

## External Debt and Public Investment: A Case Study of Pakistan

Minhaj-ud-Din<sup>\*</sup>, Muhammad Azam Khan<sup>†</sup>, Muhammad Tariq<sup>‡</sup>

### Abstract

This study aims to investigate the impact of external debt and debt servicing on the public investment in Pakistan for a period of 1976 to 2018. ARDL bound testing approach, ECM, and appropriate data diagnostic tests are utilized to analyze the neo-classical investment demand function. The estimates of external debt and debt service payment confirm the existence of debt overhang and debt crowding out effects in the long. Growth in debt burden indicates that Pakistan has been slipped into the debt trap. Therefore, policy makers should work for curtailing the debt burden as it binds the economy in vicious circle of borrowing. Enhancing the exports revenue, accelerating the economic productivity, and boosting the inflow of foreign direct investment are the channels for combating with the crisis of external debt.

*Keyword:* external debt, public investment, debt overhang, debt crowding out

### Introduction

Pakistan is a developing economy which is trapped by different economic problems since its inception (Chaudhry *et al.*, 2009). The alarming rise in debt burden indicate that Pakistan is trapped by the vicious circle of debt where taking a new loan to amortize the previous one has trapped the economy in a vicious downward spiral. Statistics reveal that external debt of Pakistan has shown a remarkable growth of 18.5% (\$112.8 billion) in June 2020 as compared to \$92.08 billion in 2018. In the federal budget, the figure of debt service payment stood as a largest expense by the government. The alarming figures of external debt and debt servicing identify the failure of the government to guarantee and meet the external debt liabilities with the existing resources (Minhaj-ud-Din *et al.*, 2020).

External debt has always remained a matter of serious concern among the policy makers and research analysts around the globe. Countries with low

---

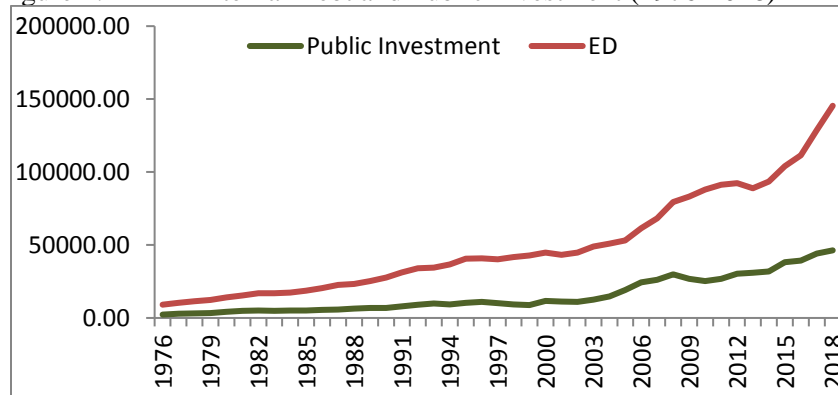
<sup>\*</sup> PhD. Research Scholar, Department of Economics, Faculty of Business and Economics, Abdul Wali Khan University Mardan, KP-Pakistan

<sup>†</sup> Department of Economics, Faculty of Business and Economics, Abdul Wali Khan University Mardan, KP-Pakistan

<sup>‡</sup> Department of Economics, Faculty of Business and Economics, Abdul Wali Khan University Mardan, KP-Pakistan

capital need to borrow more as compared to capital abundant countries. Studies available on the subject matter have identified various roots through which external debt leads to affect different macroeconomic indicators. Krugman (1988) was of the view that debt can trap economies in a vicious downward spiral as most of the government revenue is used in servicing the debt liabilities, which creates budget deficit that can be filled only through taking another loan. Similarly, when country's debt is larger than its repayment ability, then major portion of the economic resources is spent on loan amortization. Eventually, disincentives are created for investment which hampers the economic growth, and countries are trapped in the vicious circle of poverty (Mabula & Mutasa, 2019). Resultantly, hindrance is posed in the path of growth and development. Figure 1 shows the relationship of external debt with public investment.

Figure 1: External Debt and Public Investment (1976-2018)



Source: World Development Indicator, 2020.

