

External Debt and Capital Accumulation Nexus: Evidence from Pakistan

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The rising public debt burden is a common feature of developing countries like Pakistan. This study is an attempt to empirically analyse the external debt and capital accumulation nexus for Pakistan from 1972 to 2016. The ARDL bound testing technique was employed to estimate two models which incorporate different indicators of external debt. Results indicate the existence of a negative relationship between external debt to revenue ratio and stock of capital that supports the debt overhang hypothesis for Pakistan. The debt overhang hypothesis states that large accumulated debt leads to a decrease in overall capital accumulation in an economy. Similarly, other indicators of external debt, namely, external debt service to revenue ratio, external debt to export ratio, and external debt service to export ratio tend to bring a fall in stock of capital in Pakistan. Based on its findings, the study suggests the need for better and productive use of external debt in public sector development projects to foster the capital accumulation process in Pakistan.

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1. INTRODUCTION

The continuous increase in external debt burdens of low-income countries is an indicator of economic slowdown and lack of prudent debt management. Inappropriate structural reforms, lack of sustainable macroeconomic adjustment policies, lack of diversified export bases, and political instability are considered main drivers of the higher external debt burden (Zaidi, 2015). The immediate effect of the increasing debt can be observed through the decline in both domestic and the net foreign investment, which further result in lower capital accumulation and output in an economy. Additionally, higher public debt not only crowds out physical capital but also adversely affects human capital accumulation (Serieux & Samy, 2001).

Economic theory postulates that rational borrowings encourage economic growth through capital accumulation and productivity growth. This is because countries at their early stages of development generally tend to have smaller capital stocks with limited and inadequate investment opportunities. As a result, such countries assure higher rates of return on investment (Hameed et al. 2008). However, in the case of developing countries, increasing debt burdens are posing a serious threat to the macroeconomic stability by

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affecting domestic investment and foreign direct investment. Undoubtedly, supplementing resources by foreign economic assistance is important for initiating and accelerating the pace of economic growth, however, a persistent surge in the external debt burden for an extended period can create serious constraints for the economic growth of a country. There is a close relationship between the nature of the debt and economic activity. We can classify debt as productive or unproductive debt. Productive debt is raised for productive purposes and increases the productive capacity of an economy. On the other hand, unproductive debt is not self-liquidating, and does not enhance the productive capacity of an economy. Thus, a debt-financed investment should be productive so that it can earn a higher return than the cost of raising the debt (Adebusola et al. 2007).

Like many other developing countries, Pakistan is confronted with a shortage of financial resources. To manage this problem, Pakistan has been bridging its resource gap through borrowing from external resources. Pakistan has been receiving foreign economic assistance since the early 1950s for development requirements. Foreign aid has played an important role in medium and long-term development programmes in Pakistan. Foreign economic support (loans, credits and grants) is mostly categorised as project aid and non-project aid.¹ The main objective of foreign assistance has been to complement the domestic resources required to accelerate the pace of economic development in the country. The debt burden gradually increased during the 1980s and 1990s. The debt situation in Pakistan reached a vulnerable level in 1999 due to large, and persistent, current account and primary fiscal deficits. These twin deficits resulted in the unstable accumulation of huge total debt. During the first half of the 1980s, domestic debt increased by 8 percent and followed by even a higher rate of 22 percent in the second half of the 1980s (Adnan, 2008). The domestic and external debt situation worsened during the 1990s. The external debt to GDP ratio increased to 43 percent in 1998-99 from 34 percent in 1990-91, while domestic debt grew at 13.7 percent annually during the 1990s (Pakistan, 1999-00).

Pakistan entered the 21st century with the abovementioned severe financial problems. Public debt exceeded revenues by more than 600 percent and was 90 percent of GDP. At the same time, debt repayments accounted for more than half of the current revenues. In 2001, the World Bank declared Pakistan a severely indebted South Asian country. Due to Pakistan's weak financial position, Paris Club members and quasi-London Club rescheduled debt payments several times from 1998 to 2001 (Zaidi, 2015). After 2001, economic and public debt indicators showed some improvement in Pakistan. Unfortunately, this trend could not be maintained for a longer period. In the last few years, Pakistan has witnessed massive fiscal and current account deficits. The expansion of the fiscal and current account deficits resulted in higher borrowing through both internal and external sources to finance these deficits. The domestic and external debt has increased to PKR 3 trillion and PKR 3.4 trillion respectively. The public debt as a percentage of GDP increased to 61.6 percent in FY 2012-13 from 55.2 percent in FY 2006-07. Similarly, public debt as a percentage of revenue during 2016-17 fell to 442.5 percent from 479.2 percent in 2012-13 (Pakistan, 2016-17).

¹The main difference between a grant and a loan is repayment. A loan requires you to repay the money you borrow, whereas a grant does not. Grants are, essentially, a gift. In other words, they're non-repayable.

