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Impact of Public Debt on the Economic Growth of Pakistan

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1. INTRODUCTION

Heavy indebtedness of the developing countries is one of the major challenges at the beginning of 21st century. Needless to point out that government can finance its budget and development efforts by borrowing or taxing the output. However, taxes tend to distort the structure of relative prices, borrowing, if pushed beyond the carrying capacity of an economy, creates problems of intergenerational equity, and it can cause a transfer of resources that tends to be undermining growth. Yet borrowing has to be done to finance the public expenditure in order to increase social welfare and promote economic growth.

Public debt can be classified as sum of external debt and domestic debt. As far as the relationship between external debt and economic growth is concerned, a reasonable level of borrowing is likely to enhance economic growth, through capital accumulation and productivity growth [Chowdhury (2001)]. Because at early stages of development, countries have small stocks of capital and they have limited investment opportunities. External borrowing for productive investment creates macroeconomic stability [Burnside (2000)]. It is also been seen as capital inflow having positive effect on domestic savings, investment and economic growth; it implies that foreign savings complement domestic savings to cater for investment demand [Eaton (1993)]. However, high level of accumulated debt has an adverse effect on rate of investment and economic growth. Most broad rationalisation of the adverse effect of debt is "debt overhang" effect. If there is likelihood that in future, debt will be larger than the country's repayment ability then anticipated debt-service costs will depress the domestic and foreign investment [Krugman (1988); Sachs (1990); Karagol (2002)]. The other channel through which debt obligations affect economic growth is known as "crowding out" effect. If greater portion of foreign capital is used to service external debt, very little remains available for investment and growth. Debt-servicing cost of public debt can crowd out public investment expenditure, by reducing total investment directly and complementary private expenditures indirectly [Karagol (2002); Diaz-Alejandro (1981)]. However, various authors [Pattillo, *et al.* (2002, 2004)] are unable

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to find evidence of a significant crowding out effect, while others [i.e., Chowdhury (2004); Clements (2003); Elbadawi, *et al.* (1999)] finds that both debt burden and debt service obligations have reduced the investment and economic performance.

In developing countries, policy makers and international organisations have given domestic debt far less attention as compared with external indebtedness. Issuing domestic debt, whether to finance fiscal deficit or to mop up monetary liquidity, involves a complex assessment of the costs and benefits to the economy. The justification behind creation of domestic debt in poor countries is that it kindles development of deep and liquid internal financial markets, protect countries from unfavourable external shocks, and mitigate foreign exchange risk [Del (2003); Aizenman, *et al.* (2004); Kumhof (2005)]. Domestic debt can crowd in risky private sector investment by protecting bank balance sheets and profitability [Barajas Salazar (1999, 2000)]. As such, investments are more proficient than investment that is associated with low risk. Most important concern about domestic debt is crowding out effects on private investment. When governments borrow domestically, they use domestic private savings, otherwise that may have been on hand for private sector lending. In turn, smaller residual pool of loan able funds was available in market to elevate the cost of capital for private borrowers. It results in dropping private investment demand, and therefore capital accumulation, growth and welfare [Diamond (1965)]. Domestic debt is also viewed as more expensive in comparison to concessionary external financing [Burguet and Ruiz (1998)]. As a result, interest load of domestic debt may absorb important government revenues and thus crowd-out pro-poor and growth enhancing expenditures. High-yielding government domestic debt held by banks can make them self-satisfied about costs and decrease their efforts to mobilise deposits and fund private sector projects [Hauner (2006)].

The present study will explore the impacts of public debt on economic growth in Pakistan. Furthermore, as investment is the basic channel through which public debt affects growth. Therefore, it becomes very important that the relationship between debt and investment is also explored, which is what this study also seeks to do.

The organisation of the paper will as follows; after the brief introduction in Section 2 a brief review of the literature is presented, Section 3 presents a brief scenario of public debt, and economic growth in Pakistan, whereas the Section 4 provide a detailed discussion on theoretical model, data and estimation methodology. Section 5 and 6 are devoted for discussion of the results of growth and investment models respectively. The last section presents the conclusions emerged from the study and policy implications.

2. LITERATURE REVIEW

Numerous studies have dealt with the debt-economic growth relationship over the last two decades. After the second oil crisis in 1979, all countries were affected by the worldwide recession of 1980-83. Due to low goods prices, high real rates of interest and slow growth in the industrial countries, some debtor countries have experienced debt servicing problems. Therefore, the period since 1982 has been portrayed as a period of debt overhang. An overview of literature is summarised as under.

