of the poor agent is -0.204 percent while with $\beta = 0.2$ and $\gamma = 0.9$ the change is 0.21 percent. The results indicate that pension system reform will deteriorate income inequality if larger endowment of human capital is owned by rich agents. So, non-redistributive feature of fully-funded system coupled with large gaps in skills and human capital endowment of workers will deteriorate income inequality.

5.3.4. Poverty

Here we compare the present value of net wealth for the representative poor agent, individual of type 2, to evaluate whether poor agents in our model are better or worse off after the transition. Poor agents are defined as unskilled workers with lower endowment of human capital and consequently having lower labour earnings.

Following Serrano (1999), in the pay-as-you-go steady state the present value of income for poor agents is given by:

$$(1 - \tau_s)H^2w_{PG} + \frac{\tau_s \phi Hw_{PG}(1+n)}{(1+r_{PG})} \quad \dots \quad \dots \quad \dots \quad (22)$$

And the equivalent of this expression in the fully-funded case is:

$$H^2w_{ff} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (23)$$

Table 5.5 shows the effect of pension system reform on the present value of lifetime income of poor agents. In all cases poor individuals are better off after the reform. Further, this improvement is larger, the larger the fraction of total stock of human capital endowment owned by the poor agents.

The simulation results indicates that in case of $\beta = 0.2$ and $\gamma = 0.5$, there is 100 percent increase in lifetime earning of poor agents. However, this increase is larger, the larger the human capital endowment owned by poor agent, which means lower γ or higher $1-\gamma$.

Furthermore, the result indicates that keeping γ constant at 0.5, the variation across β shows that the effect of pension system reform on the present value of lifetime earning of poor agents declines with rising value of β . With $\beta = 0.2$ and $\gamma = 0.5$ the percentage change in lifetime earning of poor agent is 100 percent, while in case of $\beta = 0.5$ and $\gamma = 0.5$ this value is equal is equal to 35 percent. The lower value of β means higher increase in stock of physical capital in the fully-funded state. So the increase in physical capital in the fully-funded state increases the labour productivity, by a greater margin, which ultimately increases the lifetime earning of poor agents.

Table 5.5

*Poor Individual's Income Under
Pay-As-You-Go and Fully-Funded Pension Systems*

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	I_{2_PG}	1	0.914	0.781	0.594	0.342
	I_{2_FF}	2	1.598	1.196	0.804	0.402
	Percentage change	100	74.84	53.14	35.35	17.54
$\beta = 0.3$	I_{2_PG}	1.191	1.068	0.89	0.657	0.363
	I_{2_FF}	2	1.598	1.196	0.804	0.402
	Percentage change	67.93	49.63	34.38	22.37	10.74
$\beta = 0.4$	I_{2_PG}	1.347	1.187	0.969	0.699	0.377
	I_{2_FF}	2	1.598	1.196	0.804	0.402
	Percentage change	48.48	34.63	23.43	15.02	6.63
$\beta = 0.5$	I_{2_PG}	1.483	1.283	1.029	0.728	0.384
	I_{2_FF}	2	1.598	1.196	0.804	0.402
	Percentage change	34.86	24.55	16.23	10.44	4.69

Note: I_{2_PG} and I_{2_FF} denote the present value of lifetime income for poor agent under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively. In order to arrive at unit free measurement, all values are expressed as ratios to the lifetime income of the poor in the base category of pay-as you go with $\gamma = 0.5$ and $\beta = 0.2$.

On the other hand, if we keep β constant at 0.2, then the variation across γ shows that the effect of reforms on lifetime earning of poor is larger if larger endowment of human capital is owned by poor agents, e.g. in case of $\beta = 0.2$ and $\gamma = 0.5$, the percentage change in the lifetime earning of poor agents is 100 percent whereas with $\beta = 0.2$ and $\gamma = 0.9$ this change is just 17.5 percent .

In general poor individuals are better off due to pension system reforms in all cases; however this improvement is larger with lower values of β and γ .