Total public debt stood at PKR 28,607 billion at the end of March 2019, recording an increase of PKR 3,655 billion during the first nine months of the current fiscal year. The bifurcation of this increase is as follows: cumulative increase in debt stock cannot be entirely attributed to government borrowing. External loans are contracted in various currencies; however, disbursements are effectively converted into the PKR. Thus, devaluation of PKR against international currencies can increase the value of external public debt portfolios when converted into the PKR for reporting purposes. This is evident from the fact that increase in external public debt contributed PKR 1,900 billion to the public debt during the first nine months of the ongoing fiscal year, while government borrowing for financing of fiscal deficit from external sources was PKR 524 billion during the said period. This differential mainly occurred due to the depreciation of the PKR against US Dollar. It is worth noting that depreciation of the PKR increases the rupee value of external public debt, however, any such negative impact is spread over many years depending on the life of any given loan and immediate cash flow impact is not significant. On the other hand, fiscal indicators during FY 2018 suggest that total revenue at 15.1 percent of GDP remained below the revised target of 16.0 percent. Both tax and non-tax revenue showed dismal performance, while expenditures increased. Tax revenue reached 12.9 percent of GDP against the target of 13.2 percent of which FBR tax collection remained at 11.1 percent against the revised target of 11.4 percent. Similarly, non-tax revenue reached 2.2 percent against the target of 2.8 percent (PES 2018-19). Over the years, a narrow tax base, numerous concessions and exemptions, tax administration challenges, and weak tax compliance resulted in a low tax to GDP ratio in Pakistan.

Given the above-mentioned background, the present study aims to explore the relationship between external debt and capital accumulation in Pakistan. This exercise will enable us to understand the consequences of various indicators of external debt burden for domestic capital accumulation in Pakistan. Moreover, the findings of the study will suggest suitable measures, such as improvements in governance structure, insuring fiscal transparency and discipline, along with reduction of aid fungibility for enhancing the stock of capital by optimal utilisation of external borrowing. The significance of the study is apparent from the fact that it has endeavored to gauge the relationship between some indicators of external debt burden and capital accumulation in Pakistan.

The study is structured as follows: Section 2 surveys relevant literature; Section 3 presents estimation strategy and data; Section 4 discusses the main empirical results; and Section 5 provides the conclusions.

2. LITERATURE REVIEW

Both empirical and theoretical literature available on the nexus between external debt and capital accumulation confirm the deleterious consequences of external debt for capital accumulation. According to (Krugman, 1988) when debt obligations in a country surpass adequate levels of borrowings, it discourages investment. This also implies that at higher levels of debt burdens, investors would expect lower profits on their investments because they anticipate that to reimburse these outstanding debts, government will increase taxes. Thus, large debt burdens discourage investment and hence affect the capital accumulation process. Similarly, (Agenor & Montiel, 1996) argue that higher debt burdens affect growth through lowering total factor productivity growth.

Few studies have directly analysed the impact of foreign debt on capital accumulation. The findings of (Gong & Zou, 2000) reveal that foreign aid negatively affects capital accumulation in the long run. Whereas, in the short run, the relationship is positive because increase in foreign aid increases investment and capital accumulation and reduces external borrowings. Habimana (2005) investigates the relationship between the higher level of external debt and capital accumulation in Rwanda. The findings reveal a negative effect of external debt on capital accumulation process. It implies that continuous increase in debt burden can result in various macroeconomics effects, including reduction in capital stock via decrease in domestic investment, and lower output level in an economy. (Cohen, 1993; Wagner, 1996; Deshpande, 1997; Elmendorf & Mankiw, 1998; Serieux & Samy, 2001; Were, 2001; Clements et al. 2003) and (Sen et al. 2007) investigate the impact of foreign debt on growth via investment channel which is also called debt overhang hypothesis. All these studies support the existence of the debt overhang hypothesis. Habimana (2003) examines the nature of the relationship between high levels of external debt and capital accumulation in Rwanda. The author estimates two investment equations, including the debt to exports ratios and the debt to revenues ratios as explanatory variables. The debt to revenues ratios are used to capture the “crowding out” effects, while the debt to exports ratios serve to explore the “import compression” effects. The study suggests that debt variables impact significantly and negatively on investment. On the one hand, the debt to revenue ratios have adverse effects on investment. The study also supports the possibility of a disincentive effect through higher taxes on investment returns necessary to service debt, and to handle any increase in the fiscal deficit. The economic indicators show that revenues as a share of GDP have been rising throughout the period under study, associated with a large decrease of the gross domestic investment.

