

Is Defense Expenditure Pro Poor or Anti Poor in Pakistan? An Empirical Investigation

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Abstract

Defense expenditures can affect the economy either negatively or positively. These are considered as unproductive, have higher opportunity costs and crowd out investment. On the other hand they also have growth-promoting potentials, cause expansion of aggregate demand, production and employment generation. They exhibit spillover effects on the economy. Since independence 1947, Pakistan's defense burden (defense expenditure as proportion of GDP) on average has been 5.97 percent. Pakistan is still among the poorest countries and the per capita gross national income for Pakistan was US\$ 1261 which is 143rd among 182 countries in the world in the year of 2012. Thus on the one hand, Pakistan is facing several problems such as poverty, poor infrastructure and poor health status. On the other hand, Pakistan does spend a considerable amount on defense sector which might use scarce resources and crowd out growth-leading expenditures such as health and education expenditures. This paper empirically examines for both short and long run effects of defense expenditure on poverty in Pakistan for the period 1973-2012. The long term coefficients are examined by using Ordinary Least Square Method and short term dynamics are computed by applying Error Correction Model. The empirical findings reveal that the defense expenditures are not pro-poor.

Keywords: Defense Expenditure, Military expenditure, Defense Burden, Poverty

The issue of defense expenditure (Dexp hereinafter) is widely debated in the literature. Defense expenditure can affect the economy either negatively or positively. They are considered as unproductive, have higher opportunity costs and crowd out investment. They retard the pace of the economic growth by distorting the resource allocation. But contrary to this view, they also have growth-promoting potentials, cause expansion of aggregate demand, production and employment generation. They exhibit spillover effects on the economy. The empirical literature is divided between pro and against school of thoughts. The former group is less dominant in the literature (Frederiksen and McNab, 2001; Hassan et al.2003; Halicioglu, 2004; Yildirim, Sezgin and Ocal, 2005; Bose et al., 2007; Ando, 2009,) which enlist the positive effects of Dexp on economic growth. The later group of researcher find adverse of effects of Dexp on economic growth (Abu-Bader & Abu-Qarn, 2003; Galvin, 2003; Klein, 2004; Karagol & Palaz,2004; Kentor & Kick, 2008; Smith & Tuttle, 2008; Mylonidis, 2008; Hou, 2010; Dunne, 2010; Braşoveanu, 2010; Iftikhar ul Husnain, & Shaheen, 2011; Dunne and Tian, 2013).

The adverse effects of Dexp have not deterred countries from stockpiling military arsenals. According to Stockholm International Peace Research Institute (SIPRI), world military expenditure in 2012 is estimated to have been \$1756 billion, representing 2.5 per cent of global gross domestic product (GDP) or \$249 for each person in the world.

Since independence 1947, Pakistan on average has spent Rs. 83.18 billion (on average 5.97 percent of GDP¹) on defense sector and during last fiscal year, 2012, Pakistan spent Rs. 507.159 billion on defense sector which constitutes 5.3 percent of GDP and 12.9 percent of total federal government expenditures. Unfortunately, Pakistan is still among the poorest countries and the per capita gross national income for Pakistan was US\$ 1261 which is 143rd among 182 countries in the world in the same year². Thus on the one hand, Pakistan is facing several problems such as poverty, poor infrastructure and poor health status. On the other hand, Pakistan does spend a considerable amount on military expenditure which might use scarce resources and crowd out growth-leading expenditures such as health and education expenditures.

¹ Constituted from fiscal year 1949-50 to 2012-13 (March)

² Data refer mostly to the year 2012. World Economic Outlook Database-October 2013, International Monetary Fund. Accessed on 8 October 2013.

A large chunk of population in Pakistan is living below the poverty line. According to the Benazir Income Support Program (BISP), 45.7 percent people (Approximately 82 million) in Pakistan are living below the poverty line. And out of these 45.7 percent people 36.5 percent million (Approximately 65 million) of the total population are living in chronic poverty (Adnan, 2012). On the other hand, the large size of defence expenditure in presence of high budget deficits, declining development expenditure and increasing debt services on account of exploding public debt got the attention of researcher on the subject. Besides these factors, Pakistan's pursuit of nuclear capability, its arms race with its India and incidence of poverty also got the attention of foreign researchers (Khan, 2004).

For policy purposes, it is very important to determine the channels by which Dexp influence the economic growth process. For the policy makers, the impact of Dexp on economic development, which can be positive or negative, can have different implications with respect to what strategy to apply to stimulate economic growth (Braşoveanu, 2010). The positive impact of Dexp on economic growth causes spill over effects on the economy which may resultant reduction in the poverty while negative impact causes crowding out which may resultant in increasing the incidence of poverty.³ Therefore, the goal of this paper is to analyze the relationship between Dexp and poverty in Pakistan along with other explanatory variables like GDP per capita, growth rate, population growth rate, Foreign Direct Investment (FDI), Inflation and public spending on Education, trying to find out the existence, direction and intensity of this connection.

The remaining part of the paper is organized as: Section II provides the glimpse of Dexp in Pakistan, Section III gives the theoretical framework and review the available literature on the topic, Section IV describes the research methods undertaken to achieve the objectives and gives data sources, Section V discusses the results and lastly conclusion and policy implications are given.

³ Keynesian view: an increase in military spending increases the aggregate demand by stimulating output, employment and hence economic growth. This is positive spill-over effect. Neoclassical view: an increase in military spending means shift of resources away from private sector resulting in reduced private spending. This is crowd-out both public and private sector investments which declines economic growth.

