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The Effects of Public Debt on Economic Growth in Bangladesh: An Evidence from the ARDL Bound Testing Approach

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Abstract

Public debt is intended to bridge the gap between domestic savings and investment. This paper examines the effect of public debt on economic growth in Bangladesh using autoregressive distributed lag bound testing approach to cointegration. It finds a negative relationship between public debt and economic growth both in the short-run and the long-run. That is, a significant rise in the public debt in Bangladesh appears to be a burden for the economic growth controlling for other determinants of growth. The findings suggest that funds obtained through public debt are not utilized in the productive economic avenues which may improve the growth scenario in Bangladesh. Also, the adverse effect exerted by public debt may further be responsible for a reduction in investment and slower growth of capital stock, which eventually can hamper the labour productivity growth in the country in long run.

Keywords: Economic growth; Public debt; Gross capital formation; Debt service.

1. Introduction

"You cannot spend your way out of recession or borrow your way out of debt"
-Daniel Hannan[1]

Budget deficit due to high expenditure and fewer revenues is faced by almost all the governments. Governments can find a way to get revenue by increasing taxes, printing money, internal or external borrowing, or using previous budget surplus. When the government decides to finance the budget deficit by borrowing instead of introducing additional tax measures, it creates on itself a liability, known as government debt. This debt can be categorized as internal debt; which is owed to lenders within the country and external debt; which is owed to foreign lenders. As it turns out, foreign currency clauses are carried in because of these internally issued liabilities historically. In most developing countries after the 1980s, the major factors affecting the growth rate of output became the rate of debt accumulation and increased in debt servicing. Most of these developing countries, mainly as a result of insufficient exchange rate adjustments lost their competitiveness in the international market. Weakening of terms of trade, economic mismanagement, and the crisis of governance also further lower the growth rates, in the developing countries.

It might be beneficial for the country if the rate of return from debt is higher than the service payment rate and vice versa. Nowadays growing public debt is a worldwide phenomenon. For most of the economies, a common feature of the fiscal sector is internal debt. The part of the total government debt in a country that is owed to lenders within the country is internal debt or domestic debt. In Bangladesh, a major concern has long been for the policymakers of both fiscal and monetary authority is the issue of overall public debt. To achieve rapid economic growth after independence, Bangladesh assigned a leading role to the public debt, opted for economic planning on the consideration that it will be used for planned investment.

It is not considered a major problem per se by economists; rather the problem is the mismanagement and un-sustainability of the debt. Empirical findings support that if appropriate policies are in place and can be used to support conditional lending, where aid is tied to policy reform then only aid is effective. Both in the short-run and the long run, public debt has important influence over the economy. Debt can stimulate aggregate demand and output in the short run, but crowds out capital and reduces output in the long run, Elmendorf and Mankiw (1999) is the conventional view. A country's economic and financial position has an impact on the growth of the initial public debt vis-à-vis the rest of the world and that the currency composition of public debt also matters. When the Net

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[1] Daniel John Hannan is a British writer, journalist and politician who has been a Conservative Member of the European Parliament for South East England since 1999, and is the founding President of the Initiative for Free Trade.

Foreign Asset (NFA) position[2] is low or the portion of foreign-currency-denominated debt as a share of total public debt is high then the adverse impact of debt on growth is larger Kumar and Woo (2010). For the funds of internal debts, Commercial banks, other financial institutions, etc. constitute the sources.