The channels through which public investment is affected by the burden external debt are two: first, the channel of “debt overhang” and, second the channel of “debt crowding out”. Debt overhang refers to that situation when major portion of the country's output is utilized in meeting with debt obligations which discourages the overall investment (Sichula, 2012). It is a situation where increase in burden of debt leads to decrease the public investment (Picarelli *et al.*, 2019). Debt overhang is considered to be the principal cause of sluggish economic growth of heavily indebted countries, as the revenue generation capacity of the indebted country is so much exhausted by the repayment liabilities that country is then even unable to catch the growth path for many decades (Chaudhry *et al.*, 1988). Several studies related to debt-investment hypothesis have supported the theoretical framework of this concept that external debt creates

disincentive to save and invest (Krugman, 1988; Elbadawi *et al.*, 1997; Akram, 2013; Daka, 2017).

The channel of crowding out refers to that situation when highly indebted countries utilize their financial resources, i.e. foreign reserves, in debt servicing and are left with fewer resources for investment (Ejigayehu, 2013).

Numerous researchers have investigated these channels but ended with different conclusions. Most of these studies find that external debt leads to debt crowding out effect as it leads to hamper investment (Rockerbie, 1994; Iyoha, 1999; Asante, 2000; Maureen, 2001; Nguyen *et al.*, 2003; Presbitero, 2005; Adegbite *et al.*, 2008; Shabbir, 2013; Ostadi & Ashja 2014; Paul, 2017; Matuka & Asafo, 2018; Ncanywa, 2018; Picarelli *et al.*, 2019; Minhaj-ud-Din *et al.*, 2020). In contrast, Hwang *et al.* (2010), Sanchez-Juarez and Garcia-Almada (2016), Daka *et al.* (2017), Drama (2019), and Mabula and Mutasa (2019) indicate that external debt leads to debt crowding-in. Similarly, studies carried for Pakistan have also ended with contradictory results; existence of no effect for Chaudhry *et al.* (2009), and debt crowding out for Awan *et al.* (2014). In cross country analysis, we find only Akram (2013) who has examined this issue and has validated the presence of these effects in four Asian countries, including Pakistan.

Conclusively, the findings and recommendations of these studies cannot be applied to country specific analysis as they are based on cross country analysis and the generalization of debt-investment paradox will be misleading as each country has its own combination of social, economical and political rudiments. These estimates are also inconclusive due to mixture of research findings which signify the need that this area may be reinvestigated. This research considers this issue and investigates that whether external debt creates disincentives for investment in Pakistan or not. This study contributes to the existing literature in two broader aspects: First, this study analyzes the debt overhang effect of the external debt, and second, it also investigates the debt crowding out effect caused by external debt liabilities.

This study is organized in the following manner. Section 2 is focused on systematic review of the literature. Section 3 illustrates the empirical methodology and detail description of the variables. Section 4 is focused on data analysis and research findings. Section 5 concludes the empirical investigation in terms of conclusions and policy implications.

### **Literature Review**

Borensztein (1990) deployed the external debt variable in the neoclassical investment demand function and found that debt burden

creates disincentives for private investment in Philippines. Rockerbite (1992) and Deshpande (1997) found that debt accumulation is the root cause of decreasing investment and disrupting the economic growth. Iyoha (1999), Maureen (2001), Presbitero (2005), and Adegbite *et al.* (2008) incorporated the debt indicators in the neo-classical production function and investment demand function. The findings of these studies confirmed the coexistence of debt overhang and debt crowding effects. Asante (2000) also found that external debt creates disincentives for the private investment.

Nguyen *et al.* (2003) found that external debt and debt servicing are deleterious to investment. Chaudhry *et al.* (2009), Mugambi (2014), and Sanchez-Juarez and Garcia-Almada (2016) rejected the debt overhang hypothesis and considered that external debt is helpful in stimulating the level of investment. Ostadi and Ashja (2014) and Awan *et al.* (2014) identified that debt crowding out exists as it hampers the level of investment. In contrast, Sichula (2012) found that debt overhang hypothesis is still a paradox that may exist.