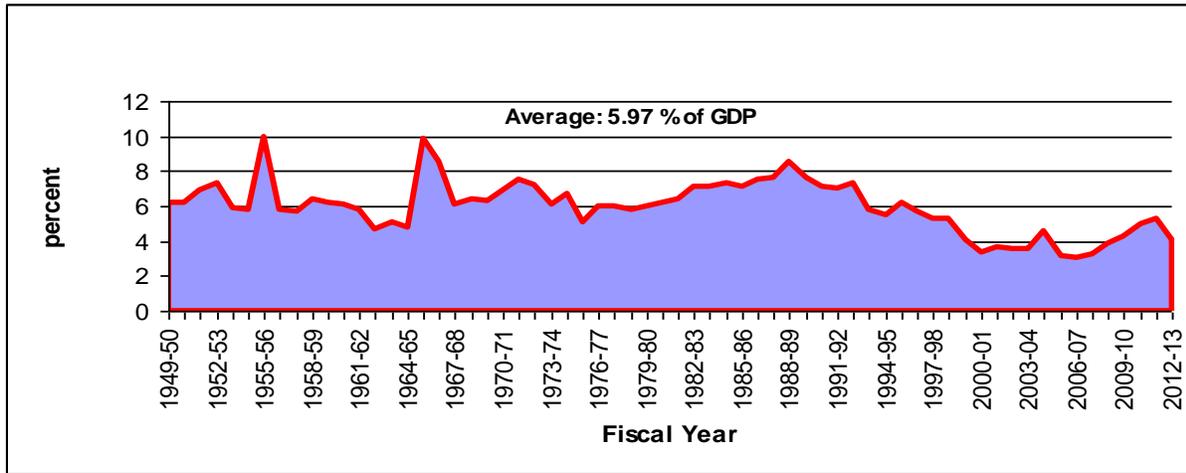
II. Trends in Defense Expenditures of Pakistan

The trend of Pakistan's defense burden (DBI: military expenditure as a proportion of GDP) is shown in Figure 1. The range of DBI is from 3.07 per cent to 9.97 per cent. Pakistan's Dexp remained one of the largest components of total government expenditures since independence. Although sizeable variation in defence expenditure to GDP ratio has been witnessed over the past five decades and the ratio declined significantly with the advent of the 21st century, the absolute size of defence expenditure is considered still very high. The defence expenditure were considerably high during the initial years after independence, it remained 6.4 percent during the first half of 1950s. It rose to 9.97 percent in the year of 1956. This exceptionally high share of defence expenditures in early years of independence may be largely attributable to the government efforts to achieve a minimum level of deterrence, necessitated by the hegemonic attitude of India towards Pakistan.

Afterwards, the share of defence expenditure witnessed a considerable decline with some fluctuations before spiking up again in year 1966 on account of 1965 war with India. In the post-1965 war era, the defence expenditure saw a modest decline. However, this decline proved short lived, as ratio surged again in the fiscal year 1972 due to 1971 war. The post-1971 war period saw a decline and it remained 6.11percent till 1980. However, the declining trend once again reversed during the decade of 1980s as Pakistan got involved in war against Soviet Union occupation in Afghanistan. The average Dexp remained during the period was 7.26 percent.

The withdrawal of Russian forces from Afghanistan coupled with the prevalence of high fiscal deficits propelled government to revisit its defence spending. As a result, the decade of 1990s recorded considerable decline in the share of defence expenditure. The decline in second half of 1990s was more pronounced compared to the first half. Despite tensions on borders with Afghanistan (following the September 11) and India (due to incident of December 13), the share of defence expenditure continued to decline and averaged 3.72 percent during first half of 21st century. The second half is averaged 3.5 percent despite Pakistan is a front line state in war against terrorism. But Dexp once against has started climbing up.

Figure 1: Defense Burdens of Pakistan (DBI), 1950-2013 (March)



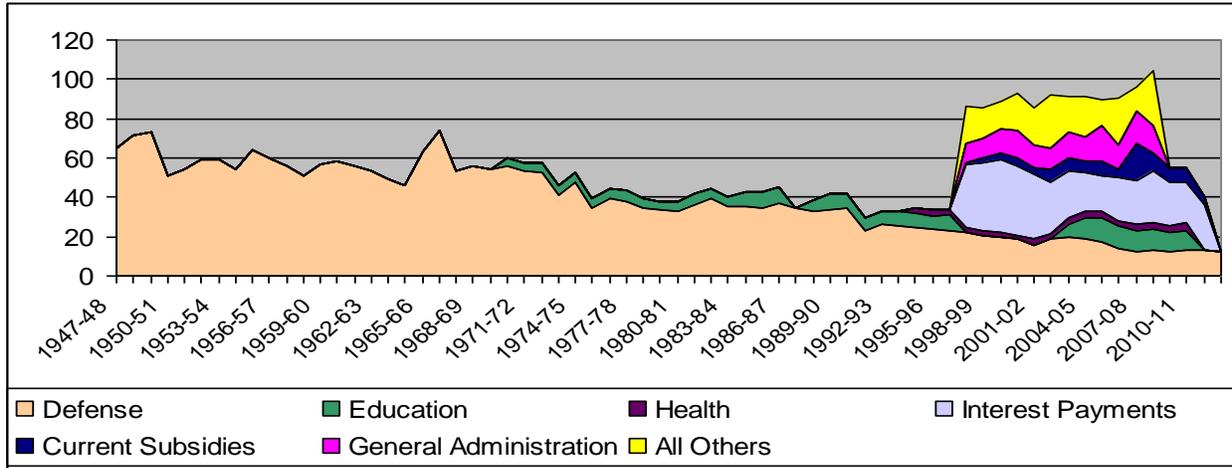
Data Sources:

- (a) Singh and Cheema (2000)
- (b) State Bank of Pakistan – Handbook of Statistics on Pakistan Economy 2005
- (c) Economic Survey (for various years) Government of Pakistan.