External debt is the complement of internal debt. Whether external public debt increases or decreases, economic growth is a contentious issue. For different economic conditions, some researchers found positive, some negative and some found no significance between the relationship of external debt and economic growth. The total public and private debt owed to non-residents, repayable in foreign currency, goods, or service is called External debt. Most countries before 1914, financed themselves with foreign currency debt in the first wave of financial globalization. External debt owed to lenders outside the country is conceptually a part of the total debt in a country where the debtors can be the government, corporations, and citizens of that country. According to the International Monetary Fund (IMF), 'Gross external debt is the amount, at any given time, of disbursed and outstanding contractual liabilities of residents of a country to non-residents to repay principal, with or without interest, or to pay interest, with or without principal'. External debt in any economy is one of the major sources to finance capital formation. If external debt is used prudently in investment or development, then it is said to be an important and powerful financial tool of an economy. To fulfil the budget deficit can be mentioned as the basic reason to borrow public debt. The developing countries as well as international communities are encouraged to borrow from developed countries to boost their economic growth, facing a current account deficit. But the burden and dynamics of external debt may show significantly adverse impact to finance economic development in developing countries. If the debt servicing cost is low from the returns of the investment then it can enhance investment levels and increase growth rate in the economy and if the cost is high, the growth rate will be slow. In the case of Bangladesh, it borrows from internal and external sources to fill up various gaps like savings-investment gap, budget deficit, and so on. These debts are mainly borrowed to boost economic growth and for macroeconomic reasons like higher investment, higher consumption, education, health etc. Each year an expanded interest payment of its budget expenditure is imposed which impacts negatively on growth. Several developing countries in recent years, adopted aggressive policies aimed at collecting internal debt replacing it with the external debt. Also this has created another problem, the problem of a high and growing domestic debt. If the internal borrowing is in excessive term, then it can have severe implications on the economy. The associated interest rate will become higher than the external debt and will consume a significant part of government revenue more. This can also create a competition between the government and the private sector for private savings, resulting in a crowding-out effect in the private sector investment. This scenario is common in the developing countries like Bangladesh. Against this backdrop, the prime objective of this study is to assess the relationship between public debt and economic growth in Bangladesh. We emphasize finding out whether debt is a barrier or not for the economic growth in Bangladesh. The study uses an econometric approach to evaluate the nature of relationship debt shares with the economic growth in Bangladesh.

2. Theoretical Framework

The economic theories suggest that if utilized effectively and efficiently in the productive investment purposes, the borrowed money by a country can add value to the economic growth of that country. A large amount of external debt on the other hand may hurt the economic growth. The debt overhang theory[3] explains this irony. Crossing the threshold level of a country's repayment capacity from the accumulated debt amount causes the domestic and foreign investors to draw back their money; which will negatively affect the economic growth of the country. Most of the studies that have looked at the impact of external debt on economic growth in developing economies have been driven by this 'debt overhang' hypothesis which indicates that if the debt overhang is present then the future increase in the output is paid to the creditors in the form of debt servicing. The external debt plays the role of a tax on the future output. The burden of future debt services also captures the debt overhang effect. Reflecting on the degree of concessional loans, it takes net present value of debt (NPVD) instead of the face value and thus more accurately measures the expected burden of future debt-servicing across countries. For many developing countries, the extra earnings and rescheduling of existing debt led to an increase in domestic output and imports also.

3. Review of Literature

Government debt also known as public debt contrasts with the annual government budget deficit, which is a flow variable that equals the difference between government receipts and spending in a single year. The debt is the accumulation of all prior deficits measured at a specific point in time. Previous studies show the different impacts of these two debts in different regions.

Saifuddin (2016), observes that investment and economic growth are positively related to public debt in Bangladesh. The empirical findings of his paper also suggest that public debt has an indirect positive effect on growth through its positive influence on investment. Fosu (1996), finds the burden of debt on the level of investment is rather weak, the nature and hence productivity of investment undertaken is influenced adversely by debt. Ayadi and Ayadi (2008), confirm the negative impact of debt on growth in Nigeria and South Africa. According to Kumar and Woo (2010), high initial public debt is associated with slower subsequent economic growth which is found to be

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[2] The net foreign asset position of a country is the value of the assets that country owns abroad, minus the value of the domestic assets owned by foreigners.

[3] Debt overhang is the condition of an organization (for example, a business, government, or family) that has existing debt so great that it cannot easily borrow more money, even when that new borrowing is actually a good investment that would more than pay for itself.

significant and consistent controlling for other determinants of growth. It reduces investment and slows down the growth of capital stock, which on the other hand, results in a slowdown in labour productivity growth. Baum *et al.* (2012) find a short-run positive impact of debt on GDP growth and highly statistically significant but beyond public debt to GDP ratio of around 67%, it decreases to around zero and loses significance. If the debt to GDP ratio is above 95%, additional debt will hurt the economic activity. Reinhart and Rogoff (2010), observe that below a threshold of 90% of GDP, the relationship between government debt and real GDP growth is weak. For debt to GDP ratios above 90%, median growth rates fall by 1% and the average growth rate falls considerably more.