5.4. Transitional Role of Fiscal Policy

In the pay-as-you-go pension system government plays the role of realisation of transfers from young to old as it collect pension contributions from current workers and then uses these contributions to finance the pension benefits of current retirees. Under the fully-funded pension system government has no active role to play as individuals in this system have their own accounts in which they deposit their contributions and the amount of pension at the time of retirement is determined by the amount that they have in their accounts including investment earnings.

However, in a pension system reform of the type considered here, government plays the most important role in shifting the system

from pay-as-you-go to fully-funded pension form. In order to meet the commitment with transition workers, government needs to generate revenues in order to pay pensions to these workers. If government decides to shift to fully-funded pension system, it will have to pay pension to current old individuals who contributed to the system in past. But after the transition government will not collect contributions from current young workers, as young individuals will now make their pension contributions to their own individual accounts. This situation changes some of the results presented above. If we also take into account this government debt then the steady state level of capital per worker that economy reaches after the transition will be lower.

In this section we present the case in which we take into account this government debt. Following Serrano (1999), an income tax rate is introduced that will generate government revenues. Tax is collected to service government debt associated with current retirees and contributors in old pay-as-you-go pension system. The tax rate is set at the level where present value of tax collected is equal to the present value of debt. In the unfunded pay-as-you-go pension system the income tax rate is zero and the pension paid to old individual is equal to contribution made by the young.

Now after the recognition of government debt, the equilibrium condition for the economy becomes

$$K_{t+1} = S_t^1 L_t^1 - B_{t+1} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (24)$$

where B_{t+1} is the level of government debt associated with current retirees and contributors in old pension system.

If the transition from pay-as-you-go pension system to the fully-funded system occurs in year then the government debt will be equal to the value of pension paid to individuals that are old at time $t = R$ or the value of contributions made by current young workers in old pay-as-you-go pension system. Thus the fiscal cost of the reform in the year of reform $t = R$, denoted by B_R , that the economy has to bear if government decides to shift from pay-as-you-go pension system to fully-funded pension system is given by:

$$B_R = \tau_s w_{PG} (H^1 L_t^1 + H^2 L_t^2) \quad \dots \quad \dots \quad \dots \quad (25)$$

The equation below shows the fiscal cost of the reforms in per capita terms [for details see Serrano (1999)].

$$b_R = \frac{\tau_s w_{PG}}{(1+n)} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (26)$$

where w_{PG} is the wage rate at the pay-as-you-go steady state position.

Following Serrano (1999), the income tax rate imposed by the government to maintain constant level of debt per unit of effective labour is given by:

$$\tau_t = \frac{b_R(r_t + n)}{y_t} \quad \text{for } t > R \quad \dots \quad \dots \quad \dots \quad \dots \quad (27)$$

Now the stock of capital per unit of effective labour will evolve according to the following non-linear difference equation.

$$k_{t+1} = \frac{(1 - \alpha) \left[1 - \left\{ b_R (\alpha k_t^{\alpha-1} + n) / k_t^\alpha \right\} \right] k_t^\alpha}{(1 + n)(2 + r)} - b_R \quad \dots \quad (28)$$

Table 5.6 shows the steady states levels of capital per unit of effective labour when government recognises its debt with past contributors and uses the strategy as described above to finance this debt. The steady state levels of capital and income are lower when government recognises its debt with past contributors as compared to the level that can be achieved without recognising this debt. We can see that with $\gamma = 0.5$ and $\beta = 0.2$ capital per unit of effective labour is 8.98 times larger after the transition to fully-funded system. This is slightly lower than the 9 times increase realised in case when government does not recognises its debt with past contributors as shown in Table 5.2. Table 5.6 and Table 5.2 indicate that similar result holds for other combination of γ and β .