*Data for FY 2012-13 on GDP is from July to March 2013.

The share of Dexp to the total federal government expenditure (FGE) is also an important indicator to understand the pattern of Pakistan’s defense spending. Figure (2) gives time-series data for Pakistan’s federal government expenditure shares by function which include the expenditure on defense, education, health, subsidies, interest payments, general administration and other functions. For Pakistan, the biggest share of FGE went to defense sector. During the period 1948-1960, the defense share was almost 60 percent of FGE. The average share of the decade of 1960s was 56 percent. After that it started declining and it averaged 43 percent during 1970s.

Figure 2: Pakistan's Federal Government Expenditure Share by Function



Data Sources:

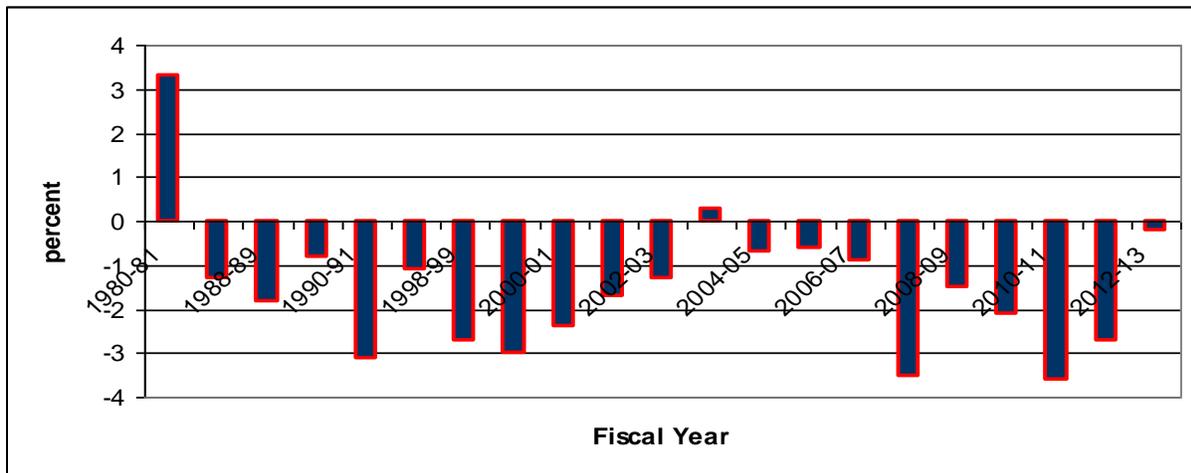
- (a) World Development Indicators database (Education, Health)
- (b) Singh and Cheema (2000) (Defense Expenditure)
- (b) State Bank of Pakistan – Handbook of Statistics on Pakistan Economy 2005(Defense Expenditure)
- (c) Economic Survey (for various years) Government of Pakistan (Interest Payments, Current Subsidies, Gen Administration, All others)

*Data for FY 2012-13 on GDP is from July to March 2013.

Since 1970s defense share in FGE showed a sharp decline. But other forms of central government expenditure showed different status. Education share increased from about 4 percent in the 1971-72 to over 10 percent in the fiscal year 2010-11. However, health share remained at a low level. Recently both the functions (Education and Health) have been devolved from federal government to provinces through a constitutional amendment. Now we can expect improvement in their budgetary allocations. The share of interest payments and current subsidies are other two prominent areas of FGE. The federal government under austerity measures to curtail the ever widening fiscal deficit has started rationalizing subsidies. But the debt servicing is still the problematic area for policy makers.

Pakistan has been struggling to increase its Tax to GDP ratio⁴. At the moment it is unable to meet its current expenditure (non-development) from its own indigenous revenue resources. Therefore there is a gap between the current expenditure and total revenue collected by the government (Figure 3). Dex and interest payments are the major components of the current expenditures. Pakistan has been entangled in a debt trap where it has been further borrowing to pay off its already debt accumulated⁵. More importantly it may be assumed that defense of the country is financed from distorting resources. The theory says that Dex, if financed by non-distorting revenues, has a positive effect on economic growth; if financed by distorting revenues, it might have a positive or negative effect on economic growth, depending on the level of the Dex (Braşoveanu, 2010, p.153).

Figure 3: Trends in Components of Expenditure (As % of GDP)
(Revenue Deficit/Surplus (TR-Total CE))



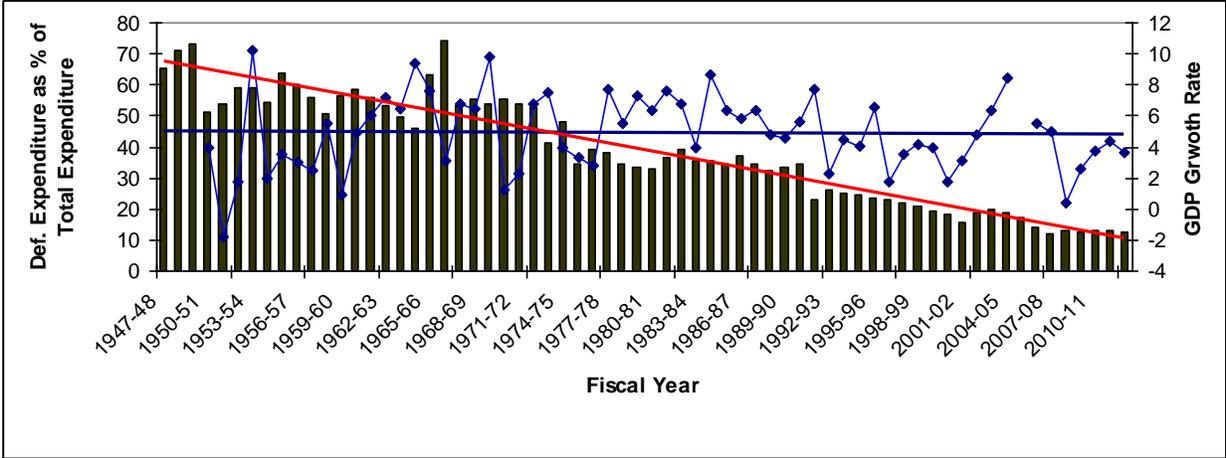
Data Sources: Fiscal Policy Statement 2012-13
Economic Survey of Pakistan 2007-08

⁴ According to Fiscal Policy Statement 2012-13, tax to GDP ratio of Pakistan for the year 2012 was 9.9 percent.