Rais and Anwar (2012), explore that in case of financing domestic budget deficit external financing is cheaper than the domestic financing. However, external financing can be significantly more expensive than the domestic financing under certain circumstances. Atique and Malik (2012), find a significant inverse relationship between domestic debt and economic growth and also between external debt and economic growth. Their results conclude that in comparison to domestic debt the negative effect of external debt is stronger on the growth of the economy. Adofu and Abula (2010), show that domestic debt negatively affects the growth of the economy. Putunoi and Mutuku (2013), investigate the effects of domestic debt on Kenya's economic growth. The study shows that domestic debt expansion in Kenya has a significant positive impact on economic growth. Maana *et al.* (2008), find a favourable shift in the domestic debt in the composition of Kenya's public debt, and also to the diversification of the investor base towards institutional investors and individuals. They also examine the effect of domestic debt on real output, resulting in an insignificant positive effect on economic growth during the period. Sheikh *et al.* (2010) indicate a positive effect of domestic debt on the economic growth in Pakistan. The findings of their study reveal that the negative impact of domestic debt servicing outweighs the positive impact of domestic debt on economic growth. The results of Aminu *et al.* (2013) reveal that in terms of per capita growth, domestic debt may, therefore, attribute a good performance in the economy and external debt is inimical to the progress of the country. The paper finds that if properly managed, domestic debts can lead to a high growth level.

Yeasmin and Chowdhury (2014), find in their paper that in Bangladesh there is a significant adverse effect of debt on growth. External debt service in Bangladesh is a burden and it makes the GDP slow down by 1.3%. Siddiqui and Malik (2001), find the impact of foreign debt to be is positive and statistically significant on economic growth. They also find that the contribution of investment is affected by the rise in debt servicing. Shah and Pervin (2012), find a long run significant negative effect of external public debt service and the positive effect of external public debt stock on GDP growth. In the long-run debt stock affects the economy somewhat positively and empirical result also provides the relevance of the supportive role of debt stock to economic growth. Clements *et al.* (2003) find that for highly indebted poor countries (HIPCs), per capita income growth will directly increase by about 1 percentage point per annum if there is a substantial reduction in the stock of external debt projected. Babu *et al.* (2014), investigate that in the East African Community (EAC), external debt has a negative significant effect on per capita GDP growth. Malik *et al.* (2010), find that economic growth will decline with the increase in external debt. Kasidi and Said (2013), reveal in their study that there is a significant impact of external debt and debt service on GDP growth. In their study, total external debt stock shows a positive effect, and debt service payment shows a negative effect on GDP growth.

4. Brief Review of the Economy of Bangladesh

Though Bangladesh has achieved significant success in various economic sectors since the independence in 1971, the inefficiency of state-owned enterprises has to some extent dampened the overall growth. A rapidly growing labour force that cannot be absorbed by the jobs generated each year, inadequate power supplies, and slow implementation of economic reforms can be identified as some major hindrance to achieve decent economic growth.

The economy of Bangladesh mainly depends on three sectors; namely, agriculture, industry, and service sectors. Still, a large portion of the population in the country depend on agricultural activities though its share in GDP is falling. Between 1960 to 2017 the sector has on average a share of 34.6 % in GDP, with a minimum of 13.41% in 2017 and a maximum of 61.95 % in 1975. The contribution of the industrial sector to the GDP in Bangladesh has outpaced the agricultural sector as the country adopted more liberalised trade and industrial policy. Industrial growth is mainly led by the readymade garments (RMG) sector which also creates new jobs each year for men and women with its steady expansion. Between 1960 to 2017 industrial sector has a share of 18.57% on average in the GDP with a minimum of 6.06% in 1972 and a maximum of 27.75 % in 2017. The service sector has the highest share in GDP in Bangladesh. Between 1960 to 2017 on average this sector has a 44.22 percent share in GDP with a minimum of 26.43 % in 1975 and a maximum of 53.71 % in 2015.