Levy and Chowdhury (1993) has concluded that an increase in the public and publicly guaranteed external debt may indirectly depress the level of GNP by discouraging capital formation and encouraging capital flight due to tax increase expectations. Cunningham (1993) found that debt burden has a negative effect on

economic growth because of the impact on the productivity of labour and capital. In another study Sawada (1994), finds that heavily indebted countries (HICs) have debt overhang problems. Since their current external debts are above the expected present value of the future returns. Many other studies; Chowdhury (2001), Siddiqui and Malik (2001), Easterly (1999, 2001 and 2002) and Sen, *et al.* (2007) comes to the same conclusion that external debt negatively affects economic growth. Impact of high debt on growth appears to operate through both a strong negative effect on physical-capital accumulation and on total factor productivity (TFP) growth. In addition, neither TFP nor private savings rates are affected by external debt levels [Patillio, *et al.* (2004)]. Fosu (1996) argued that GDP growth is negatively influenced via diminishing marginal productivity of capital. It was also estimated that on average a high debt country faces about one percentage reductions in GDP growth rate annually. Latter on Fosu (1999), comes to the conclusion that negative relationship between economic growth and debt might be due to a poor performance of recipient country.

Smyth and Hsing (1995) find that in early 1980, debt ratios rose but it was below 38.4, and debt-financing have stimulated the economic growth. On the other hand, during 1986-93, debt ratio rose from 40.7 percent to 50.9 percent. This ratio is above the (38.4) optimal debt ratio and it is expected to adversely affect the economic growth. In another very comprehensive study Patillo (2002) indicated that on average, external debt is growth-enhancing up to about 160 percent of export to debt level, and growth-reducing thereafter (i.e. the debt overhang range). Furthermore study suggests that the debt overhang mechanism works through the productivity of investment as much as it does through the volume of investment. However, Maghyereh, *et al.* (2002) comes to the conclusion that in Jordon, external debt below the threshold level of 53 percent of GDP has a positive relationship with GDP and thereafter the relationship turns to be negative. Blavy (2006) finds that 'threshold level of debt' is 21 percent of GDP, below that level, debt is positively associated with productivity, but the coefficient for the "above threshold debt" becomes negative and significant. The total effect of high debt is significantly negative. It found that doubling of public debt would reduce productivity growth of about 1.5 percent.

As mentioned earlier investment is very important channel through which economic growth is affected. Cohen (1993) found that the level of debt does not explain the slowdown of investment in highly indebted developing countries. Warner (1992) suggests that the reasons behind the decline of investment in many of the heavily indebted countries are declining exports prices, high world interest rates, and sluggish growth. These shocks could have directly caused investment to decline. It was argued that debt failed to have a negative coefficient as the debt theories predict. These finding were criticised by Rockerbie (1994) and it was argued that these shortcomings may have caused investment to be biased and unreliable testing method. Deshpande (1997) also comes to the conclusion that relationship between external debt and investment is negative.

Metwally (1994) found that capital inflows have a significant impact on the growth in Algeria, Egypt and Morocco. In a study on Kenyan economy, Maureen (2001) finds that current debt flows, stimulate investment while past debt accumulation discourages investment. This confirms the existence of a debt overhang problem in Kenya. It has also been found that 'crowding out' of current investment as a result of servicing relatively large amounts of external debt so debt servicing does not appear to affect growth adversely but has some crowding out effects on private investment.

Abbas (2004) finds that there was a significant positive growth payoff to debt, even at the very high levels, 93 percent of GDP. Analysis presented quite a complex picture of the relationship between debt and growth, and domestic debt and growth. On one hand, the results seemed to affirm conventional wisdom that the decision to switch the source of budgetary finance from external to domestic debt would be fraught with difficulties. On the other, the study obtained quite robust results on the growth payoff of domestic debt issuance in more developed financial systems. However the overall relationship remained negative. Abbas (2007) has extended its previous work; and finds the evidence that above a ratio of 35 percent of bank deposits domestic debt undermines economic growth.

Anwar (2002) concluded that if exports remain stagnant, then devaluation has directly increased foreign debt in rupee and results in dramatic increase in debt service burden, lower economic growth and higher poverty level. Study argues that it is crucial to address basic reasons that caused debt build-up and subsequent adverse effects on economic growth and poverty levels while designing a debt reduction strategy. Policy of tax reforms, expanding the production and export base and creating diversification in exports can be handy in tackling debt problem.