Similarly, (Abdullahi et al. 2016) analyse the impact of external debt to the growth and development of capital formation in Nigeria. Time series data was utilised from 1980 to 2013, employing the Autoregressive Distributed Lag (ARDL) modelling. The ARDL estimation showed the presence of a long run relationship amongst the variables. It was also proved that the variables were independently related in the long run. The impact of external debt on capital formation has been established to be negative and statistically significant while savings came out as the only variable with a bidirectional causal relationship amongst the variables. Interest rate was found to be statistically significant even though weak. The other variables were found to be of unidirectional causal effects. The coefficient of ECM term has the expected sign and is significant at 1 percent. The study suggests that savings should be given priority and encouraged internally to boost the speed of capital growth and formation in the economy.

We have come across quite a few studies which have attempted to investigate investment response to external debt in Pakistan. To this end, (Chishti & Hasan, 1992) analysing the impact of foreign aid (grants and loans) on investment and consumption activities in public sector of Pakistan, show that foreign aid in the form of grant has a modest impact on public investment but foreign aid in the form of loans has a robust effect on public investment in Pakistan. Chaudhry et al. (2009) explore the effects of external debt on saving and investment in Pakistan from 1973 to 2006. The authors find a positive but marginally significant impact of foreign debt on investment levels. The authors are of the opinion that inflows of foreign debt have favourable impacts on investment expenditures in Pakistan.

Jafri and Hira (2012) analyse the impact of external debt service payments on investment. The findings of the study show that debt services to multilateral and private creditors have a significant impact on gross private capital investment in case of Pakistan. Results also suggest that the impact of external debt service payments on investment is dependent on the nature of credit institutions. Debt services to multilateral creditors and other private creditors negatively influence gross private capital investment in Pakistan. However, this situation reverses in case of debt servicing to bilateral creditors.

Ali (2013) focuses on estimating the impact of external debt, foreign direct investment and worker's remittances on domestic investment in Pakistan from 1972 to 2007. The time series analysis reveals a significant investment increasing impact of foreign debt inflows into the Pakistan economy. Although the impact of external debt on domestic investment is positive and significant, the study suggests that foreign debt should be utilised for indispensable purposes.

Zaman and Arslan (2014) analyse the role of external debt on economic growth in Pakistan. The study incorporates gross domestic product (GDP) as a measure of economic growth and gross domestic saving (GDS), gross capital formation (GCF) and external debt stock (EDS) as measures of economic debt. The study employs the OLS regression model along with descriptive statistics over the time series data for 39 years. The statistical findings of the study reveal that gross capital formation (GCF) and external debt stock has a significant and positive effect on Pakistan's GDP while gross domestic saving does not have any significant impact on the GDP of Pakistan.

Undeniably, domestic capital accumulation plays a critical role to determine the trajectory of growth and similarly, foreign debt has a vital role to play in complimenting domestic resources in developing countries to speed up the process of capital accumulation and economic growth. Unfortunately, there is a dearth of literature focusing on the role of various indicators of external debt burden on the process of capital accumulation in a developing country like Pakistan. The present study aims to fill this vacuum in related literature.

3. ANALYTICAL FRAMEWORK

The two-gap model² posits that developing economies face two gaps in their economy, which they have to fill. The first gap is between savings and investments in the economy. A developing country starts with very low savings, but then has to engage in a big push by investing heavily. In what ways would countries fill this gap between savings and investments? There is a lot of debate among economists here. However, a dominant view is that developing countries require capital from developed countries in the form of foreign aid, debt or foreign direct investment to close this gap. The second gap corresponds to trade deficit, which is a mismatch between export earnings and import payments. A developing country, by definition, produces only primary goods, whereas it would require large imports of consumer and capital goods. There is obviously a cost differential here because of which, developing countries would necessarily face trade deficit.

² See Chenery and Strout (1966).

High debt stocks appear to affect growth through their dampening effects on both physical capital accumulation and total factor productivity (Pattilo et al. 2004). As they suggest, the size of the effects is similar to that of the effect on output growth: on average, for countries with high debt levels, doubling debt will reduce output growth by one percentage point and reduce growth in both per capita physical capital and total factor productivity by almost as much. The debt burden can have a depressing effect on growth through the government budget by crowding out public investment and instigating a reduction in private and total investment and a fall in the productivity of investment (Serieux & Samy, 2001). With this background, we proceed to the nature of the econometric model used in the study.