Table 5.6

Steady State Level of Capital Per Unit of Effective Labour Under Pay-As-You-Go and Fully-Funded Pension Systems (With Explicit Consideration to Government Debt)

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	k_{PG}	0.0209	0.0326	0.0501	0.0776	0.1235
	k_{FF}	0.2092	0.2091	0.209	0.2089	0.2088
	Percentage change	898	540	316	169	69
$\beta = 0.3$	k_{PG}	0.0373	0.0546	0.0775	0.1083	0.1502
	k_{FF}	0.2091	0.209	0.2089	0.2088	0.2087
	Percentage change	459	282	169	92	38
$\beta = 0.4$	k_{PG}	0.0563	0.0775	0.1027	0.1324	0.1675
	k_{FF}	0.209	0.209	0.2089	0.2088	0.2088
	Percentage change	270	169	103	57	24
$\beta = 0.5$	k_{PG}	0.0775	0.1006	0.1254	0.1517	0.1796
	k_{FF}	0.209	0.2089	0.2088	0.2088	0.2087
	Percentage change	169	107	66	37	16

Note: k_{PG} and k_{FF} denote capital per unit of effective labour under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

Similar situation holds with respect capital-output ratio. Table 5.7 (along with Table 5.3) shows that capital-output ratio is higher after the transition from pay-as-you-go system to the fully funded system. Here again the rate of increase in capital-output ratio is reduced due to government's realisation of debt with past contributors.

Table 5.7

*Steady State Level of Capital Output Ratio Under Pay-As-You-Go and Fully-Funded Pension Systems
(With Explicit Consideration to Government Debt)*

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	k_{PG}	0.0668	0.0911	0.1231	0.167	0.2313
	k_{FF}	0.3348	0.3347	0.3347	0.3346	0.3346
	Percentage change	401	267	171	100	44
$\beta = 0.3$	k_{PG}	0.1002	0.1307	0.167	0.211	0.2653
	k_{FF}	0.3347	0.3347	0.3346	0.3346	0.3345
	Percentage change	233	155	100	58	25
$\beta = 0.4$	k_{PG}	0.1336	0.167	0.2033	0.2429	0.2863
	k_{FF}	0.3347	0.3346	0.3346	0.3346	0.3345
	Percentage change	150	100	64	37	16
$\beta = 0.5$	k_{PG}	0.1669	0.2003	0.2338	0.2672	0.3006
	k_{FF}	0.3346	0.3346	0.3346	0.3345	0.3345
	Percentage change	100	66	42	25	11

Note: k_{PG} and k_{FF} denote capital per unit of effective labour under pay-as-you-go and fully-funded pension systems respectively. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

Table 5.8 shows that the transition cost b_R is higher, the higher the fraction of population represented by rich agents or higher the fraction of population that has access to the financial system. The transition cost is also higher when the fraction of total stock of human capital owned by rich agents is higher. As a result the income tax rate required to keep the level of debt unchanged increase with increase in the values of β and γ . In the $\beta = 0.2$ and $\gamma = 0.5$ case, the transition cost is equal to 2.52 percent of capital per unit of effective labour and 0.168 percent of the economy's output per unit of effective labour. Whereas in the $\beta = 0.5$ and $\gamma = 0.5$ case, this cost is equal to 1.01 percent of capital per unit of effective labour but still 0.168 percent of the economy's output per unit of effective labour. So the income tax rate required to keep the level of debt unchanged increases with increase in the fraction of population represented by rich agents and with the increase in the endowment of human capital owned by the rich agents. The income tax rate is equal to 0.11 percent in case of $\beta = 0.5$ and $\gamma = 0.5$ whereas it is 0.07 percent in $\beta = 0.2$ and $\gamma = 0.5$ case. Similar result

is obtained if we keep β constant at 0.2 and move across γ e.g. the income tax rate is equal to 0.07 percent in case of $\beta = 0.2$ and $\gamma = 0.5$ whereas it is 0.13 percent in $\beta = 0.2$ and $\gamma = 0.9$ case.

We can conclude that the pension system reform will increase the level of physical capital in the economy but the increase will be larger the larger the fraction of population composed of poor individuals and higher the level of human capital owned by them.