In another study, Waheed (2006) concluded that there is primary deficit so it has to be filled out by domestic debt. The only way to stop the process of debt accumulation is to reduce the primary deficit by continued fiscal adjustment. This adjustment should not be achieved on the cost of cut in development expenditure rather there is need for serious efforts to increase domestic tax revenue.

From the review of literature it can be broadly surmised that divergent opinions exist on practically every aspect of the relationship of debt with key economic variables. Firstly, most of the studies on the subject focus on the relationship between external debt and economic growth, neglecting domestic debt entirely or mentioning it in the passing. The reason is the understanding that, unlike domestic debt, external debt is more difficult to service and repay. But this is true only when the domestic debt is moderate and not when it is large and growing. Secondly, most of these studies have been conducted by using panel data. There is very limited studies on Pakistan on the impacts of public debt on economic growth.

3. SITUATION OF PUBLIC DEBT IN PAKISTAN[1]

At the time of independence Pakistan was a poor and underdeveloped country. In order to stimulate economic growth, adequate revenues are a prerequisite but since its independence, Pakistan is facing financial crunch. Confined revenues and savings coupled with rising expenditures have caused situation of persistent fiscal deficit over the years. Similarly, situation of balance of payment is also not satisfactory and Pakistan is facing current account deficit. These deficits are filled by public debt and Pakistan has to spend considerable portion of its GDP on interest payments of the loans. The need to service debt obligation is undermining economic performance and resulting in collapse of development planning. Because debt obligations and expenditure on debt servicing become a resource drain for already limited revenues and is halting economic growth and poverty reduction efforts. Decade of 1990s is a typical example of this situation, during

[1]For detailed discussion, see Akram (2010) and Akram, *et al*. (2011).

1990s Pakistan is facing severe fiscal deficit, elevated public debt and near to the ground economic growth and rising incidence of poverty. Developing countries with higher incidence of public debt have to cope up with the same situation.

Several points can be concluded after examining Public debt scenario in Pakistan. Firstly, debt problem has been in making for a long time. Inability of successive governments to reduce fiscal deficit significantly, unproductive use of debt and stagnant growth in real revenues has fuelled the debt problem. Secondly, rising public debt in Pakistan is largely contributed by factors like stagnant government revenues and high real cost of borrowing. Resultantly, sharp fluctuation in real cost of borrowing, dynamics of the growth in public debt also changed over time. Thirdly, debt problem cannot be detached from broader issues of economic strategy and management especially policies regarding savings, exports, and revenue, expenditure etc. Lastly, due to rising expenditure on debt servicing governments have always reduced development expenditure instead of reducing the current expenditure. Pakistan's increasing debt servicing requirements during 1990s exerted significant strain on fiscal management. To meet the commitments under IMF's structural adjustment programme, Pakistan had to reduce size of the budget deficit to less than 5 percent of GDP during 1990s. As revenue generation efforts are only partially successful and Pakistan is unable to generate adequate revenues to meet expenditure. Consequently, successive governments have tried to reduce deficit by reducing development expenditure that has hampered economic growth process and resulted in decline in human development indicators and it has raised incidence of poverty. Moreover, public debt servicing placed serious constraints for priorities of government's budgetary allocations, leaving very limited resources available for development expenditure. However, improved situation of Debt obligations aftermath of 9/11, Pakistan got considerable fiscal space to increase expenditure on development projects especially in social sector and infrastructure development, extremely vital for pro poor and sustainable economic growth. Pakistan got much needed fiscal space but it is debatable whether Pakistan has developed a sound fiscal policy to get long-term benefits from it or not. Debt explosion coupled with higher fiscal and current account deficit resurfaced in 2008 and is a major threatening syndrome for economic management, it depicts that Pakistan has wasted the opportunity for sustainable growth.

4. DATA AND METHODOLOGY

The model used in the present study is borrowed from Cunningham (1993), wherein debt burden has been introduced into the production function. This is because debt burden has important implications for the capital and labour productivity. Nations that carries a significant debt burden required to spend portion of its resources to service its debt liabilities having significant implications on decisions regarding the employment of labour and capital in the production function. The growth equation[2] in the reduced vector form can be written as under:

$$y_t = \alpha + \beta y_{t-1} + \sum_{j=1}^{k} \delta x_{tj} + \sum_{m=1}^{p} \pi Debt_{tm} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where y_t is log of per capita GDP at t time and y_{t-1} is lagged value of GDP. x_{tj} is a vector of control variables, x_{tm} is the vector of various public debt indicators, and ε_t is the classical error term.