3.1. Econometric Model

To gauge the effect of external debt on capital accumulation, we estimate two physical capital stock models. These models include debt to revenue ratios and debt to export ratios as explanatory variables along with some control variables. Debt to revenue ratios are used to capture the “crowding out” effects, while the debt to exports ratios serve to explore the “import compression” effects. The model is borrowed from Serieux and Samy (2001), in their study on the nature of the relationship between debt and growth, in a cross section of 53 low and lower-middle income countries from 1970 to 1999, where they estimate an investment equation, a human capital growth equation, and a growth equation. Their investment model is based on a modified version of the accelerator theory. Thus, we specify our econometric models as:

$$KS_t = \alpha_0 + \alpha_1 GDPGR_t + \alpha_2 DR_t + \alpha_3 DSR_t + \alpha_4 INF_t + \alpha_5 LHC + e_t \quad \dots \quad (1)$$

$$KS_t = \beta_0 + \beta_1 GDPGR_t + \beta_2 DE_t + \beta_3 DSE_t + \beta_4 INF_t + \beta_5 LHC_t + u_t \quad \dots \quad (2)$$

where, KS represents stock of physical capital as percent of GDP taken as dependent variable, $GDPGR$ denotes growth rate of GDP which shows economic growth performance of the economy, EDR is external debt to revenue ratio (or external debt as percent of total public revenue), $EDSR$ is external debt service to revenue ratio (or external debt service as percent of total revenue), INF is consumer price index based inflation rate, LHC is natural logarithm of human capital proxied by gross secondary school enrolment, EDE is external debt to exports ratio (external debt as percent of export earnings), $EDSE$ denotes external debt service to exports ratio (or external debt as percent of export earnings), e and u are random error terms.

3.2. Data and Estimation Technique

The study covers the years from 1972 to 2016. All the required data have been sourced from the IMF’s International Financial Statistic (IFS), Pakistan Economic Survey (various issues), and the World Bank’s World Development Indicators (WDIs).

Since data on stock of physical capital are not available in the context of Pakistan, we have generated the absolute stock of physical capital (K) series applying the perpetual inventory method, as Caselli (2005), and Awounang and Fonning (2014) did. The perpetual inventory equation is given by:

$$K_t = (1 - \rho) K_{t-1} + I_t$$

where I represents gross investment, and ρ denotes the depreciation rate. Since data are fully available for Pakistan ranging from 1972 to 2016, we take 1972 as the reference year ($Year_{t_0}$) to calculate the initial capital stock as follows:

$$K_{t_0} = I_{t_0} / (gI - \rho)$$

where, gI is the geometric growth rate of the aggregate investment between time t_0 and time $t_0 + t_{44}$. The choice of this formula for calculating the initial capital stock is because it is the expression of the equilibrium capital stock in the Solow growth model. Following Caselli, 2005; Cavalcanti et al. 2011; Awounang and Foning, 2014, the depreciation rate of capital is taken at 6 percent.

The present study employs the autoregressive distributed lag (ARDL) bounds testing technique developed by (Pesaran & Pesaran, 1997 & Pesaran et al. 2001) to empirically estimate models (1) and (2). This technique has many advantages over other co-integration techniques. Firstly, this technique is capable of yielding consistent parameter estimates even in the case of small data set (Mah, 2000). Secondly, this technique provides consistent results, irrespective of the fact that variables are integrated of order $I(0)$, $I(1)$ or fractionally integrated. The ARDL representations of models (1) and (2) are as follows:

$$\begin{aligned} \Delta KS_t = & \gamma_0 + \sum_{i=1}^p \gamma_i \Delta KS_{t-i} + \sum_{i=0}^p \gamma_2 \Delta GDPGR_{t-i} + \sum_{i=0}^p \gamma_3 \Delta EDR_{t-i} \\ & + \sum_{i=0}^p \gamma_4 \Delta EDSR_{t-i} + \sum_{i=0}^p \gamma_5 \Delta INF_{t-i} + \sum_{i=0}^p \gamma_6 \Delta LHC_{t-i} + \lambda_1 KS_{t-1} \\ & + \lambda_2 GDPGR_{t-1} + \lambda_3 EDR_{t-1} + \lambda_4 EDSR_{t-1} + \lambda_5 INF_{t-1} + \lambda_6 LHC_{t-1} + v_t \quad \dots \end{aligned} \quad (3)$$

$$\begin{aligned} \Delta KS_t = & \delta_0 + \sum_{i=1}^p \delta_i \Delta KS_{t-i} + \sum_{i=0}^p \delta_2 \Delta GDPGR_{t-i} + \sum_{i=0}^p \delta_3 \Delta EDE_{t-i} \\ & + \sum_{i=0}^p \delta_4 \Delta EDSE_{t-i} + \sum_{i=0}^p \delta_5 \Delta INF_{t-i} + \sum_{i=0}^p \delta_6 \Delta LHC_{t-i} + \kappa_1 KS_{t-1} \\ & + \kappa_2 GDPGR_{t-1} + \kappa_3 EDE_{t-1} + \kappa_4 EDSE_{t-1} + \kappa_5 INF_{t-1} + \kappa_6 LHC_{t-1} + \varepsilon_t \quad \dots \end{aligned} \quad (4)$$