⁵ According to Economic Survey of Pakistan, the provisional figure of Public debt is Rs 12,667.2 Billion which amounts to 61.3 of GDP (Debt to GDP ratio). Fiscal Responsibility and Debt Limitation Act 2005 sets the threshold ratio to 60 percent and beyond that it is unsustainable.

Figure 4 exhibits the historical trend of Dex as share of total government expenditure against GDP growth rate. It suggests that war driven changes in defence expenditure in Pakistan hardly support the Military Keynesian Hypothesis (MKH) and lend more credence to the view that the defence expenditure is used mainly for securing external defence and as such may not necessarily be used to counter down-turn cyclical movements in the economy. Pakistan’s unique geo-strategic location, tensions on eastern as well as on western borders demand optimal Dex.

Figure 4: The share of Dex to the total federal government expenditure (FGE)



Data Sources:

- (a) Singh and Cheema (2000)
- (b) State Bank of Pakistan – Handbook of Statistics on Pakistan Economy 2005
- (c) Economic Survey (for various years) Government of Pakistan.

*Data for FY 2012-13 on GDP is from July to March 2013.

To sum up the discussion, Pakistan’s defense burden historically has been higher especially during the tension period of war with India and front line state against Soviet aggression of Afghanistan. The share of non-development expenditure has been alarming disproportionate to development expenditure. And the share of Dex in the current expenditure has been on higher side. This defense share promotes the economic growth and retards it; this is the question of empirics.

III. Theoretical Underpinning and Review of Literature

The use of government expenditure as a fiscal policy tool is well established; however the usefulness of defence expenditure as a tool of fiscal policy especially for developing countries is

yet to be established. Theoretical background on the relationship between defence expenditure and economic growth argues both positive as well as negative relationship. The positive correlation between defence expenditure and economic growth springs out from the theory of military Keynesianism. The advocates of the theory argue that as defence expenditure is part of the budgetary outlay and the government has a considerable control over it. Therefore having positive effects on economy, it can be used as a fiscal instrument to stabilise the economy when it is needed (Khan, 2004). In order to achieve economic growth, the government should enhance defence spending (Peter, 2010 and Veronique de Rugy, 2012). The theory focuses on Dexp as a component of aggregate demand and spillover effect of these spending also explains the economic effect of Dexp. Increased aggregate demand due to high Dexp will add in economy's output and generate employment (Alpetekan and Levine 2009).

Braşoveanu (2010) and Pardhan (2010) enlist positive and negative effects of defence spending. Some of these positives are summarised here as follows:

- Dexp promotes Research and Developments (R &D) in defense sector which brings technological innovations and this technological spill-overs applied to civil sector can enhance economic growth.
- Dexp promotes economic growth, if some of the expenditure is used for the creation of public infrastructure development and human capital formation.
- Dexp provides security which promotes a stable business environment, a necessary condition for encouraging foreign investment and market exchange.
- Dexp can improve productivity and generate welfare, if the part of spending is used for revamping the economy during crisis times like earthquake, floods, terrorist attacks and so forth.
- Dexp in the period of unemployment provides stimulate effect to economic growth as it causes an expansion of aggregate demand.

On the other hand, there are arguments regarding the negative relationship between Dexp and economic growth. Some of them are summarised here as follows:

- Dexp can adversely effect economic growth by crowding-out private investment. This is classical and neoclassical argument: an increase in public spending substitutes public goods for private goods. The higher Dexp generates a distortion in resource allocation and the diversion of resources from productive activities to the accumulation of military arsenal.
- Dexp has the opportunity cost as these expenditures hinder economic development by reducing savings and misallocating resources away from more productive use in the public or private sector. The resources spent on preparation for war and on war-fighting could be better employed on more productive avenues.
- Dexp may further bring constraints on budget. If financed by non-distorting revenues, has a positive effect on economic growth; if financed by distorting revenues, it might have a positive or negative effect on economic growth, depending on the level of the Dexp.
- Dexp may affect efficient resource allocation as it is not governed by market processes, so it tends to create distortions in relative prices.
- Dexp may be driven not by security needs, but by a rent seeking military industrial complex, and may cause arms races or damaging war.
- Under the assumption of fixed government expenditure, high defence expenditure undermines the government efforts to spend more on infrastructure, which is a prerequisite for economic growth,

Some researchers are also of the view that although defence spending is undertaken to achieve an important intrinsic objective of external defence, some feedback effects might still be present (Ram, 1995 and Khan, 2004)

The first seminal empirical study on the relationship between Dexp and economic growth was carried out by Benoit (1973, 78). He studied 44 less developed countries (LDCs) for the period 1950-65 and found a positive link between Dexp and economic growth. Benoit (1978) proposes a neo-classical supply side explanation on the link between Dexp and growth where Dexp can affect growth in two directions, negatively and positively. It affects negatively by taking away the resources which may be better used in civilian economy, and it affects positively by providing jobs and increasing employment, involving in infrastructure, training and research and

development (R&D). The works of Benoit have been criticized on account of his conclusions and methodology by later researchers. But his empirical work induced more research and the subsequent research has been greatly influenced by his postulates (Alpetekan and Levine, 2009).