[2]For the detailed derivation of the model, see Cunningham (1993).

Keeping in view the importance of investment, Presbitero (2005) is of the view that it is better to disentangle the analysis of public debt and economic growth in a two-step relationship. Firstly, the direct links between public debt and economic growth are explored then relationship between public debt and Investment is also analysed. Following the analogy that investment is the basic channel through which debt affects economic growth. The vector form equation for the investment can be written as under:

$$Inv_t = \alpha + \sum_{j=1}^{k} \delta x_{tj} + \sum_{m=1}^{p} \pi Debt_{tm} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where inv_t is log of investment at t time and x_{tj} is a vector of control variables, x_{tm} is the vector of various public debt indicators, and ε_t is the classical error term.

To empirically test, the relationship between public debt and economic growth, time series data of Pakistan for the period of 1972-2009 has been used. Different variables have been used in various studies to analyse the impact of public debt on economic growth. A brief description and some background of the variables used is summarised in Table 1 below:

Table 1

Data Source

Sr. No.	Name of Variable	Data Source	Description
1.	Per Capita GDP (Yt)	WDI [3]	Different measures of GDP growth have been used in literature e.g. Per capita GDP, GDP growth rate, Real GDP, Real GNP etc. In the present study, we have used per capita GDP because it captures the perspective of economic growth and welfare.
2.	Investment (Kt)	WDI	For capital stock the main variables used in the literature are gross domestic investment (Gross capital or gross fixed capital formation), Investment/output ratio, (Capital stock is calculated by using hedonic valuation method and by using the perpetual inventory method). The present study uses gross capital formation as a ratio to GDP.
3.	External debt (ED_Y)	GDF[4]	The indicators of public debt are categorised as:
4.	Domestic Debt (dd_y)	IFS[5]	**Stock Variables:** The stock variables relates to value of the debt burden
6	Debt Servicing (DS_X)	GDF	to different key economic indicators e.g. debt/exports ratio, debt/GDP ratio, domestic debt/GDP ratio. The most widely used indicator to judge stock of public debt (including external debt) is its ratio to GDP. **Flow Variables:** Flow variables focus on debt service payment. Public debt consists of two parts i.e. external debt and domestic debt. In the study, we have used Public External Debt/GDP, Domestic Debt/GDP and Debt Servicing/Exports ratios.
7.	Exports	WDI	
8.	Imports	WDI	
9.	Openness (op)	WDI	The variables used to measure openness includes tariffs and quotas, real exports, real imports, balance of trade and the ratio of exports and imports as percentage of GDP. The present study uses the (Exports + Imports)/GDP*100 as a proxy for openness.
11.	Inflation (inf)	WDI	In order to capture the impact of uncertainty created by debt/debt servicing, inflation becomes very crucial as a control variable. There exist different indicators to measure inflation. Consumer price index and GDP deflator are most widely used indicators of inflation. In this study, we have used CPI as an indicator of inflation.

[3] *World Development Indicators* (World Bank).
[4] *Global Development Finance* (World Bank).
[5] *International Financial Statistics* (IMF).

Estimation Methodology

For the time series, in order to guard against spurious regression, the first step is to see whether the series is stationary or non-stationary; to ensure that unit root tests are used. The time-series method used has the problem of settling at the very outset the issue of the stationarity of the data. If some variables are I(I) then standard regression analysis may yield spurious results.[6] To tackle that issue the latest approach is the cointegration analysis. In the present study, ADF unit root test has been applied. The detailed results of unit root test are summarised in Table 2 below:

Table 2

Results of Unit Root Test

	Level			1st Difference		
Name of Variable	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
Yt	–1.3058	–3.1201	–3.1851	–3.9636*	–	–
OP	–2.3112	0.2769	–5.6354*	–	–	–
INF	–3.2371**	–	–	–	–	–
KT	–2.3304	–2.2869	–5.0182*	–	–	–
ED_Y	–1.0071	–1.1647	–1.2025	–4.5151*	–	–
DD_Y	–2.8093	–2.6208	–0.1687	–5.1595*	–	–
DS_X	–2.0982	–2.9363	–0.7879	–7.9247*	–	–

Null Hypothesis: Existence of unit root. *, **denotes the rejection of Null at 5 percent and 10 percent level respectively.

The results of unit root test reveal that the model is a mixture of I(0) and I(I) variables, so most appropriate method for estimation in these circumstances is Autoregressive Distributed Lags Model (ARDL) Cointegration technique proposed by Pesran, *et al.* (2001).