In models (3) and (4), the coefficients attached with difference operators measure short run dynamics, whereas, the terms with first lag capture long run relationship. For checking the existence of long run relationship between stock of capital and all the explanatory variables, we test a separate null hypothesis of no cointegration for models (3) and (4) as:

$$\begin{aligned} \lambda_1 &= \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0 \\ \kappa_1 &= \kappa_2 = \kappa_3 = \kappa_4 = \kappa_5 = \kappa_6 = 0 \end{aligned}$$

For this purpose, the computed F-statistic from the test is compared with critical bound values from Pesaran et al. (2001). If the null hypothesis is rejected, it will point to the existence of a cointegrating relationship between capital stock and all the regressors given in models (1) and (2). If a long run relationship is established between the variables, next step is to estimate short run dynamics and stability of equilibrium relationship between capital stock and its determinants by means of the following two error correction models:

$$\begin{aligned} \Delta KS_t = & \phi_0 + \sum_{i=1}^p \phi_i \Delta KS_{t-i} + \sum_{i=0}^p \phi_2 \Delta GDPGR_{t-i} + \sum_{i=0}^p \phi_3 \Delta EDR_{t-i} \\ & + \sum_{i=0}^p \phi_4 \Delta EDSR_{t-i} + \sum_{i=0}^p \phi_5 \Delta INF_{t-i} + \sum_{i=0}^p \phi_6 \Delta LHC_{t-i} + \varpi ECT_{t-1} + \zeta_t \quad (5) \end{aligned}$$

$$\begin{aligned} \Delta KS_t = & \theta_0 + \sum_{i=1}^p \theta_i \Delta KS_{t-i} + \sum_{i=0}^p \theta_2 \Delta GDPGR_{t-i} + \sum_{i=0}^p \theta_3 \Delta EDE_{t-i} \\ & + \sum_{i=0}^p \theta_4 \Delta EDSE_{t-i} + \sum_{i=0}^p \theta_5 \Delta INF_{t-i} + \sum_{i=0}^p \theta_6 \Delta LHC_{t-i} + \pi ECT_{t-1} + \zeta_t \quad (6) \end{aligned}$$

where, ϖ and π are coefficients of lagged error correction term (*ECT*) in Equations (5) and (6) respectively. From Pesaran et al. (2001) it is evident that the coefficient of lagged ECT specifies the speed of adjustment which is linked to cointegration equation. Hence, lagged *ECT* characterises the feedback of the system in stabilising its disequilibrium. Finally, the validity of the estimated econometric model is checked by means of some important stability and diagnostic tests which are frequently employed in empirical studies.

4. RESULTS AND DISCUSSION

The first step in the ARDL procedure is to test for unit roots to eliminate the possibility of $I(2)$ variables. Because, in the presence of $I(2)$ variables the computed F-statistics provided by Pesaran et al. (2001) are not valid any more since they are based on the assumption that the variables are $I(0)$ or $I(1)$. Consequently, the implementation of unit root tests in the ARDL procedure is necessary to ensure that none of the variables are integrated of order 2 or beyond. For this reason, the present study employs the Dickey-Fuller –Generalised Least Squares (DF-GLS) unit root test to check the stationarity of the time series. The DF-GLS unit root test results are reported in Table 1. Results show that GDP growth rate, inflation and debt service to revenue ratio are stationary at level, whereas, all other variables are non-stationary at level, but they become stationary at first difference. Hence, it confirmed that the regressors in models (1) and (2) have mixed order of integration and none of them is integrated of order two. This outcome makes a reasonable case for using the ARDL technique for getting short run and long run parameter estimates from models (3) and (4).

Table 1
Results of DF-GLS Unit Root Test (1972-2016)

Variable	Level	First Difference	Mackinnon Critical Values for Rejecting the Unit Root	
			Hypothesis (at 5%)	Decision
KS	-1.531	-5.785	-2.137	$I(1)$
GDPGR	-3.596	-	-2.137	$I(0)$
INF	-2.962	-	-2.137	$I(0)$
LHC	-1.17	-7.097	-2.137	$I(1)$
EDR	-1.160	-2.734	-2.137	$I(1)$
EDSR	-2.72	-	-2.137	$I(0)$
EDE	-1.38	-3.512	-2.137	$I(1)$
EDSE	-1.23	-6.758	-2.137	$I(1)$

The computation of the ARDL bounds testing is sensitive with lag length selection. Hence, in the second step, the orders of the lags in the ARDL models (3) and (4) are selected on each first differenced variable using the Schwarz Bayesian Criterion (SIC). Narayan and Narayan (2005) suggests that the SIC is the best for lag selection for the ARDL model with small sample.³

³The estimation task is executed by using the computer software Eviews 9. Optimal lag length for each time series is selected the SIC with automatic lag selection option.