The coexistence of debt overhang and debt crowding out effects were also confirmed by Akram (2013) and Shabbir (2013). Ncanywa (2018) also found that external debt leads to debt crowding out effect. Picarelli *et al.* (2019) indicated that the impact of debt crowding out effect is more savior than the adverse effect of debt overhang. Minhaj-ud-Din *et al.* (2020) found that debt burden is a curse that leads to create disincentives for investment and growth. On contrary, Drama (2019) and Mabula and Mutasa (2019) rejected the crowding out effect in support of debt crowding-in hypothesis as they found that external debt helps in accelerating the level of private investment.

### Model Specification and Data

Conclusively, studies investigating the debt-investment dilemma for Pakistan have also ended with contradictory results; existence of no effect for Chaudhry *et al.* (2009) and debt crowding out for Awan *et al.* (2014). In cross country analysis, we find only Akram (2013) who has investigated this issue and has validated the presence of both these effects in four Asian countries, including Pakistan. These results are inconclusive as we find a mixture of research findings that signifies the need that this area may be reinvestigated. ARDL bound test, ECM test, and appropriate diagnostic tests are utilized to investigate that whether external debt creates disincentives for investment in Pakistan or not. Sample data is spanning from 1976 to 2018. Stationarity of the variables is determined by ADF and PP tests. Gross fixed capital formation is used as representative of public investment. Debt overhang effect is represented with the ratio of debt to

GDP, whereas debt crowding out effect is represented with the ratio of debt servicing to exports. Control variables are: GDP, rate of interest, inflation, budget deficit, real trade and foreign direct investment. Data sources and description of variables are listed in Table 1.

In light of this discussion, the following augmented neo-classical debt-investment model is constructed to inspect the debt-investment dilemma in Pakistan.

$$\Delta INV_t = \omega_0 + \sum_{i=1}^n \omega_1 \Delta INV_{t-1} + \sum_{i=0}^n \omega_2 \Delta ED_{t-1} + \sum_{i=0}^n \omega_3 \Delta DSP_{t-1} + \sum_{i=0}^n \omega_4 \Delta GDP_{t-1} + \sum_{i=0}^n \omega_5 \Delta RI_{t-1} + \sum_{i=0}^n \omega_6 \Delta INF_{t-1} + \sum_{i=0}^n \omega_7 \Delta BD_{t-1} + \sum_{i=0}^n \omega_8 \Delta RT_{t-1} + \sum_{i=0}^n \omega_9 \Delta FDI_{t-1} + \mu_1 INV_{t-1} + \mu_2 ED_{t-1} + \mu_3 DSP_{t-1} + \mu_4 GDP_{t-1} + \mu_5 RI_{t-1} + \mu_6 INF_{t-1} + \mu_7 BD_{t-1} + \mu_8 RT_{t-1} + \mu_9 FDI_{t-1} + \epsilon_j \dots \dots \dots (1)$$

Table 3 depicts that the calculated F-statistics value is neither positioned within the lower and upper critical bound values and nor lies below the lower critical bound value, therefore we have to accept the alternative hypothesis of cointegration and proceed with the following long run augmented neo-classical debt-investment model.

$$\Delta INV_t = \zeta_0 + \sum_{i=1}^n \zeta_1 \Delta INV_{t-1} + \sum_{i=0}^n \zeta_2 \Delta ED_{t-1} + \sum_{i=0}^n \zeta_3 \Delta DSP_{t-1} + \sum_{i=0}^n \zeta_4 \Delta GDP_{t-1} + \sum_{i=0}^n \zeta_5 \Delta RI_{t-1} + \sum_{i=0}^n \zeta_6 \Delta INF_{t-1} + \sum_{i=0}^n \zeta_7 \Delta BD_{t-1} + \sum_{i=0}^n \zeta_8 \Delta RT_{t-1} + \sum_{i=0}^n \zeta_9 \Delta FDI_{t-1} + \epsilon_j \dots \dots \dots (2)$$

Short run estimates of the model are calculated with the help of following ECM model.