The basic conditional VECM equation for the relationship between public debt and economic growth Equation 2 can be written as under.

$$\Delta y_t = \alpha + \gamma_1 y_{t-1} + \gamma_2 op_{t-1} + \gamma_3 k_{t-1} + \gamma_4 ed\_y_{t-1} + \gamma_5 ds\_x_{t-1} + \gamma_6 dd\_y_{t-1} + \gamma_7 inf_{t-1} + \sum_{i=1}^{\rho} \omega_i \Delta y_{t-i} + \sum_{i=0}^{\rho} \tau_i \Delta op_{t-i} + \sum_{i=0}^{\rho} \sigma_i \Delta k_{t-i} + \sum_{i=0}^{\rho} \beta_i \Delta ed\_y_{t-i} + \sum_{i=0}^{\rho} \varphi_i \Delta ds\_x_{t-i} + \sum_{i=0}^{\rho} \theta_i \Delta dd\_y_{t-i} \sum_{i=0}^{\rho} \pi_i \Delta inf_{t-i} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (A)$$

Where γ_i the long run multipliers are α is the intercept and ϵ_t is the error term. Similarly, the ARDL specifications for investment is presented in equation B:

$$\Delta k_t = \alpha + \gamma_1 k_{t-1} + \gamma_2 inf_{t-1} + \gamma_3 yt_{t-1} + \gamma_4 ed\_y_{t-1} + \gamma_5 ds\_x_{t-1} + \gamma_6 \mathrm{dd\_y}_{t-1} + \sum_{i=1}^{\rho} \omega_i \Delta k_{t-i} + \sum_{i=0}^{\rho} \tau_i \Delta inf_{t-i} + \sum_{i=0}^{\rho} \sigma_i \Delta y_{t-i} + \sum_{i=0}^{\rho} \beta_i \Delta ed\_y_{t-i} + \sum_{i=0}^{\rho} \varphi_i \Delta ds\_x_{t-i} + \sum_{i=0}^{\rho} \theta_i \Delta dd\_y_{t-i} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (B)$$

Where α is intercept, ε_t is the error term, similarly $\gamma_1 \ldots\ldots \gamma_6$ are the long run coefficients and ω, τ, σ, π, β, φ and θ are the short run dynamic coefficients. It is also worthwhile to define the variables here *y*, *k*, *op* and *inf* denote per capita GDP, investment openness and inflation respectively. Similarly, *ed_y* (external debt as percentage of GDP), *ds_x*

[6]Newbold (1974).

(debt servicing as percentage of exports) and *dd_y* (domestic debt as percentage of GDP) are the major indicators of public debt used in the analysis. From these equations long run and short run relationships can be derived.

5. GROWTH EQUATION RESULTS

As mentioned above, Equation **A** has been estimated for cointegration. The ARDL cointegration procedure begins with conducting the bound test for the null hypothesis of no Co-integration—i.e.

Ho: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = \gamma_7 = 0$ against the alternative hypothesis of
H1: $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq \gamma_7 \neq 0$

For F-test, the selection of maximum lag length is very important. The observations in the study are annual and we have only 36 observations with seven parameters. For such short observations, as suggested by Pesaran, *et al.* (2001), we have selected a maximum lag length of 2. The estimation results of F-test for the level of significance are summarised in Table 3.

Table 3

Bound F Test Results

Country	F-Statistic Value	Lag Length	Significance Level	Bound Critical Values I(0)	Bound Critical Values I(I)
			1%	2.96	4.26
Pakistan	5.547	2	5%	2.32	3.50
			10%	2.03	3.13

The results reveal that the F-statistic is greater than the upper bound critical values. It depicts that there exists a co-integrating relationship among the variables. After determination of the existence of cointegration among the variables, the next step in the ARDL approach is to determine the long-run coefficients for equation A. To find out the optimal length for the long-run coefficients of Equation (A), Schwarz Bayesian criterion (SBC) of the lag selection is utilised. The long-run results are summarised in Table 4.

Table 4

Long Run Estimation Results (1,1,0,0,1,2,0)

Variable	Coefficient	Std. Error	t-Statistic
Constant	0.817945	0.199972	4.090287
KT	0.015222	0.006844	2.224182
OP	0.078454	0.040259	1.948709
ED_Y	–0.161078	0.026391	–6.103601
DS_X	–0.002903	0.014712	–0.197318
DD_Y	–0.017687	0.017090	–1.034935
INF	0.004254	0.002469	1.723192
R-squared		0.995548	
Adjusted R-squared		0.994131	
F-statistic		702.7534	
Prob(F-statistic)		0.000000	
Serial Correlation LM Test		0.864945	
P value of LM Test		0.44101	

*and ** represent significance at 5 percent and 10 percent level respectively.