We reach our decision regarding the presence of the long run relationship between the variables of the specific model with a simple comparison. i.e. the bounds approach compares the calculated F-statistic against the critical values generated by lower critical bound and upper critical bound developed by Pesaran et al. (2001). There is cointegration if the computed F-statistic is more than upper critical bound and no cointegration if the value of the F-statistic remains below the lower critical bound. However, if the sample test statistic falls between these two bounds, the result is inconclusive. All this relates to a situation when the regressors have mixed or of integration like ours. The results of the bounds testing to cointegration are displayed in Table 2. It is obvious that for both the models the calculated F-statistic exceeds the upper bound at 5 percent level of significance, indicating rejection of null hypothesis of no cointegration. Thus, stock of capital forms a long run equilibrium relationship with external debt to revenue ratio, external debt service to revenue ratio, external debt to export ratio, external debt service to export ratio, GDP growth rate, inflation and human capital in the case of Pakistan over the study period 1972 to 2016.

Table 2
Bound Test Results

Estimation	F-Test Statistic	Critical Value (5% Level of Significance)	
		Lower Bound	Upper Bound
Model 3	5.20	2.48	3.67
Model 4	5.79	2.29	3.42

4.1. Short Run and Long Run Estimates of Model (3)

The next task in ARDL bound testing technique is to investigate the extent of the long run effects of explanatory variables on the dependent variable. We now proceed with a discussion of the results of model (3) given in Table 3. The regression coefficient of growth rate of GDP is significantly and positively associated with capital stock, indicating that 1 percent increase (decrease) in economic growth rate will result in 0.311 percent increase (decrease) in capital accumulation in Pakistan. This finding is consistent with the notion of the Accelerator Theory of Investment. The effect of external debt to revenue ratio on stock of capital is significant but negative such that 1 percent increase (decrease) in the former brings a decrease (increase) of 0.08 percent in the latter. It indicates that with increase in debt to revenue ratio, the uncertainty regarding government policies and actions also increases which adversely affects the level of capital accumulation in our economy. Especially, when the government's debt stock increases then such obligations are usually financed through imposing high taxes, which leads to reduction in investment and discourages the capital accumulation process. In such a situation, investors prefer to wait rather than investing in long run projects (Agenor & Montiel, 1996). Additionally, the rapid accumulation of debt over a longer period may also result in massive capital outflows due to the unfavourable policies of government to finance its debt obligations (Oks & Wijnbergen, 1995). The relationship between external debt to revenue ratio and capital accumulation can also be explained through the debt overhang hypothesis, which

Table 3

Long Run Estimates of Model (3)

Dependent Variable: KS	Selected ARDL (1, 1, 1, 2, 1, 1)	
Regressor	Coefficient	t-value
GDPGR	0.311 **	2.699
EDR	-0.180 **	-2.217
EDSR	-0.703 ***	-4.301
INF	-0.354 ***	-3.287
LHC	0.0793 **	2.217
C	0.171 *	1.834

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent, and 10 percent levels respectively.

states that rising debt burden leads to decreased investment in the economy (Deshpande, 1997; Fosu, 1999; Chowdhury, 2001). Similarly, the relationship between external debt service to revenue ratio and stock of capital has also emerged as significant and negative. This outcome implies that external debt servicing puts a pressure on the available resources in the country to be diverted towards investment purposes in the economy. Increasing the burden of foreign debt payments limits the financial ability of an indebted nation like Pakistan to allocate sufficient resources for building its stock of physical capital.

The regression coefficient of inflation rate is negative and significant, implying that with 1 percent increase (decrease) in inflation rate, the stock of capital decreases (increases) by 0.354 percent. A high rate of inflation raises the cost of borrowing and thus lowers the rate of capital accumulation. Similarly, higher variations in prices make it difficult for investors to estimate the costs and benefits associated with a particular project which discourages investors to start new and long run projects (Were, 2001). A higher rate of inflation also reduces capital accumulation through its adverse effects on welfare of individuals (Ahmed & Mohamed, 2005). Finally, human capital plays a significant and positive role in the capital accumulation process. However, the magnitude of the long run impact of human capital on stock of physical capital is very small, a 1 percent increase in human capital leads to a 0.079 percent increase in stock of physical capital. The result may be different if we use some other proxy of human capital. Developed human capital is considered a valuable asset for a nation with which the nation can improve its capacity to adopt new technologies and techniques of production (Schutt, 2003; Mohsin, 2005). It also enhances capital accumulation through creating more skills and knowledge related to the availability of investment opportunities in the economy.