The opinions of the researchers are divided on the account of the effects of Dexp. The “pro” group of researchers views military expenditures as a guarantee of peace, security and welfare. This school of thought believes that Dexp increases purchasing power and brings improvements in human and physical capital in addition to direct technology benefits that enhance economic growth (Benoit, 1978; Beenstock, 1998; Sezgin 2001; Atesoglu, 2002; Yildirim, Sezgin and Ocal, 2005). The other “against” group of researchers sees Dexp as a wasteful enterprise that influences the economy beyond the resources it takes up. The Dexp is a consumption good that reduces saving and crowds out private investment and affects growth negatively. Moreover Dexp diverts resources from productive uses to unproductive uses (Karagol and Palaz, 2004; Dunne and Tian 2013). Researchers have also found that Dexp has neither positive nor negative effect on growth (Al-Yousif, 2002). The question of link between Dexp and economic growth is empirical in nature.

A number of researchers have tried to survey the existing literature on the Dexp and growth nexus. In recent literature, Nijkamp and Poot (2004), Alpetekan and Levine (2009), and Dunne and Uye (2010) qualitatively surveyed the literature and there is no unanimous empirical regularity in the findings.

Nijkamp and Poot (2004) survey the sample of 93 published studies with 123 meta-observations and examined the effect of disaggregated government expenditure on economic growth using a meta-analysis approach. Five fiscal policy areas namely general government consumption, tax rates, education expenditure, defense, and public infrastructure are considered. On balance, the evidence for a positive effect of conventional fiscal policy on growth is rather weak, but the commonly identified importance of education and infrastructure is confirmed. The net effect of Dexp on economic growth is negative.

Alpetekan and Levine (2009) provide a substantial quantitative survey of Dex and economic growth literature by conducting a meta regression analysis. They analyse 32 empirical studies and 169 estimates. By using a fixed and random effects meta analysis, the combined effects of Dex-growth studies are found to be a direct small positive impact of Dex on economic growth. Dunne and Uye (2010) in a survey of 102 studies on the economic effects of military spending show that negative effects of military spending on growth were reported in 39 and 35 percent of cross-country and case studies respectively. Only 20 percent found positive effects for both types, while over 40 percent found unclear results.

As evident from the above narration, the findings of the empirical literature are contradictory. Some are getting support of the positive relationship between Dex and economic growth, while others do not. The reasons on having varying results could be attributed to sample size, method applied, time period, other control variables and the functional form used in the analysis. Therefore, the empirical studies must be interpreted with underpinning hypotheses tested and the other conditioning variables used (Dunne, 1996).

The literature review reveals that numerous studies have been conducted to explore the relationship between Dex and economic growth and the possible spillover effects of Dex. But studies have not been taken yet to explore the direct relationship between Dex and poverty. Keeping this gap in literature, the present study empirically investigate the impact of Dex on poverty alongwith other literature-supported determinants of poverty.

III. Data Sources and Research Method

The data on Poverty is taken from the study done by Jamal (2006)⁶ and data on Dex have been was taken from the Economic Survey of Pakistan (various issues). The data on GDP, Public spending on education, Population growth rate and GDP per capita have been taken from World Development Indicators available on online from the data bank of World Bank. The data on FDI has been taken from UNCTAD. The time period covered in the study is from 1973 to 2012. Both

⁶ Data is upto 2003, for remaining of years of the study, data was extrapolated.

short term and long term relationships between Dexp and poverty have been computed, where Poverty is dependent variable and Dexp is independent variable. The long-term relationship between Dexp and Poverty has been tested for by applying Ordinary Least Square Method. Details of variable description and data sources are given in the Appendix A.

The following log linear model (equation 1) has been used for investigation of long-term effects of Dexp and other variables on poverty in the present paper:

$$LPOV_t = \alpha_1 + LDEXP_{t-1} + \alpha_2 LFDI_{t-1} + \alpha_3 LINF_t + \alpha_4 LGDP_t + \alpha_5 LPSE_t + \alpha_6 LGDPPC_t + \alpha_7 LPGR_{t-1} + \mu_t \quad (1)$$

Where⁷

- LPOV = Poverty Headcount ratio
- LDEXP= Defense expenditure as share of GDP
- LFDI = Foreign Direct Investment as share of GDP
- LINF = GDP deflator as proxy for Inflation
- LGDP = Gross Domestic Product
- LPSE = Public Spending on Education as share of GDP
- LGDPPC = GDP per capita as measure of living standard of people
- LPGR = Population Growth Rate

A full description of the data and their sources is in the Appendix A. Literature on Log Linear Approach made by various researches such as Ehrlich (1977); Layson (1983), Bowers and Pierce (1975), Cameron (1994) and Ehrlich (1996) validated that empirical findings computed through Log Linear Approach are more consistent than that of Functional method.

The choice of the independent variables is motivated by the related existing empirical studies focusing on the determinants of poverty and the availability of data. The studies (Hassan & Siddiqi, 2010; Jamal, 2006; Kalim & Hassan, 2013) lead us to select a set of these variables that

All variables are in log form. “L” represents log of.

are widely used and found to be significant determinants of poverty. A description along with hypotheses of all the variables of the model is given below in detail:

Head Count Ratio as proxy for Poverty is obtained by taking the ratio of the total number of people who are below the poverty line to the total population.

Defense Expenditures are perceived that whenever any government allocates a major share of its GDP to defense sector then it will eventually add to poverty of the country. Therefore, in order to control the cancer like poverty, resources may be allocated to development and productive side rather on non-productive side.

Hypothesis: Dex is positively related with Poverty (increase in Dex will increase poverty as it diverts expenditures from more productive resources).