Table 1 reports a year-wise comparison of the total contribution (in percentage) of these three sectors to the GDP in Bangladesh. It's apparent that the agricultural sector has witnessed a sharp decline in terms of share in GDP over the years whereas both industrial and service sectors have registered a decent contribution to the GDP in the country.

Table-1. Contribution of Agriculture, Industry and Service Sectors to the GDP in Bangladesh

Years	GDP growth (Percentage)	Agriculture (Percentage)	Industry (Percentage)	Service (Percentage)
1986	4.17	32.37	20.38	45.08
1996	4.52	23.27	21.68	50.12
2006	6.67	18.03	24.10	52.74
2014	6.06	15.35	26.31	53.64
2017	7.28	13.41	27.75	53.48

Source: World Development Indicator (WDI) Database (2019)

5. Public Debt and GDP per Capita

As of 2019, Bangladesh's GDP per capita income is calculated to be $1,888 (nominal) and $4,992 (PPP) as per IMF data.

Figure-1. Public Debt Contribution to GDP per Capita
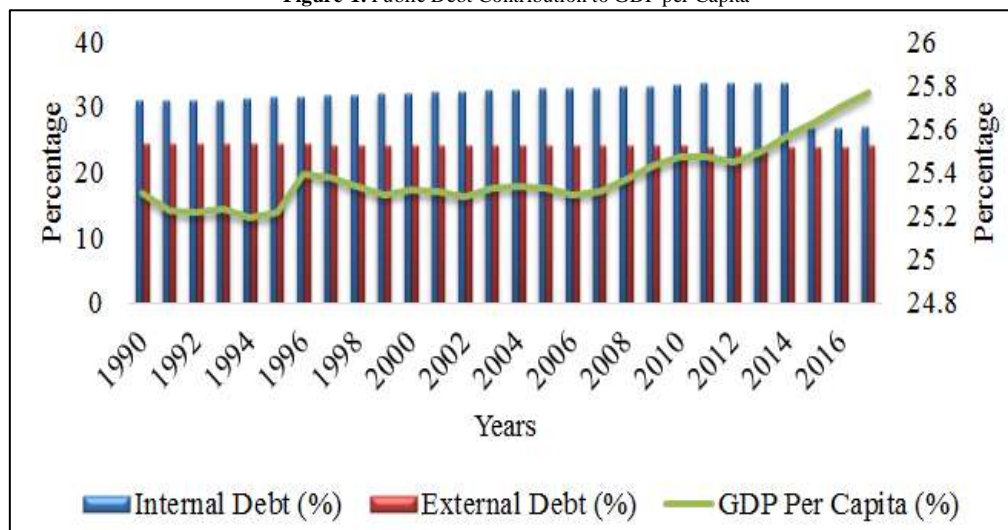
Source: World Development Indicator (WDI) Database (2019)

Public debt, also referred to as government debt; represents the total outstanding debt of a country's central government which can be raised both internally and externally. Internal debt is that part of the total debt that is owed to lenders within the country; that is the government borrows the money from its citizens. On the other hand, external debt is owed to creditors outside the country. The amount of money required over some time to repay debts is called debt service. Repayment of principal and interest, and lease payments are included in it. The service of repayment on borrowed funds from foreign lenders is usually called the debt service on external debt.

Figure-1 depicts the public debt scenario in Bangladesh. Since the early 1990s accumulation of public debt has been persistently rising with no major exception until 2015. This sudden dip in the public debt during 2015 can be attributed to the decline in internal debt. In 2015, internal debt as a percentage of GDP was 25.6% as opposed to 33.6% in 2014. External debt, on the other hand, appears to be the same in the whole sampling period. In 1990 external debt as a percentage of GDP was 24.3% and in 2017 it was 24.09%.