$$\Delta INV_t = \mu_0 + \sum_{i=1}^n \mu_1 \Delta INV_{t-1} + \sum_{i=0}^n \mu_2 \Delta ED_{t-1} + \sum_{i=0}^n \mu_3 \Delta DSP_{t-1} + \sum_{i=0}^n \mu_4 \Delta GDP_{t-1} + \sum_{i=0}^n \mu_5 \Delta RI_{t-1} + \sum_{i=0}^n \mu_6 \Delta INF_{t-1} + \sum_{i=0}^n \mu_7 \Delta BD_{t-1} + \sum_{i=0}^n \mu_8 \Delta RT_{t-1} + \sum_{i=0}^n \mu_9 \Delta FDI_{t-1} + \gamma ECM_{t-1} + \epsilon_t \dots \dots \dots (3)$$

Table 1: Description of variables and data sources

Variable	Symbol	Definition / Unit	Source
Gross fixed capital formation	GFCF	GFCF as ratio of GDP	WDI (2020)
External debt	ED	ED as ratio of GDP	WDI (2020)
Debt Service Payment	DSP	DSP as ratio of Exports	WDI (2020)
Gross domestic product	GDP	Growth rate of GDP per capita	WDI (2020)
Rate of interest	RI	Annual Ri on bank loan	State Bank of Pakistan (2020)
Inflation	INF	Inflation (consumer price index)	WDI (2020)

External Debt and Public Investment			Minhaj, Azam, Tariq
Budget deficit	BD	Budget deficit as ratio of GDP	WDI (2020)
Real trade	RT	Real trade (X -M) as ratio of GDP	Economic Surveys of Pakistan (2020)
Foreign direct Investment	FDI	FDI as ratio of GDP	WDI (2020)

## Results and Discussion

### Unit Root Test

Stationarity of the variables is determined by ADF and PP tests. Table 2 presents that variables are stationary, hence the alternative hypothesis is accepted against the null hypothesis.

Table 2: Stationarity Test  
H<sub>0</sub> = Unit Root

Variables	ADF Test	ADF Test	PP Test	PP Test
	(With Intercept)	(With Intercept and Trend)	(With Intercept)	(With Intercept and Trend)
	t-Statistics and integration order	t-Statistics and integration order	t-Statistics and integration order	t-Statistics and integration order
GFCF	-6.217483* at I(1)	-6.130498* at I(1)	-6.220335* I(1)	-6.135635* I(1)
ED	-5.832706* at I(1)	-5.940715* at I(1)	-5.832634* I(1)	-5.940715* I(1)
DSP	-8.195969* at I(1)	-8.105803* at I(1)	-8.224658* I(1)	-8.173600* I(1)
GDP	-4.523104* at I(0)	-4.578666* at I(0)	-4.572288* I(0)	-4.523445* I(0)
RI	-4.345189* at I(1)	-4.304894* at I(1)	-4.388906* I(1)	-4.279837* I(1)
INF	-4.598922* at I(1)	-4.781286* at I(1)	-2.974576* I(1)	-2.945940* I(1)
BD	-5.522669* at I(0)	-6.107754* at I(0)	-5.520781* I(0)	-6.511650* I(0)
RT	-5.957353* at I(1)	-5.972209* at I(1)	-5.946491* I(1)	-5.962374* I(1)
FDI	-4.320573* at I(1)	-4.294399* at I(1)	-4.279900* I(1)	-4.250024* I(1)

\*denotes that all variables are significant at 1% level of significance

Table 3: F-Bound Test  
H<sub>0</sub>: No Cointegration

Calculated F-Statistic	F-Bound Test	
	Lower Bound	Upper Bound
	5.667276	
10 percent	1.92	2.89
5 percent	2.17	3.21
2.5 percent	2.43	3.51
1 percent	2.73	3.9

### Long Run Estimates

The estimates of stationarity tests and F-bound test suggest to use the ARDL bound test and discover the long run coefficients of the model. Table 4 depicts that all variables significantly determine the level of public investment in Pakistan. The estimates of external debt and debt servicing underline that one percent increase in these variables is causing 0.15 and 0.12 percent downfall in public investment, respectively. Hence, the results of this study confirm the conclusion of numerous studies that

debt overhang and debt crowding dilemmas are associated with external debt accumulation.

