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Public Debt and Economic Growth in Bangladesh: Evidence from Granger Causality

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Abstract: Whether the public debt is disastrous for accelerating economic growth in a developing country is an important empirical question in the present world. In order to analyzing the dynamic relationship between public debt and economic growth in Bangladesh, yearly data of Real GDP and external debt outstanding from 1970 to 2016 have been covered in this study. In this regard, multivariate time series techniques have been employed and it is found that public debt is cointegrated with economic growth in Bangladesh. This study finds a short-run as well as the long-run association between the economic growth and the public debt. Moreover, the results of this study also uncover that public debt causes the economic growth in Bangladesh. However, government should be careful of spending money and once prepares the deficit budget, reduce the dependency on the public debt, especially on the external sources.

Introduction

Having a significant amount of public debt is the common phenomenon of the least developed and developing countries in the present world. Most of these countries undertake deficit budget policy by thinking that this policy will in turn provide a greater benefit by accelerating economic activities. In order to financing the deficit budget, normally government of these countries rely on debt, and as a consequence public debt is increasing day by day. Bangladesh, which just overcomes its status from the least developed countries, is not an exception from this. Borrowing from the other countries is not always bad, rather economic theory advocates that moderate borrowing to cover deficit budget is good for an economy (Pereira, 2000). When the government uses these loans to promote economic growth by investing more in education and heath to build a strong human capital base, in infrastructure, roads and highway, in social development, etc. then the country will enjoy the benefit of the public debt by eradicating poverty (Amakom, 2003) and enhancing individual well-being.

Bangladesh is a population abundant country with scarce resources so that it has to dependent on borrowing from other countries to cover the deficit budget. In the literature, a debate exits on whether it is good or bad to borrow from other. One group believes that persistent deficit budget sometimes fall the country into debt trap so that economic activities will stuck down as a result of high public debt (Islam and Biswas, 2005). This happens because in order to pay the interest of the debt government later increases taxes and VAT significantly that effects the purchasing power of the people. Another group supports the borrowing policy to cover the budget deficit, as they believe that when government becomes unable to cover the deficit budget from taxes and revenues then borrowing money becomes the available option to continue economic growth and development. But it is important that from where government borrow the money to cover the deficit budget. Because, if government take loans from the local bank then it will create an upward pressure on the interest rate so that the domestic investment will decline as a result of crowding out effect with high interest rate.

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Basically, government can finance the deficit budget from four sources- (1) it can print new money, (2) it can borrow from domestic sources, (3) it can borrow from foreign sources, and (4) it can run down the foreign exchange reserves. Although Bangladesh has been using all these four options, borrowing from the domestic sources and foreign sources are still prominent. In this context, this study is an attempt to uncover the fact that whether public debt is good for accelerating the economic growth of Bangladesh or not.

Literature Review

A large number of studies had been conducted to identify the impact of public debt burden on the economic growth of a country throughout the world. In Bangladesh a several number of research studies had been done on the sustainability of public debt burden and on the crowding out effect.

Fosu (1996) examined the data of 13 severely indebted countries, "Zambia, Venezuela, Sierra Leone, Philippines, Peru, Morocco, Mexico, Kenya, Honduras, Egypt, Ivory Coast, Argentina and Algeria" by taking the data from 1971 to 1991. His study was employed OLS method on panel data and found that investment is inversely related to public debt. Using the yearly data of Pakistan from 1981 to 2008, Qureshi & Ali (2010) also found that public debt negatively affect the economy. Study of Hyman (2007), which was conducted by covering six Caribbean countries, also supports the conclusion that high debt deteriorate economic growth. Moreover, by using the yearly data of Egypt from 1981 to 2006, El-Mahdy & Torayeh (2009) also found that public debt causes to deteriorate economic growth in Egypt, and using the annual data of Nigeria from 1970 to 2007, Ogunmuyiwa (2011) no causality between these two. Study of Chowdhury (2006) also found the evidence on "Bulow–Rogoff's proposition" that the external debts of developing countries are not a primary cause of economic slowdown.

According to a study of International Monetary Fund (2008), "Bangladesh's risk of debt distress is low based on external debt indicators. Bangladesh's external debt burden indicators do not breach the relevant policy-dependent indicative thresholds under the baseline scenario and exhibit only a marginal breach under the stress tests. Debt burden indicators are significantly worse when domestic debt is included. Accordingly, this analysis reveals a more elevated risk of debt distress on public debt compared to results based solely on external debt. Staffs will monitor closely the evolution of domestic debt and the government's ability to mobilize domestic resources".

Study of Majumber (2007) tried to analyze whether public borrowing of Bangladesh crowding-out private investment by employing multivariate time series techniques and found that instead of crowing-out, actually crowding-in effect exists in the context of Bangladesh, which implied increasing private investment consistent with increasing public debt.