Table 5.8

*Transition Cost as Percentage of Output and Capital Per Unit of
Effective Labour and Income Tax Rate Required for
Constant Level of Debt*

		$\gamma = 0.5$	$\gamma = 0.6$	$\gamma = 0.7$	$\gamma = 0.8$	$\gamma = 0.9$
$\beta = 0.2$	<i>Cost/k %</i>	2.52	1.85	1.37	1.01	0.73
	<i>Cost/y %</i>	0.168	0.168	0.168	0.168	0.168
	τ_{ff}	0.07	0.08	0.1	0.11	0.13
	b_R	0.0005	0.0006	0.0007	0.0008	0.0009
$\beta = 0.3$	<i>Cost/k %</i>	1.68	1.29	1.01	0.8	0.63
	<i>Cost/y %</i>	0.168	0.168	0.168	0.168	0.168
	τ_{ff}	0.09	0.1	0.11	0.12	0.13
	b_R	0.0006	0.0007	0.0008	0.0009	0.00095
$\beta = 0.4$	<i>Cost/k %</i>	1.26	1.01	0.83	0.69	0.59
	<i>Cost/y %</i>	0.168	0.168	0.168	0.168	0.168
	τ_{ff}	0.1	0.11	0.12	0.13	0.14
	b_R	0.0007	0.0008	0.0009	0.00091	0.00098
$\beta = 0.5$	<i>Cost/k %</i>	1.01	0.84	0.72	0.63	0.9
	<i>Cost/y %</i>	0.168	0.168	0.168	0.168	0.168
	τ_{ff}	0.11	0.12	0.13	0.14	0.15
	b_R	0.00078	0.0008	0.0009	0.00095	0.001

Note: Cost/k percent and cost/y percent denote transition costs as percentage of capital and output. τ_{ff} and b_R income tax rate required for constant level of debt and fiscal cost of reform that the economy has to bear if government decides to shift from pay-as-you-go pension system to fully-funded pension system. The parameters γ and β denote the fraction of human capital owned by skilled (rich) agents and the fraction of skilled (rich) labour force respectively.

We also find that for some initial distribution when access the financial system is restricted to some of the individuals, income distribution may improve due to financial system reforms, however with complete access to the financial system before reform, income distribution deteriorates in all cases. Moreover different initial distributions will have different effects on fiscal position of the government needed to finance transition cost. We find that the income tax rate required to keep the level of debt unchanged increases with increase in the fraction of population represented by the rich agents and with increase in the endowment of human capital owned by them.

Chapter 6

CONCLUSION

In this chapter we conclude the study and suggest an alternative approach to avoid the problems associated with pay-as-you-go pension system in Pakistan. The problems that the current system is facing now are as under.

- Rising life expectancy coupled with declining fertility rates are resulting in changes in the age structure of the population. This demographic transition will soon lead to an increase in the proportion of elderly population in Pakistan. Thus the economic burden on the current and future young generations to support their elderly is expected to rise in future.
- The conventional means of support for the elderly through strong inter-generational family ties are also likely to dry up as the joint family system in Pakistan is gradually breaking down.
- The existing pension system in Pakistan has very low coverage and the fiscal resources are collected from broader population to cover pension for the minority.
- The current pension system in Pakistan is highly biased in favour of public sector employees who are treated quite generously in comparison to private sector workers who do not generally have access to any worthwhile old-age security system.
- The pension system for the public sector employees operates as unfunded (pay as you go) system, which places substantial financial pressure on budgetary allocations.
- The payment of commutation without discounting doubles the government's long term and unfunded fiscal liability for pensions. Employers' ability to pool longevity risk is reduced with the practice of commutation, so the cost of pension is increased for the government. This practice also creates hurdles in reforming compensation package as a whole, e.g. monetising compensation without revising the structure of commutation would mean that government pension liabilities would explode.

- Efforts to reduce the burden of pensions by early retirement schemes, mostly in the form of the so-called golden handshake schemes, are on the rise in Pakistan. Most of these schemes aim at downsizing the pool of employees in various public sector and semi-government organisations that are up for privatisation. This practice has reduced the supply of experienced labour in many professions.
- Uneven pension schemes across sectors and across professions have created unwarranted obstacles to job mobility.
- Properly functioning private annuity market is almost non-existent in Pakistan.