Table 4: Long-Run Estimates

Variable	Coefficient	t-Statistics	p-Values
ED	-0.154511	-5.992794	0.0003*
DSP	-0.126160	-6.019488	0.0003*
GDP	0.225492	2.752289	0.0250**
RI	-0.533798	-4.276681	0.0027*
INF	-0.153007	-4.677294	0.0016*
BD	-0.174074	-5.622262	0.0005*
RT	-0.227228	-3.798097	0.0053*
FDI	0.627574	3.804580	0.0052*
C	-7.523970	-3.533710	0.0077

\*, \*\* denote that variables are significant at 1% and 10% levels of significance

### Short Run Estimates

Table 5 indicates that the coefficient of ECM is negative and significantly different from zero. This value tells us that in response to an external shock, 51.3 percent of deviation will be corrected in the first year and the economy will take, approximately, two years to converge back to the long run equilibrium.

Table 5: Short Run Estimates

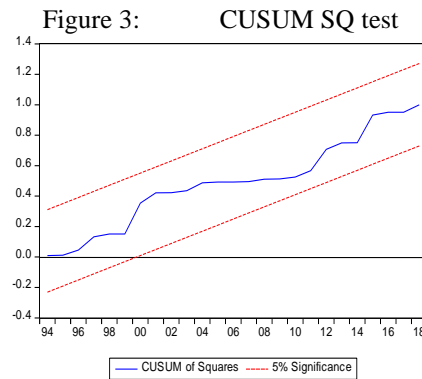
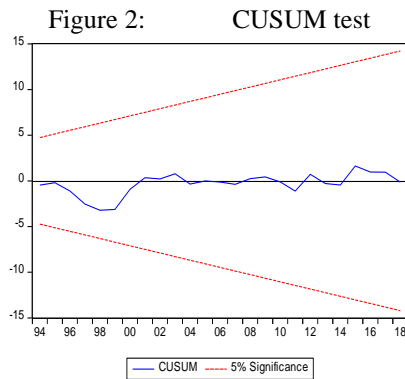
Variable	Coefficient	t-Statistics	p-Values
ECM (-1)	-0.513586	-5.107325	0.0000
ED (-1)	-0.063107	-2.366566	0.0244
DSP (-1)	-0.034376	-1.535535	0.0348
GDP (-1)	0.202255	3.284371	0.0025
RI (-1)	-0.037389	-0.62574	0.5394
INF (-1)	-0.041441	-1.825965	0.0775
BD (-1)	-0.020134	-0.873548	0.3891
RT (-1)	-0.022431	-0.541249	0.5922
FDI (-1)	0.447076	3.284371	0.0025
C	-0.135186	-2.123312	0.0418

### Diagnostic Tests

Different data diagnostic tests including Durbin-Watson test, BPG test, LM test, and Jarque-Bera test were also deployed in this study. The results of these tests are portrayed in Table 6. Stability of the model is tested with CUSUM and CUSUMSQ and the results are shown in Figure 2 and Figure 3, which demonstrate that there is no issue with the model as all parameters of the model are stable.

Table 6: Diagnostic Tests

Test	Diagnostic Tests		Decision
	Estimates	F-Statistics	
Durbin-Watson	2.892306	-----	No auto correlation
BPG (P-value)	-----	0.995800 (0.5472)	No serial correlation
LM (P-value)	-----	2.999234 (0.1975)	No heteroscedasticity
Jarque-Bera (P-value)	2.308296(0.315326)	-----	Normality is OK



**Concluding Remarks**

Intension of this study was to investigate the impact of debt indicators on the public investment in Pakistan over a period of 1976 to 2018. ARDL bound test, ECM test, and appropriate data diagnostic tests were utilized to investigate this issue. Conclusively, we found that; first, debt overhang effect is severely affecting the level of public investment, and second, external debt creates disincentives for public investment and causes crowding out effect. Based upon the research findings, this study concludes that debt overhang and debt crowding out effects are associated with external debt accumulation. Therefore, it is suggested that government should develop proper mechanism for curtailing the magnitude of external debt as it leads to increase the debt servicing liabilities and slip the economy into vicious circle of debt-trap. Enhancing the exports revenue, accelerating the economic productivity, and boosting the inflow of foreign direct investment are the channels for combating with the adverse effects of external debt.

**References**

Adegbite, E. O., Ayadi, F. S., & Ayadi, O. F. (2008). The impact of Nigeria's external debt on economic development. *International Journal of Emerging Markets*, 3(3), 285.