Inflation demolishes economic value of everything by gradually eroding real returns over time. It declines the real value of the money that the purchasing power of the society erodes over time and perpetuates poverty. Price stability is one indicator of a stable macroeconomic environ of a country. Usually, high rate of inflation in a country can reduce the return on investment and is an indicator of macroeconomic instability and considered a sign of internal economic tension and unwillingness of the government to balance its budget and failure of the central bank to conduct appropriate monetary policy. Consumer Price Index reveals the variation in the expenditures made by the average household in order to attain the basket of goods and services which may be remained constant or may be changed at specified intervals, such as yearly.

Hypothesis: Inflation is positively related with poverty (Inflation increases poverty by increasing cost of living).

FDI is the most useful tool for economic development and long run growth for a country in comparison to other forms of capital inflows. It stimulates the economy which adapts the advanced technological and management skills (Lipsey, 2002; Johnson, 2006). The rapidly growing economies tend to absorb more FDI for its further contribution to economic growth

(Walsh and Yu 2010). Moreover, FDI also exhibit its positivity associated with social uplift of the people by improving their standard of living (Srinivasan, 1983; Gonzalez, 1998). FDI could also create a virtuous circle of confidence building for the host country. The inflows of FDI reinforce local investment environment that subsequently affects both local and foreign investment (Khan and Yun-Hwan, 1999). Hence, FDI is considered to be one of the important factors of economic growth. It can play significant role in achieving the country's socio-economic objectives for example jobs creation, poverty eradication and technological advancement.

Hypothesis: FDI is negatively related with Poverty (FDI reduces poverty).

GDP = Gross Domestic Product

GDP show the production of goods and services in given period of time which is normally one year. Here GDP growth rate is taken as to show the average change in GDP during one year of time. Increase in GDP is positively related with poverty. As the growth rate of GDP increases, people get new jobs hence increase in their income level and it also reduces poverty.

Hypothesis: GDP is negatively related with Poverty (GDP has spill over effect on Poverty).

PSE = Public Spending on Education as share of GDP

In traditional neoclassical growth theory, education is emphasized as the main source of human capital formation and ultimately a crucial tool for growth and poverty avoidance. Education remains the key not only to employment in the formal sector but also to various opportunities to better living conditions, though access to education remains uneven for both men and women (Ajakaiye and Adeyeye, 2001).

Hypothesis: Public Spending on Education is negatively related with Poverty (Public Spending on Education reduces poverty).

GDPPC = GDP per capita as measure of living standard of people

GDPPC is a measure which shows living standard of the masses. Increase in GDPPC shows that the living standard of the people is better and people are enjoying all facilities of life. Decrease in figure of GDPPC shows that living standard of the people is declining. Increase in GDPPC is negatively related with poverty as increase in GDPPC also reduces poverty. People have more income now to spend on luxurious things hence showing reduction in poverty.

Hypothesis: GDP per capita is negatively related with Poverty (GDP per capita shows the standard of living of people and increase in it shows reduction in poverty).

PGR = Population Growth Rate

Population has the potential to impact all aspects of poverty. The relationship between population growth and incidence of poverty has been debated for more than a century. But there is a general consensus among different school of thought that population growth has some relationship with poverty. In Pakistan, population growth has eroded fruits of higher economic growth. It is considered a cause for poverty (Mallick and Ghani, 2005).

Hypothesis: PGR has a positive relation with poverty.

IV. Results and Discussion

Ng-Perron test was used to check stationary of data. The results of unit root state that some variables (inflation, GDP and public spending on education) are stationary at r with intercept while the other variables (poverty, Dexp and foreign direct investment) are stationary at first difference with intercept⁸.

The Table 1 shows the results of lag length criteria where VAR lag length criteria is used. Maximum three lags have been selected. Lag Length Criteria consists of LR, FPE, AIC, SC and

⁸ Results of unit root test are at Appendix B.

HQ. It shows how many lags can be taken as to get significant results. Here the significant lag length is up to three years of lag time period.

Table 1: Lag Length Criteria

VAR lag order selection criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-28.70061	NA	0.362562	1.821654	2.039346	1.898401
1	87.11623	194.0715	0.000732	-4.384661	-4.123431	-4.292565
2	199.5991	182.4046	1.77e-06	-10.41076	-10.10599	-10.30332
3	228.2256	44.87395*	3.99e-07*	-11.90408*	-11.55578*	-11.78129*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

The results of unrestricted co-integration rank test results are presented in the Table 2. There are two types of statistics, trace statistic and Maz-Eigen Statistics. It has empirically found that in five co-existing co-integrating equations only three are significant at five percent level of significant.

Table 2: Unrestricted co-Integration rank test

Hypothesized no. of CE(s)	Trace Statistics	0.5 critical values	Prob**	Hypothesized no. of CE(s)	Maz-Eigen Statistics	0.5 critical values	Prob**
None*	254.6847	95.75366	0.0000	None*	141.2563	40.07757	0.0001
At most 1 *	113.4284	69.81889	0.0000	At most 1 *	47.80577	33.87687	0.0006
At most 2 *	65.62262	47.85613	0.0005	At most 2 *	35.75118	27.58434	0.0036
At most 3 *	29.87143	29.79707	0.0490	At most 3	18.22301	21.13162	0.1217
At most 4	11.64842	15.49471	0.1746	At most 4	10.52566	14.26460	0.1797
At most 5	1.122761	3.841466	0.2893	At most 5	1.122761	3.841466	0.2893
Trace test and Maximum Eigen Statistic indicate 3 & 2 co-integrating equations at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.							