6. Data and Methodology

The real gross domestic product per capita which is one of the indicators of economic growth is taken as the dependent variable. Public debt (summation of external debt stocks and internal debt), gross capital formation, population growth rate, trade openness, inflation, and debt service on external debt are the independent variables. We seek to examine the effects of public debt on economic growth in an econometric framework. Our study uses secondary data. Our sampling period spans the year 1990-2017. Data for the key variables such as real gross domestic product per capita, debt service on external debt, inflation, gross capital formation, population growth rate, trade openness, external debt stocks, and internal debt are obtained from World Development Indicator (WDI) Database (2019) and Bangladesh Bank (2015). The internal debt is in crore taka, so it is converted to USD figure to match the unit of the other variables. To convert the data to USD value we have used the annual exchange rates of BDT for USD in the corresponding year. And, for real terms, the variables are multiplied by 100 and then divided by consumer price index (CPI) in the corresponding year.

For estimating the effect of public debt on economic growth, the key determinants of economic growth are identified. To examine the role of public debt on economic growth, we employ a time-series estimation procedure by employing an autoregressive distribution lag (ARDL) approach developed by Pesaran *et al.* (2001) to cointegration. The study to determine the optimal lag-length incorporated into the model, employs the Akaike Information Criteria (AIC).

There are some reasons for which the procedure is adopted in this study. First, the ARDL bound testing approach is simple as opposed to other multivariate cointegration techniques. Once the lag order is selected, it allows the cointegrating relationship to be estimated by OLS. Second, much of the recent studies indicate that the ARDL approach is more preferable in estimating the cointegration relation to other methods like Engle and Granger (1987) and Johansen and Juselius (1990) where the regressor must be of the same integrated level. The ARDL approach is more reliable as it is applicable irrespective of whether the underlying regressors are purely I (0), purely I (1), or mutually cointegrated. However, in the presence of I (2) series, the procedure will crash. Third, the ARDL approach unlike most of the conventional cointegration procedures, which are valid for large sample sizes, is more robust and performs well for small sample sizes.

7. Econometric Model Specification

The production function used here to explain the relationship between GDP growth and debt burden in Bangladesh is given in Cunningham (1993). The productivity of labour and the accumulation of capital is affected by the debt burden. So, including the debt burden in the production function is rational. In line with the previous studies and to analyse the impact of public debt on economic growth properly, the econometric model specification will include some control variables like inflation, debt service, gross capital formation, population growth rate, and trade openness. The following mathematical model is constructed for analysis:

$$lnGDP_t = \beta_0 + \beta_1 lnPD + \beta_2 INF + \beta_3 lnDS_t + \beta_4 lnGCF_t + \beta_5 POP_t + \beta_6 TO + \varepsilon \qquad 1$$

We employ an autoregressive distributed lag model (ARDL) approach to cointegration to estimate the model stated in equation 1. The following ARDL equation is first estimated:

$$\Delta lnGDP_t = \alpha_1 + \sum_{i=1}^{n} \delta_i \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \gamma_{1i} \Delta lnPD_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta INF_{t-i} + \sum_{i=0}^{n} \gamma_{3i} \Delta lnDS_{t-i}$$
$$+ \sum_{i=0}^{n} \gamma_{4i} \Delta lnGCF_{t-i} + \sum_{i=0}^{n} \gamma_{5i} \Delta POP_{t-i} + \sum_{i=0}^{n} \gamma_{6i} \Delta TO_{t-i} + \lambda_1 \, lnGDP_{t-1} + \lambda_2 \, lnPD_{t-1}$$
$$+ \lambda_3 \, INF_{t-1} + \lambda_4 \, lnDS_{t-1} + \lambda_5 \, lnGCF_{t-1} + \lambda_6 \, POP_{t-1} + \lambda_7 \, TO_{t-1} + \varepsilon_t \qquad 2$$

Where GDP is real gross domestic product per capita in Bangladesh; PD is public debt; INF is CPI inflation rate; DS is debt service on external debt; GCF is gross capital formation; POP is total population growth rate; TO is trade openness and ε is a stochastic error term. Here, ln denotes the natural logarithm of the corresponding variables. At first, equation 2 is estimated to compute F-statistic that will be compared with two sets of critical F-statistic called lower bound I(0) and upper bound I(1). The null hypothesis related to the cointegration test is $H_o : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ indicating no cointegration among the variables and the alternative hypothesis is $H_a : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq 0$ indicating cointegration among the variables. If the F-statistics exceeds the upper critical values, the null hypothesis indicating no long run relationship can be rejected, whereas if the test statistics falls below the lower bound of critical values, the null hypothesis cannot be rejected indicating no long run relationship among the variables. If the calculated value lies between lower and upper bounds, the decision about the cointegration becomes inconclusive (Pesaran *et al.*, 2001). Upon having favourable results from the cointegration test the following long run or level form equation is estimated.