Table 4 reports the short run dynamics of the model. In contrast to the long run outcomes, in the short run, we see that only growth rate of GDP, external debt service to revenue and human capital are significant drivers of capital accumulation in Pakistan while the rest of the regressors do not play a role in shaping the behaviour of capital accumulation. The coefficient of lagged error correction term (ECT) is negative and significant which indicates that the long run equilibrium relationship between stock of capital and all the explanatory variables given in table 3 are stable. The coefficient value of lagged ECT is -0.659, implying that reasonably high speed of adjustment towards the long run equilibrium. In other words, it can be stated that in case of any deviation from

the long run equilibrium, almost 66 percent correction will take place in a year to restore the equilibrium position. Moreover, at the bottom of Table 4, results of four diagnostic tests are given which indicate that our estimated model does not suffer from serial correction, heteroscedasticity, functional form and normality issues.

Table 4

Results of the Error Correction Model

Dependent Variable: (ΔKS)	Selected ARDL (1,1,1,2,1,1)	
Regressor	Coefficient	t-value
$\Delta GDPGR$	0.131***	8.882
ΔEDR	-0.010	-1.0787
$\Delta EDSR$	-0.009*	-1.933
$\Delta EDSR (-1)$	-0.006	-0.962
ΔINF	0.059	1.572
ΔLHC	-0.003**	-2.139
ECT (-1)	-0.659***	-5.345
Diagnostic Tests		
$\chi^2_{SC} = 0.129(0.716)$		$\chi^2_H = 0.851(0.356)$
$\chi^2_{FF} = 1.688(0.194)$		$\chi^2_N = 1.562(0.306)$

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent and 10 percent levels of significance respectively. χ^2_{SC} , χ^2_H , χ^2_{FF} and χ^2_N denote LM tests for serial correlation, functional form and normality respectively. The associated p values are in parentheses.

4.2. Short Run and Long Run Estimates of Model 4

The estimated long run results of model 4 are reported in Table 5. All the regressors have been found as significant factors in determining capital accumulation in the long run. The impacts of growth rate of GDP, inflation rate and human capital on capital accumulation are consistent with the previous case of Model 3 as displayed in Table 3. The regression coefficient of external debt to export ratio is significant and negative, implying that external debt to export ratio discourages the capital accumulation process in the long run in Pakistan. This finding suggests that a 1 percent increase in external debt to export ratio will result in nearly 0.27 percent decline in stock of capital.

Table 5

Long Run Parameter Estimates of Model 4

Dependent Variable: KS	Selected ARDL (1,2,1,1,2,1)	
Regressor	Coefficient	t-value
GDPGR	0.419***	3.149
EDE	-0.267***	-2.836
EDSE	-0.143**	-2.249
INF	-0.242***	-3.281
LHC	0.107***	-3.520
C	0.342 ***	2.863

Note: *** and ** indicate significant at 1 percent and 5 percent levels respectively.

The adverse effect of external debt to export ratio on capital accumulation can be explained through the reduction in the import capacity of capital goods of the government, which is also known as the import compression effect. According to import compression effect, the increasing debt burden decreases the public investment.

For the coefficient of external debt service to export ratio, we also find it significant and negative such that a 1 percent increase (decrease) in debt service to export ratio decreases (increases) stock of capital by 0.143 percent. This finding presents external debt service as an impediment in the way of accelerating capital accumulation process in the long run in Pakistan. Hence, it transpires that external debt has played its adverse role in the capital accumulation process during the sample period of study in the country. This outcome indicates that unfortunately we misused the borrowed funds in non-development projects (Zaidi, 2015). We did not remain successful in making the best possible productive use of the external debt, which resulted in increasing external debt burden on the economy. Hence, the rising debt burden emerged as one of the impeding factors in the way of fostering physical capital accumulation process in Pakistan.

Now we move to short run analysis. From Table 6, it is obvious that the capital accumulation process is only affected by the growth rate of GDP and external debt to export ratio where the former is positively, and the latter is negatively associated with capital stock in the short run. None of the other variables appear as significant factors in shaping the behaviour of stock of capital. The regression coefficient of lagged ECT is in accordance with our prior expectation i.e. it is significant and negative. From the coefficient value of lagged ECT, it can be inferred that in case of an external shock to the long run equilibrium association between stock of capital and all the regressors given in Table 5, the forces of the model correct almost 79 percent disequilibrium every year, indicating a quick restoration. Finally, on the basis of four diagnostic tests, provided at the bottom of Table 6, we can

Table 6
Results of the Error Correction Model

Dependent Variable : (ΔKS)	Selected ARDL (1,2,1,1,2,1)	
	Coefficient	t-value
ΔGDPGR	0.055 **	2.143
ΔGDPGR(-1)	0.093	1.361
ΔEDE	-0.086 ***	-5.997
ΔEDSE	-0.137	-1.277
ΔLINF	-0.065	-0.348
ΔLINF	-0.049	-0.784
ΔHC	0.101	1.221
ECT(-1)	-0.792 ***	-4.534
Diagnostic Tests		
$\chi^2_{SC} = 0.902(0.342)$		$\chi^2_H = 0.996(0.325)$
$\chi^2_{FF} = 0.341[0.728]$		$\chi^2_N = 0.171(0.852)$

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent and 10 percent levels of significance respectively. χ^2_{SC} , χ^2_H , χ^2_{FF} and χ^2_N denote LM tests for serial correlation, functional form and normality respectively. The associated p values are in parentheses.

state that our estimated model is not plagued with any of four econometric problems. These outcomes increase our confidence in the overall findings of the estimated model. Finally, CUSUM and CUSUM of squares tests suggest stability of the parameter estimates of the estimated models as their plots remain within 5 percent level of significance (see Figures 1and 2).