Akram, N. (2013). Empirical examination of debt and growth nexus in South Asian countries. *Asia-Pacific Development Journal*, 20(2), 29-52.



- Asante, Y. (2000). Determinants of private investment behavior in Ghana
- Awan, R. U., Anjum, A., and Rahim, S. (2015). An econometric analysis of the determinants of external debt in Pakistan. *British Journal of Economics, Management & Trade*, 5(4), 382-391.
- Azam, M., & Feng Y. (2017). Does military expenditure increase external debt? Evidence from Asia. *Defence and Peace Economics*, 5(28), 550-567.
- Borensztein, E. (1990). Debt overhang, debt reduction and investment: The case of the Philippines.
- Chaudhry, I. S., Malik, S., M. Ramzan (2009). Impact of external debt on saving and investment in Pakistan. *Journal of Quality and Technology Management*, V (II), 101-115.
- Daka, L., Kapena, S., Fandamu, H., & Phiri, C. (2017). The impact of external debt on Zambia's economic growth: an ARDL approach. *Journal of Economics and Sustainable Development*, 8(8), 55-68.
- Deshpande, A. (1997). The debt overhang and the disincentive to invest. *Journal of development Economics*, 52(1), 169-187.
- Economic Survey of Pakistan (2020). Government of Pakistan, Ministry of Finance, Islamabad.
- Ejigayehu, D. A. (2013). The effect of external debt on Economic Growth: A panel data analysis on the relationship between external debt and economic growth.
- Elbadawi, I., Ndulu, B. J., & Ndung'u, N. (1997). Debt overhang and economic growth in Sub-Saharan Africa. *External finance for low-income countries*, 49-76.
- Government of Pakistan (2020). Economic Survey of Pakistan. Ministry of Finance, Islamabad-Pakistan
- Hwang, J. T., Chung, C. P., & Wang, C. H. (2010). Debt overhang, financial sector development and economic growth. *Hitotsubashi Journal of Economics*, 51, 13-30.
- Iyoha, M. A. (1999). External debt and economic growth in sub-Saharan African countries: An econometric study.
- Krugman, P. R. (1988). *Market-based debt-reduction schemes* (No. w2587). National Bureau of Economic Research.
- Mabula, S., & Mutasa, F. (2019). The Effect of Public Debt on Private Investment in Tanzania. *African Journal of Economic Review*, 7(1), 109-135.
- Maureen, W. (2001). The impact of external debt on economic growth in Kenya: An empirical assessment. *Wider Discussion Paper, No 2001/116*

- Minhaj-ud-Din, Khan, M. A., & Tariq, M. (2020). External debt – blessing or curse: Empirical evidence from Pakistan. *International Journal of Economics and Financial Issues*, 10(4), 235-246.
- Nguyen, T. Q., Clements, M. B. J., & Bhattacharya, M. R. (2003). *External debt, public investment, and growth in low-income countries* (No. 3-249). International Monetary Fund.
- Picarelli, M. O., Vanlaer, W., & Marneffe, W. (2019). Does public debt produce a crowding out effect for public investment in the EU?
- Presbitero, A. F. (2005). The debt-growth nexus: A dynamic panel data estimation. *Rivista italiana degli economisti*, 11(3), 417-462.
- Rockerbie, D. W. (1994). Did the debt crisis cause the investment crisis? Further evidence. *Applied Economics*, 26(7), 731-738.
- Sanchez-Juarez, I., & Garcia-Almada, R. (2016). Public debt, public investment and economic growth in Mexico. *International Journal of Financial Studies*, 4(2), 1-14.
- Shabbir, S. (2013). Does external debt affect economic growth: Evidence from developing countries. *State Bank of Pakistan, Research Department*, 63.
- Sichula, M. (2012). Debt overhang and economic growth in HIPC countries: The case of Southern African development community (SADC). *International Journal of Economics and Finance*, 4(10), 82-92.
- State Bank of Pakistan (2020). Handbook of statistics on Pakistan economy (various issues)
- Warner, A. M. (1992). Did the debt crisis cause the investment crisis? *The quarterly journal of economics*, 107(4), 1161-1186.
- World Development Indicators (2020), the World Bank.