The above-mentioned problems indicate that there is a need to reform the pension system of Pakistan. Fully-funded pension system can help to strengthen the formal channels of retirement savings and can help to get rid of these problems. If the decision to reform the pension system is not taken in time then in the near future rising pension expenditure can be harmful for Pakistan economy on various accounts. The foremost impact will be the increase in pension expenditure, which will in turn lead to increase in indirect taxes, reduction in development expenditure and/or increase in government borrowings. Other consequences include increased inequality among elderly population segmentation of labour between public and private sectors and the resulting incoherence in the society.

Although some efforts to reform the pension system had been made to reduce the government's rising pension bill, yet despite realisation of the problem no serious effort had been made to reform the pension system in a fundamental way to avoid the situation from getting out of control in future. Moreover, systematic reforms or a shift to a fully-funded pension system can solve the fiscal problems of pay-as-you-go pension system forever, whereas parametric or minor reforms just postpone the fiscal burden for a short period of time and open the door for additional minor reform in future.

The existing theoretical and empirical literature on efficiency and growth effects of pension reforms indicates that pension system reforms have positive impact on national savings and financial market development, which in turn contribute to long-run economic growth.

The study uses Serrano's overlapping generation model and applies simulations to draw some conclusion about Pakistan economy. The model is used to study the effects that a transition from pay-as-you-go pension system to fully-funded system may have on capital accumulation, income distribution, poverty and fiscal position of government.

The simulation analysis shows that pension system reform will increase the level of physical capital in the economy but the increase will be larger the larger the fraction of population composed of poor individuals and higher the level of human capital owned by the poor. For example, if the proportion of poor is 80 percent and the proportion of human capital owned by the poor is 20 percent then in the long-run the stock of physical capital per unit of effective labour will increase by 70 percent due to the pension system reform.

The simulation analysis further shows that under all the parametric assumptions considered, the effect of reforms on the present value of lifetime earning of poor individual is positive but this improvement is larger the larger the fraction of total stock of effective labour owned by poor agents who have relatively lower human capital per person. If, for example, we consider the case in which the proportion of poor is 80 percent and the proportion of human capital owned by the poor is 20 percent then the pension system reform will result in 34 percent increase in lifetime earning of poor agents.

We also find that for some initial distribution when access to the financial system is restricted to poor individuals, the income distribution may improve due to reforms. In case the proportion of poor is 80 percent and the proportion of human capital owned by the poor is 20 percent, the percentage change in income distribution measured by the ratio of the present value of lifetime income of rich agents to that of the poor agent is -0.043 percent. However income distribution deteriorates in all the cases with complete access to the financial system before reform.

Moreover different initial distribution will have different effects on fiscal policy needed to finance transition cost of the reform. We find that the income tax rate required to keep the level of debt unchanged increases with increase in the fraction of population represented by rich agents and with increase in the fraction of population having access to the financial system. Furthermore, the income tax rate required to keep the level of debt unchanged is also higher if the endowment of human capital owned by rich agents is higher.

However, a number of initial conditions need to be in place before a shift from pay-as-you-go to fully funded system can be implemented successfully. These initial conditions include the following.

- There is a need to create an enabling environment for the successful implementation of pension system reform. Awareness about the strengths and weaknesses of pay-as-you-go and fully-funded pension systems need to be created

through information dissemination both at intellectual and academic levels.

- There is a need to have at least a small number of sound and well-functioning banks and insurance companies. Pension-fund managers need to be carefully selected based on past performance and current management and services. To minimise the investment risk, international diversification may also be allowed to pension-fund managers.
- Finally, pension system reforms require a strong role of the government. There is a need to develop a regulatory framework to protect pension participants from the whole range of capital markets, insurance, inflation and other risks.
- Above all, further research on the issue needs to be undertaken. The present study is primarily academic in nature. It is hoped that this study will create awareness of the problem and contribute to understanding of the issue among academic circles as well as policy makers. Future research needs to be undertaken with a more practical approach.

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