Long-run Relationships

The results confirm the negative relationship between external debt indicators and economic growth. External debt as percentage of GDP has significant and negative relationship with per capita GDP in Pakistan. Debt servicing as percentage of exports has insignificant relationship in Pakistan. It reveals that in Pakistan, debt overhang hypothesis seem to have played a significant role while the crowding out effect of external debt is not significant. The effects of domestic debt are negative and insignificant relationship with per capita GDP. Domestic debt has both positive and negative effects on economic growth. However, financial markets liberalisation and macroeconomic stability is a necessary condition for the domination of positive effects [Del (2003)]. Pakistan is lacking on these grounds so negative impacts of domestic debt are dominating.

The conventional wisdom is that investment enhances economic growth. This proposition has received support from various studies—e.g. Barro (1991), Pattillo, *et al.* (2002) and Abbas (2007)—which say that investment has had a positive relationship with per capita GDP. Openness is found to have positive and significant relationship with per capita GDP. It also supports the conventional wisdom that globalisation and free trade promotes economic growth. It is supported by various earlier studies including Naqvi (2010). Similarly, inflation is also have a positive and significant relationship with economic growth, supporting the view that reasonable level of inflation (by giving incentive to the investors) enhance the economic growth. This result is further confirmed by the analysis of investment. It is noteworthy that during the selected time period in Pakistan (except for few years) inflation remained in single digit.

Diagnostic tests results suggest a high value of R^2 revealing that overall goodness of fit of the model is satisfactory considering the number of variables. The F-Statistic measuring the joint significance of all the regressors in the model is also statistically significant. Serial correlation LM test indicates that there exists no serial correlation.

Short-run Relationships

After estimating long run coefficients**,** the final step in ARDL approach is the analysis of Error correction and estimation of short run coefficients. According to the relevant theory if there is cointegration among the variables then in the short-run error correction will also happen. The results of Error Correction Model are summarised in Table 5.

According to the results given in the table above, the existence of a stable long-run relationship among the variables is further confirmed by the significant error correction term [Bannerjee and Mestre (1998)]. The coefficient of the error correction term also represents the speed of adjustment. That is following a disturbance in the unrestricted model how quickly the variables returned backs to their long-run values. The results suggests that following a shock, approximately 72 percent, adjustment towards the long-run equilibrium is completed after one year.

The results reveal that external debt as percentage of GDP has negative and significant relationship in the short run. As far as debt servicing as percentage of exports, it also has a negative and significant relationship in the short run with per capita GDP. However, domestic debt does not have a significant effect on per capita GDP in the short run. Similar to the long run investment has a positive and significant effect on per capita GDP in the short run. However in the short run openness and inflation has insignificant relationship with per capita GDP.

Table 5

Error Correction Representation of the Selected ARDL Model (1,1,0,0,1,2,0)

Variable	Coefficient	Std. Error	t-Statistic
Constant	0.00612	0.01592	0.38472
D(YT(–1))	0.166321	0.178915	0.929612
D(KT)	0.02280	0.07367	0.30953
D(KT(–1))	0.03135*	0.01189	2.63618
D(OP)	0.04721	0.03158	1.49520
D(ED_Y)	–0.18881*	0.03404	–5.54650
D(DS_X)	–0.01345	0.00962	–1.39762
D(DS_X(–1))	–0.02680*	0.00666	–4.02185
D(DD_Y)	0.02363	0.01561	1.51414
D(DD_Y(–1))	–0.00722	0.00949	–0.76047
D(DD_Y(–2))	0.02138**	0.01208	1.76959
D(INF)	–0.00300	0.00913	–0.32865
ECT(-1)	–0.68722	0.19955	–3.44384
R-squared	0.734593		
Adjusted R-squared	0.504573		
F-statistic	3.193611		
Prob(F-statistic)	0.017272		

*, and ** denote significance at 5 percent and 10 percent level respectively.

The cumulative sum (CUSUM) graphs show that coefficient of the short run lies within the critical limits and indicate stability in the coefficients over the sample period.