The relationship between Dexp and Poverty has been tested for long term time period. The long term coefficients are examined by applying Ordinary Least Square Method and the results are presented in Table 3 where dependent variable is poverty and independent variables are Dexp,

public spending on education, GDP, inflation, FDI, Population growth rate and GDP per capita. The key explanatory variable is Dexp.

Table 3: Long Term Dynamics of Poverty and Independent Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.406337	0.048311	70.50917	0.0000
P _{t-1}	0.022303	0.074395	3.833301	0.0005
P _{t-2}	0.032078	0.001888	16.98922	0.0000
LDE _{t-1}	0.588549	0.141829	-4.14970	0.0002
LPSE _t	-0.335432	0.132755	-2.52696	0.0158
LGDP _t	-26.9464	0.066013	-4.08180	0.0002
LINF _t	0.538645	0.242286	2.223179	0.0328
LFDI _{t-1}	0.101365	0.049680	2.040374	0.0483
LPGR _{t-1}	-0.281315	0.067793	-4.149630	0.0002
LGDPPC _t	0.285177	0.074395	3.833301	0.0005
R-squared	0.966997	Mean dependent var	0.003172	
Adjusted R-squared	0.957371	S.D. dependent var	0.002851	
S.E. of regression	0.000589	Akaike info criterion	-11.82493	
Sum squared resid	8.32E-06	Schwarz criterion	-11.45849	
Log likelihood	197.1988	Hannan-Quinn criter.	-11.70346	
F-statistic	100.4576	Durbin-Watson stat	1.958210	
Prob(F-statistic)	0.000000			

Ordinary least square estimation technique was used to compute the results. The results show that model is good fitted as co efficient of determination is 96 percent. There is no problem of autocorrelation as Durbin-Watson is 1.96. Result of poverty one year lag is 2 percent and two year lag is 3 percent. It means little steps are being taken by government to cure this poverty problem.

The defense expenditure has positive and significant effect on poverty. The sign is positive which shows that one percent increase in Dexp will increase poverty by 58 percent. The result is supported by the study Kalim & Hassan (2013) where military expenditure has a positive and significant relationship with poverty. The justification may be that the Dexp in Pakistan are done at the expense of development expenditure and thus may have negative impact on economic growth in Pakistan as the studies by Iftikhar ul Husnain & Shaheen (2011) Dunne & Tian (2013) have shown the negative relationship between Dexp and economic growth.

Public spending on education has negative and significant impact on poverty. This shows that one percent increase in public spending on education will reduce poverty by 33 percent in the country.

The impact of GDP on poverty is negative and highly significant. The coefficient shows that it has larger impact on reduction of poverty. The increase in GDP will also indicates increase in employment opportunities, increase in income of poor people, hence reducing poverty.

Inflation has significant and positive impact on poverty. This indicates that one unit increase in inflation will increase poverty by 54 percent. The growing inflation declines the purchasing power of the both, the rich and the poor, but impacts the poor class the more, hence worsening their living conditions. The results are supported by the earlier study by Kalim and Shahbaz (2009) and Hassan and Siddiqi (2010) where they have found a positive relationship between inflation and poverty in case of Pakistan.

FDI has positive and significant impact on poverty. This may be justified as instead of providing jobs to unskilled labour, FDI is providing employment in selected service sectors like telecommunications and financial service sectors. Findings are also supported by Kalim and Shahbaz (2009).

Population growth rate (PGR) has negative and significant impact on poverty. This shows that one percent increase in PGR will reduce poverty by 28 percent. This can be justified as many population and birth control methods have been introduced by the government and now population is increasing at decreasing rate in the country. The PGR in Pakistan has shown improvement and it decreased from 2.05 percent (2010-11) to 2.03 percent in 2011-12 and 2.00 percent in 2012-13⁹.

GDP per capita has significant and positive impact on poverty. Increase in GDP per capita indicates better living standards of population. The results show that one percent increase in

⁹ Pakistan Economic Survey 2012-13

GDP per capita will increase poverty by 28 percent. This can be justified as prevailing income inequality within country. The living standards of rich people is improving day by day and at the same time the living standard of poor people is becoming worsen in the county hence supporting findings of the study.

Now the next step is to investigate the impact of Dex on poverty in the short term time period by applying Error Correction Model (equation 2):

$$\Delta LPOV = \beta_1 + \beta_2 \Delta LPOV_{t-1} + \beta_3 \Delta LDEXP_{t-1} + \beta_4 \Delta LFDI_{t-1} + \beta_5 \Delta LINF + \beta_6 \Delta LGDP + \beta_7 \Delta LPSE + \beta_8 \Delta LGDPPC + \Delta PGR_{t-1} + \eta ECM_{t-1} + \varepsilon$$

Eq. 2

Table 4 presents the short-run estimates obtained from the ECM though the equation 2. The ECM coefficient indicates the speed of correction of determinants of poverty so that these variables return to long run equilibrium. The estimate of ECM should be negative with high significance. It is argued by Bannerjee *et al.* (1998) that significant error correction term is another way to prove occurrence of long run relationship. The paper estimates the coefficient in the short-term as ECM_{t-1} (-0.935621). This seems to imply that deviation from the long-term poverty is corrected by more than 93 percent by each year at high level of significance.