$$lnGDP_t = \theta_1 + \sum_{i=1}^{n} \beta_{1i} \, lnGDP_{t-i} + \sum_{i=0}^{n} \beta_{2i} \, lnPD_{t-i} + \sum_{i=0}^{n} \beta_{3i} \, INF_{t-i} + \sum_{i=0}^{n} \beta_{4i} \, lnDS_{t-i}$$
$$+ \sum_{i=0}^{n} \beta_{5i} \, lnGCF_{t-i} + \sum_{i=0}^{n} \beta_{6i} \, POP_{t-i} + \sum_{i=0}^{n} \beta_{7i} \, TO_{t-i} + v_{2t} \qquad 3$$

Equation 4 provides the short-run dynamics of the variables of interest.

$$\Delta lnGDP_t = \mu_0 + \sum_{i=1}^{n} \delta_i \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \gamma_{1i} \Delta lnPD_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta INF_{t-i} + \sum_{i=0}^{n} \gamma_{3i} \Delta lnDS_{t-i}$$
$$+ \sum_{i=0}^{n} \gamma_{4i} \Delta lnGCF_{t-i} + \sum_{i=0}^{n} \gamma_{5i} \Delta POP_{t-1} + \sum_{i=0}^{n} \gamma_{6i} \Delta TO_{t-i} + \varphi_1 \, ECM_{t-1} + v_{3t} \qquad 4$$

Here, the coefficient of error-correction term (ECM) denotes speed of adjustment. That is, it shows how much of the disequilibrium from the previous period gets corrected in each period to make the model converge to the long run equilibrium. The estimated coefficient on *ECM* must be statistically significant and negative.

8. Empirical Results and Discussions

We test for the stationarity of the selected time series data before proceeding with the ARDL bound test. This is to ensure that the variables are not stationary at an order of I (2) since the computed F-statistics provided by Pesaran *et al.* (2001) are valid only when the variables are I (0) or I (1). Here, to test for the presence of unit roots we have made use of augmented Dickey-Fuller and Phillips-Perron test.

Results from the table 2 show that all the variables except INF are non-stationary at levels. Having found this, the next step is to perform stationarity tests on the variables after taking their first difference.

The results reported in table 2, show that after differencing once, all the variables have become stationary. It is therefore, worth concluding that all the variables used in this study are integrated of order one I (1) except INF, which is stationary at level or I (0). Therefore, the autoregressive distributed lag (ARDL) approach to co-integration is appropriate in this study.

Table-2. Unit Root Test Results

Variables	ADF Statistics	1% Critical Value	5% Critical Value	PP Statistics	1% Critical Value	5% Critical Value
$lnGDP_t$	1.10	-3.74	-2.99	1.78	-3.70	-2.98
$\Delta lnGDP_t$	-3.86	-3.72	-2.99	-4.11	-3.71	-2.98
$lnPD_t$	-1.36	-3.70	-2.98	-1.47	-3.70	-2.98
$\Delta lnPD_t$	-5.00	-3.71	-2.98	-5.00	-3.71	-2.98
INF_t	-4.00	-3.70	-2.98	-4.00	-3.70	-2.98
$lnDS_t$	0.13	-3.70	-2.98	0.13	-3.70	-2.98
$\Delta lnDS_t$	-6.41	-3.71	-2.98	-6.41	-3.71	-2.98
$lnGCF_t$	0.35	-3.72	-2.99	0.86	-3.70	-2.98
$\Delta lnGCF_t$	-4.23	-3.72	-2.99	-4.26	-3.71	-2.98
POP	-1.36	-3.74	-2.99	-1.20	-3.70	-2.98
ΔPOP	-3.92	-3.81	-3.02	-1.95	-3.71	-2.98
TO	-1.62	-3.70	-2.98	-1.63	-3.70	-2.98
ΔTO	-4.42	-3.71	-2.98	-4.42	-3.71	-2.98

Findings of the unit root tests allows us to estimate equation 2 to check for the existence of a long run relationship or cointegration among variables. We keep the maximum lag orders in our model to two i.e. i=2 as all the series involved here are annual. The optimal number of lags are selected based on the Akaike info criterion (AIC). The lag order that minimizes the AIC is ARDL (2, 2, 2, 2, 2, 0, 2).