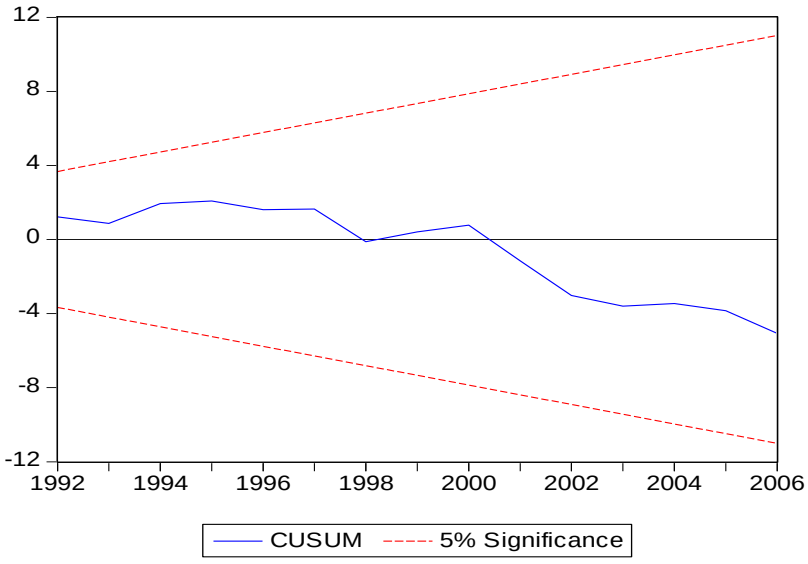

Fig. 1. CUMSUM Test

6. INVESTMENT EQUATION RESULTS

To analyse the impact of debt on investment Equation B will be used and following test of cointegration performed:

Ho: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$ against the alternative hypothesis of
H1: $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$

Similar to the estimation reported above, maximum lag length of 2 has been selected. The results of F-test for the significance of are summarised in Table 6.

Table 6

Bound F-test Results

Country	F-Statistic Value	Lag Length	Significance Level	Bound Critical Values I(0)	Bound Critical Values I(I)
			1%	3.15	4.43
Pakistan	2.18	2	5%	2.45	3.61
			10%	2.12	3.23

The table shows that calculated F-statistics value lie within the bound limits at 10 percent level of significance. Therefore, these results are inconclusive and from the results of error correction model we will decide about the existence of the cointegration. After determination of cointegration among the variables, long run relationship is determined and long run coefficients are estimated for Equation B. The optimal length of the long-run coefficients is found by using the lag selection criterion of SBC. The long-run results of Equation (B) are summarised in Table 7.

Table 7

Long Run Estimation Results (1,0,1,1,1,2)

Variable	Coefficient	Std. Error	t-Statistic
INF	0.082148*	0.022979	3.574845
ED_Y	–0.164481*	0.073332	–2.242953
DS_X	–0.010207	0.038837	–0.262823
DD_Y	–0.095909*	0.048019	–1.997317
YT	0.080666**	0.04478	1.801379
Constant	2.117185	0.666954	3.174409
R-squared	0.645456		
Adjusted R-squared	0.552966		
F-statistic	6.978675		
Prob(F-statistic)	0.000254		
Serial Correlation LM Test	2.004280		
P value of LM Test	0.1597		

*, ** and *** denotes significance at 1 percent , 5 percent and 10 percent level respectively.

The Table 7 above reveals that in the long-run external debt as percentage of GDP has a negative and significant relationship with investment. It suggests that for Pakistan debt overhang hypothesis has a role in curtailing investment. However, debt servicing as percentage of exports has a negative but significant relationship with investment. Combined results of the impacts of public external debt and debt servicing show that in Pakistan, debt overhang is the major channel curtailing investment and per capita GDP.

The domestic debt also seems to have a negative and significant relationship with investment. This situation is well explained by Hauner (2006). He points out that government domestic debt held by banks results in making banks self-satisfied with their costs and makes them reduce their efforts to mobilise deposits to fund private sector projects. Hence, domestic debt reduces investment to some extent. In Pakistan, inflation, perhaps due to its mild nature has helped investment. It is also evident from the results that per capita GDP has a positive and significant relationship with investment.

The diagnostic tests show that there exists no serial autocorrelation and satisfactory goodness of fit. In the last step of ARDL the short run coefficient of the model are estimated and results are presented in Table 8.