Table 4: Estimation of Short Term Results

Dependent Variable: ΔPOV_t				
	Coefficient	Standard Error	T-Statistics	Probability
P_{t-1}	0.918145	0.152344	6.02691	0.0000
LDE_{t-1}	0.952312	0.334232	2.84927	0.0002
$LPSE_t$	-0.256722	0.100324	-2.55901	0.0012
$LGDP_t$	-12.65421	0.087423	-14.47469	0.0000
$LINF_t$	0.677652	0.412342	1.64335	0.1042
$LFDI_{t-1}$	-0.562324	0.432652	-1.29971	0.1821
$LPGR_{t-1}$	-0.191543	0.504342	-0.37978	0.5432
$LGDPPC_t$	0.227632	0.672341	0.33856	0.5042
ECM_{t-1}	-0.935621	0.243213	-3.8496	0.0008
C	-0.011234	0.025321	-0.44352	0.4563
R-squared	0.823997		Mean dependent var	-0.013245

Adjusted R-squared	0.793214		S.D. dependent var	0.7324512
S.E. of regression	0.056321		Akaike info criterion	-3.824932
Sum squared resid	0.043231		Schwarz criterion	-3.458491
Log likelihood	68.82311		Hannan-Quinn criter.	-3.703464
F-statistic	7.785421		Durbin-Watson stat	2.182102
Prob(F-statistic)	0.000054			

The coefficient of ECM should be negative and significant. The coefficient of ECM demonstrates the speed of adjustment of variables towards equilibrium. These findings are supported by Bannerjee et al (1998) and Kalim & Hassan (2013) who argued that the significant and negative coefficient of ECM will indicate convergence to long term stable equilibrium. The result indicates that defense expenditure is positive and significant while inflation and GDP per capita are also positive but insignificantly related with poverty in short run. GDP and public spending on education have negative and significant relationship with poverty in short run. Population growth rate and FDI have negative but insignificant relationship with poverty. For the attainment of long term stable equilibrium, the correction into short term fluctuations is examined by first period lag of error correction term. Short term results indicates $ECM_{t-1} = (0.0008) - 0.935621$. This shows that the speed of adjustment is high and it takes almost 1.07 ($1.06881 = 1/0.935621$) years to attain the equilibrium.

Short run behavior of key explanatory variable, Dexp, is not different from long run. Dexp also increases poverty in the short run. The coefficient of Dexp is positively associated with poverty and it is significant.

V. Conclusion and Policy Implications

This paper investigated the impact of Dexp, inflation, foreign direct investment, public spending on education, GDP and GDP per capita on poverty for both long term and short term for the dataset ranging from 1973-2012. The results have shown that Dexp are not pro-poor both in the short and long time period in Pakistan. Inflation also contributes to poverty in both in the long run and short run, but impact is insignificant in the short run. Empirical investigation reveals that public spending on education is a productive expenditure which alleviates poverty both in the short and long run. GDP per capita has significant and positive impact on poverty in the long

run, but it has a negative impact in the short run. Population growth rate (PGR) has negative and significant impact on poverty both in the short run and in the long run. The impact of GDP on poverty is negative and significant both in the short and long run. FDI has positive and significant impact on poverty in the long run, but its impact is negative and insignificant in the short run.

The empirical findings of the study may entail several policy implications. The findings show that Dexps are not pro poor in Pakistan and they deteriorate the incidence of poverty in the country. The policy makers need to revisit and rationalize Dexps. The current geo-strategic situation in the region may not favour to reduce Dexps drastically, but their prudent and rationale allocation and utilization can be argued. Contrary to Dexps, expenditure on education is pro poor. Budget allocation for education can further be enhanced to reap the positive results of the education. It is widely accepted that FDI is most useful tool for economic development and long run growth for a country in comparison to other forms of capital inflows. But unfortunately Pakistan has not been successful in attracting a larger share of investment despite investor friendly policies. Pakistan has recently experienced a short surge in FDI inflows, but they have confined to services sector especially telecommunication and financial businesses. The policy-makers need to revisit investment policies and attract investment in other sectors of the economy which will alleviate poverty in the country. Inflation hurts the poor segment of the society more than the rich people. It can be controlled through monetary and fiscal policy measures. Fiscal deficit has become chronic in Pakistan and it could be the main reason on inflation. This could be controlled anti inflation monetary tools and stringent fiscal adjustments.

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Appendix A: Data and Sources

Variables	Descriptions	Data Sources
Poverty	Headcount ratio	The data was taken from Jamal (2006) up to the year 2003 and for remaining years the data are extrapolated.
Defense expenditure	Defense expenditure as percentage of GDP	Economic Survey of Pakistan (various issues)
Public spending on Education	Public Spending on Education as percentage of GDP	WDI
Inflation	GDP Deflator (%)	WDI
FDI	FDI as percentage of GDP	UNCTAD
Population	Population growth rate	WDI
GDP per capita	Proxy for living standard	WDI
GDP Growth rate	Annual growth in real gross domestic product in percent	WDI

Appendix B: Unit Root Test

NG-PERRON AT LEVEL WITH INTERCEPT I(0)				
	MZa	MZt	MSB	MBT
LPOVt	0.5638	0.94815	1.68155	167.141
LDEXPt	-3.30281	-1.26827	0.38400	7.40257
LFDIt	-2.50428	-1.08976	0.43516	9.63047
LINFt	-16.4280*	-2.80584	0.17080	1.71297
LGDPt	-15.8635*	-2.80586	0.17688	1.58365
LPSEt	-10.9094*	-2.33538	0.21407	2.24636
LGDPPC	-14.4694*	-2.67019	0.18454	1.76660
NG-PARREN AT FIRST DIFFERENCE WITH INTERCEPT I(1)				
Δ LPOVt	-8.49538**	-1.99544	0.23488	10.9388
Δ LDEXPt	-18.5654*	-3.04452	0.16399	4.92185
Δ LFDIt	-17.4562*	-2.95299	0.16917	5.22832
Δ PGRt	-8.49538*	-1.99544	0.23488	10.9388
CALCULATED		CRITICAL VALUES		
1 %	-13.8000	-2.58000	0.17400	1.78000
5 %	-8.10000	-1.98000	0.23300	3.17000
10 %	-5.70000	-1.62000	0.27500	4.45000
Note: Note: * & **&*** indicate significance at 1% & 5% and 10% level.				

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