Table-3. F-Bounds Test for Cointegration Relationship

Null Hypothesis: No levels relationship				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	10.55838	10%	2.12	3.23
		5%	2.45	3.61
k	6	2.5%	2.75	3.99
		1%	3.15	4.43

The calculated F-statistic and critical values of lower and upper bounds are reported in the table 3. The computed F-statistic (10.55838) is higher than the upper bound critical value I (1) at the 1% significance level, implying that the null hypothesis of 'no cointegration' cannot be accepted. That is, there exists a long-run cointegrating relationship among the variables considered in this study.

8.1. Long Run Model Estimation

The confirmation on the existence of cointegration allows us to estimate the long run or level form equation. The long-run estimates of the model are reported in the table 4. The results indicate that *lnPD* has a significant and negative effect on the economic growth in Bangladesh.

Table-4. Long run model for Public Debt-Growth relationship

Dependent variable: *lnGDP*	
Variables	Coefficient (Std. Error)
lnPD	-0.026362*** (0.006535)
INF	0.003826 (0.002948)
lnDS	0.096362 (0.052429)
lnGCF	0.172255*** (0.053296)
POP	-0.043273 (0.043888)
TO	0.005366 (0.004510)

*** Significant at 1% and below

The long-run elasticity is -0.03 which implies that a 1% increase in public debt leads to a 0.03% reduction in the economic growth. Adofu and Abula (2010), Fosu (1996), Kumar and Woo (2010) and Rais and Anwar (2012) also find a negative relationship between public debt and economic growth. One reason behind this negative relationship may be the fact that these debts are issued for non-production purposes and are mainly used for consumption. Gross capital formation is found to have a positive significant effect on the economic growth. Debt service registers a

positive yet insignificant effect on the economic growth in the country. The coefficients on inflation rate and trade openness also register an insignificant effect on the economic growth in Bangladesh.

8.2. Short Run Model Estimation

In the estimation of public debt-growth relationship, it is also relevant to estimate the short run model. To maintain the long run relationship, the short run change is necessary (Boef, 2001). The short run estimates of the model are presented in the table 5.

The short run estimates of the coefficient on the public debt is also found to exert a negative effect on the economic growth in Bangladesh. That is, a 10% increase in the public debt will reduce the economic growth in Bangladesh by 0.013% although the coefficient is significant below the 10% level. The short-run effect of public debt on the economic growth is apparently less pernicious than that of the long-run. Debt service also exerts a negative short-run effect on the economic growth in Bangladesh. The same result is obtained for this variable lagged by one period. Both of the coefficients on debt service are highly significant at the 1% level. The ECM term that signifies the speed of adjustment of the model is negative and significant at the 1% level. The negative sign confirms that the model converges to the long-run equilibrium. The estimated coefficient on the ECM is -0.3454, suggesting a deviation from the long-run equilibrium following a shock is corrected by about 34.5% in each period. More intuitively, the system requires about 2.9 years to get back to the long run equilibrium once shocked.

Table-5. Short-run estimation

Dependent Variable: $\Delta lnGDP_t$			
	Coefficient	**t-Statistic**	**p-value**
$constant$	6.892986	11.71806	0.0000
$\Delta lnGDP_{t-1}$	0.270762	3.98379	0.0053
$\Delta lnPD_t$	-0.00132	-1.94195	0.0933
$\Delta lnPD_{t-1}$	0.004758	6.266676	0.0004
$\Delta lnDS_t$	-0.02516	-3.6216	0.0085
$\Delta lnDS_{t-1}$	-0.03372	-3.85793	0.0062
$\Delta lnGCF_t$	0.696082	28.00359	0.0000
$\Delta lnGCF_{t-1}$	-0.18113	-2.88957	0.0233
ΔTO_t	-0.00059	-1.77527	0.1191
ΔTO_{t-1}	-0.0022	-5.38988	0.001
ΔINF_t	0.000643	1.619177	0.1494
ΔINF_{t-1}	-0.00135	-4.67928	0.0023
ECT_{t-1}	-0.34539	-11.7158	0.0000

8.3. Stability Test Results

Finally, to check the structural stability of the long run parameters together with the short run movements, the CUSUM and CUSUMSQ tests are conducted and plotted.