Table 8

Error Correction Representation of the Selected ARDL Model (1,0,1,1,1,2)

Variable	Coefficient	Std. Error	t-Statistic
Constant	–0.02953	0.01504	–1.96324
D(KT(-1))	0.247017	0.15417	1.602239
D(INF)	0.034109	0.021647	1.575683
D(ED_Y)	–0.41422*	0.203461	–2.03586
D(ED_Y(-1))	–0.24726*	0.124859	–1.98033
D(DS_X)	–0.05105	0.036778	–1.38795
D(DS_X(-1))	–0.02393	0.027757	–0.86224
D(DD_Y)	0.033382	0.033803	0.987534
D(DD_Y(-1))	–0.04228	0.050002	–0.84557
D(YT)	–0.47572	0.560392	–0.8489
D(YT(-1))	0.538052*	0.285887	1.882046
D(YT(-2))	0.992588**	0.561617	1.767375
ECTK(-1)	–0.85042*	0.265804	–3.19944
R-squared	0.74623		
Adjusted R-squared	0.555902		
F-statistic	3.920766		
Prob(F-statistic)	0.006235		

* and ** denotes significance at 5 percent and 10 percent level respectively.

According to the results given in the table above, the existence of a stable long-run relationship among the variables is confirmed by the significant error correction term [Bannerjee and Mestre (1998)]. The results suggests that following a shock, after one year, about 85 percent adjustment back towards the long-run equilibrium is completed.

In the short run, public external debt has a negative and significant relationship with investment. It is also evident from the results that per capita GDP has a positive and

significant relationship with investment in Pakistan. From the above results it can be concluded that debt variables have an insignificant relationship in the short run but a significant one in the long run.

The cumulative sum (CUSUM) graphs, indicate the stability in the coefficients over the sample period.

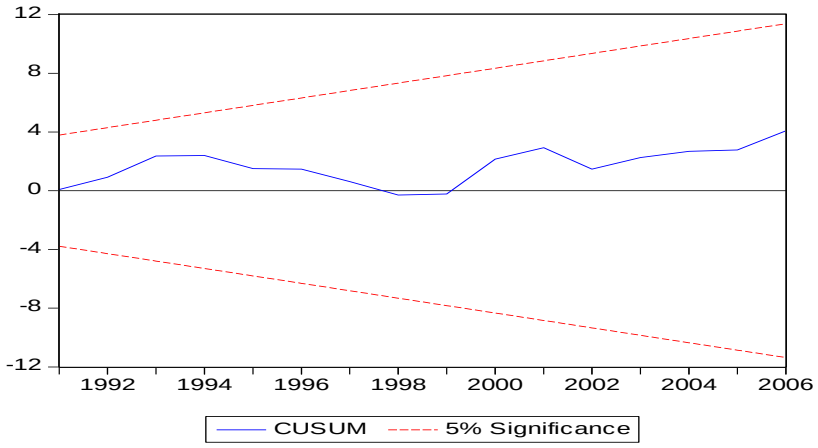

Fig. 2. CUMSUM Test

7. CONCLUSIONS AND POLICY IMPLICATIONS

The present study examines consequence of public debt for economic growth and investment regarding Pakistan. Furthermore, study has also investigated impacts of certain other variables on economic growth.

In Pakistan, public external debt has a negative and significant relationship with per capita GDP and investment, both in the short run and in the long run. Therefore, the results strongly confirm the existence of "Debt Overhang effects". On the other hand, only in the short run debt servicing has a negative and significant relationship with per capita GDP. But from this evidence we cannot infer the existence of the "crowding out effect" because debt servicing does not seem to significantly affect investment. Domestic debt has a negative and significant relationship with investment, suggesting that it has tended to crowd out private investment. However, domestic debt does not have significant relationship with per capita GDP; and that investment has a positive and significant relationship with per capita GDP. Keeping in view the findings of the study, first and foremost implication emerges that heavy reliance on external and domestic debt must be discouraged. Therefore, the policy makers should not use the debt to finance the deficits rather there is a dire need to enhance efforts to stimulate the revenue or reduce the current expenditures. The present study also shows that openness is growth enhancing; hence there is need that Pakistan may extend its efforts to increase the exports.

It may be interesting to highlight new areas of research that the present study suggests. In line with Pattilo, *et al.* (2002) and various others, this study is also unable to find out the full significance of "crowding out effect" of debt servicing, but

there is consensus that debt servicing results in reducing the development expenditure. To test this argument further it is suggested that an empirical study may be conducted that explores the relationship between 3D's of public expenditure i.e. Development Expenditure, Defence Expenditure and Debt Servicing Expenditure. In that study by analysing the interlink-ages between 3D's, the government preferences for the development expenditure may be further explored. Furthermore, it is also suggested that a study may be conducted that may try to find out the optimal level of debt.

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