Fig. 1. Plots of CUSUM and CUSUMSQ Tests (Model 3)

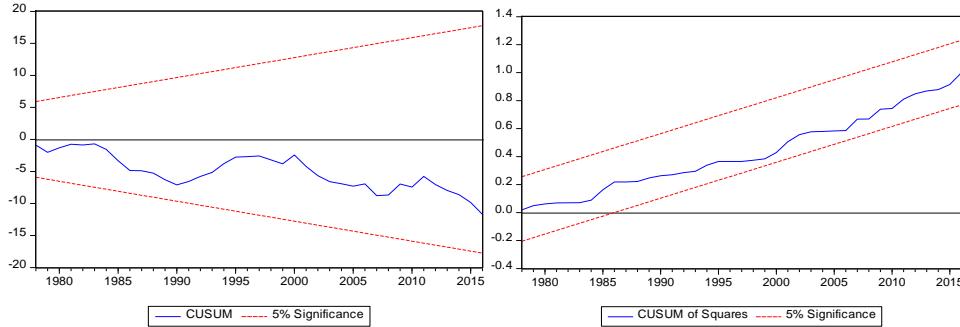
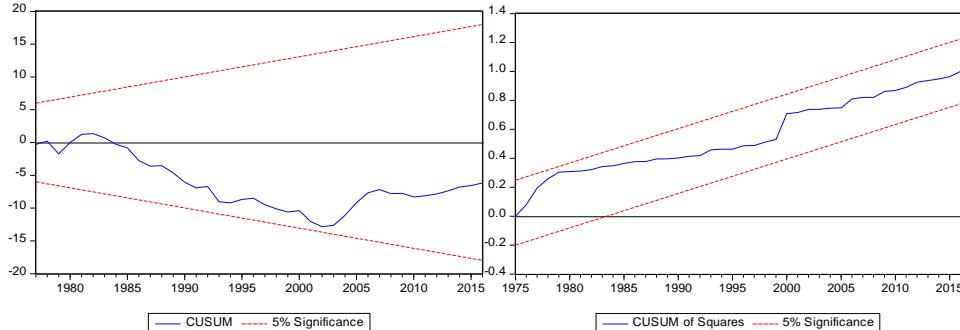


Fig. 2. Plots of CUSUM and CUSUMSQ Tests (Model 4)



5. CONCLUSION AND POLICY RECOMENDATIONS

This study investigates the implications of external debt for capital accumulation in Pakistan using the annual time series data covering the period from 1972 to 2016. To this end, different indicators of external debt have been used and the ARDL bound testing approach to cointegration has been employed to accomplish the empirical task. The findings of the study indicate that external debt does matter for capital accumulation process in Pakistan as external debt to revenue, external debt service to revenue, external debt to export and external debt service to export ratios have been found significant and adversely related with stock of capital in the long run in Pakistan. Nonetheless, in the short run only external debt service to revenue and external debt to export ratios have emerged as significant determinants of the stock of capital. Similarly, inflation rate tends to bring a reduction while growth rate of GDP and human capital enhance the stock of capital in the long run.

Policy implications of the study are straight forward. Firstly, the need is to formulate and implement a strict legal framework to allocate major chunk of external

debt to public sector development programmes. This action will stimulate business activities in the economy, leading to significant increase in the stock of capital in Pakistan. Secondly, the tax system should be reformed to generate sufficient resources from within the country, which will help in reducing external debt to revenue ratio. A fall in external debt to revenue ratio will induce capital accumulation process. Finally, as human capital has proved a significant driver of capital accumulation, the government should invest in education and skills improvement programmes to enhance the general as well as specific skills of individuals.

To conclude, there is a need to learn from past mistakes and to replace the non-concessional financing with concessional loans and grants to boost investment based on prudent economic projections and keeping in mind the country's vulnerability to shocks. This suggests that even though external financing leads to accumulation of debt, debt should be manageable so that higher growth generates the resources to service it. This should be considered while formulating new borrowing policies in Pakistan. External borrowing can only be beneficial if it generates an adequate increase in a country's capacity to repay including GDP, fiscal and exports revenues in the country.

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