Figure-2. CUSUM and CUSUMQ tests of stability
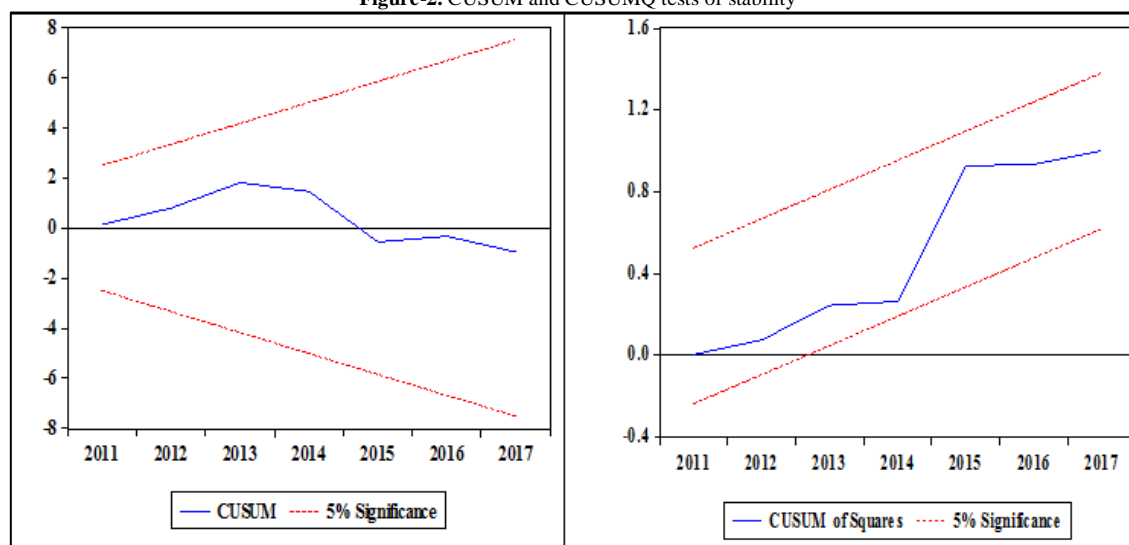
The test results suggest that all the coefficients in the given regression will be stable if the plots of the CUSUM and CUSUMSQ residuals stay within the critical bounds of 5% level of significance. As per the plots in the figure 3 both CUSUM and CUSUMSQ statistics are well within the 5% critical bounds thus confirming the stability of the short run and long run coefficients in the ARDL models.

9. Conclusion

The study finds that debt negatively affects economic growth in Bangladesh in the long run. This implies that the funds generated through domestic borrowing have not been used properly especially, in financing the expenditures of government, which contribute to the growth of GDP. This indicates the need for an effective debt management policy in Bangladesh. If the government finances its budget deficit by improving the present revenue base rather than from domestic borrowing, more resources can be preserved for the generations to come.

Debt is needed for the development and growth in Bangladesh but it is urgent to be more concerned about its utilisation. Aid or debt is some form of tax on future generations and source of benefits for the present generation, since it will be paid back by increasing tax in the future. Many international and domestic organizations suggest that debt cancellation is a must for Bangladesh. To alleviate the negative effect of public debt on the economy Bangladesh should pay attention to her citizen's development. Bangladesh is a low-income country and doesn't have additional resources to pay for the debt service. Service to the external debt has become a great burden for the country. Policies must be formed to reduce borrowing from external sources. Additionally, the basic needs of people should be ensured along with equal distribution of resources, poverty reduction, achieving SDGs to name a few. Some policies can be undertaken and favourable environment may be created for attracting FDI. In order to ensure the success of the domestic borrowing program, the government should maintain confidence in the financial markets through effective fiscal policy.

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