Islam and Biswas (2005) revealed that debt-GDP ratio is sustainable in Bangladesh. Another empirical study on the debt sustainability of Bangladesh, made by Islam (2007), shows that "the differential between growth and interest rate, reduction in primary deficit, export growth and improvement of current account balance have stronger influence in changing the overall public debt-GDP and external debt-export ratios. The current debt level appears sustainable in Bangladesh. The paper suggests that either the interest rate on

debt or GDP growth needs to be maintained at levels such that the GDP growth- real interest rate differential may increase further". According to Asian Development Bank (ADB), "An excessive level of public debt can make a nation vulnerable to interruption in aid flows or to sudden shifts in domestic financial market conditions. These problems are aggravated by a narrow export and production base and various structural, political, and institutional factors that reduce returns on investment" (ADB 2005). However, "the impact of public debt on investment and other economic indicators vary depending on a country's extent of indebtness" (Hashibul and Tahmina, 2012).

Budget Balance and Financing for Bangladesh

A clear guideline is provided by the "Public Money and Budget Management Act 2009" to maintain the budget deficit to a sustainable level. Therefore, government is conscious to keep the budget deficit within 5 percent of GDP. Table 1 shows the data of overall budget balance and financing of last few years:

Table 1: Overall Budget Balance and Financing

(As Percent of GDP)

Budget Balance/ financing	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Overall budget balance (excluding foreign grants)	-3.5	-3.9	-4.0	-4.4	-4.1	-4.4	-5.0	-5.0	-5.0
Overall budget balance (including foreign grants)	-2.8	-3.4	-3.6	-4.0	-3.6	-4.0	-4.7	-4.7	-4.8
Net domestic financing	2.0	2.2	3.3	33	2.7	3.0	3.6	3.6	3.5
Net foreign financing (excluding grants)	0.8	1.3	0.4	0.7	1.0	0.9	1.1	1.5	1.4
Net foreign financing(including grants)	1.5	1.7	0.7	1.1	1.4	1.4	1.4	1.8	2.2

Source: Finance Division, M/O Finance and BBS. (Various issues of the Budget in Brief). Base year of GDP 2005-06.

Public Debt Management

The Government borrows from both domestic and external sources to meet the budget deficit in Bangladesh. Data on government domestic borrowing from different sources that the Government has paid back Tk.18,405 crore to the banking system in FY2016-17. On the other hand, in FY2015-16 the Government borrowed Tk.2,814.8 crore from the banking system. Besides, the Government borrowed Tk.53,689.2 crore from non-bank sources in FY2016-17. Therefore, the total government borrowing (net) from the domestic sources stood at Tk.35,284.2 crore in FY2016-17, which is 4.92 percent lower compared to FY2015-16.

Government Borrowing from External Sources

The budget of recent years shows a trend of steady decline of dependence on external assistance. But principal and interest repayment for received loans by Bangladesh is gradually increasing. Analyzing data from external sources, it is seen that in FY2016-17 amount of foreign resources stood at US$3,531 million which is 0.93 percent less than the receipt of US$3,564 million of previous fiscal year. At that time repayment of principal and interest was US$1,144 million which was 8.21 percent more than the

previous fiscal year. Compared to FY2015-16, disbursement of FY2016-17 has decreased by 0.87 percent. On the other hand, debt service (principal and interest) expenditure of FY2016-17 has increased by US$94 million compared to last fiscal year. As a result, net external assistance flow (after deducting principal and interest payment) in FY2016-17 has decreased by US$127 million compared to last fiscal year (Bangladesh Economic Review, 2017).

Methodology

Data Description and Sources

Using annual data from 1974 to 2016, this study has investigated the dynamic relationship between public debt and economic growth in Bangladesh. To represent economic growth, the real GDP (RGDP) is used, and external debt outstanding is used to represent public debt, while these data are collected from World Development Indicators (WDI). Some secondary data are also collected from Bangladesh Bureau of Statistics, and Bangladesh Economic Review.

Table 2: Statistical features of the variables in log level

	LNGDP	LND
Mean	24.48971	23.03250
Median	24.46033	23.42689
Maximum	26.21363	24.07548
Minimum	22.99034	20.03212
Std. Dev.	0.863490	0.940139
Skewness	0.262369	-1.399219
Kurtosis	2.174713	4.395196
Jarque-Bera	1.753490	17.92603
Probability	0.416135	0.000128
Sum	1077.547	1013.430
Sum Sq. Dev.	32.06142	38.00601
Observations	44	44

Summary statistics of the natural log of RGDP (LNGDP) and natural log of debt (LND) are decorated in Table-2, from where it is observed that the mean of LNRGDP is 24.48971 (with +/- 0.863490) and the mean of LND is 23.03250 (with +/- 0.940139). The "Jarque-Bera (JB)" statistic for the LNGDP is 1.753490 with the probability of 0.416135 (greater than 0.05). The p-value indicates here that the null hypothesis is true and LNGDP is distributed normally. Now, the JB statistic for the LND is 17.92603 and the p-value is 0.000128 (less than 0.05), which indicates that LND is not normally distributed.

The graph for this data set at the level form are illustrated in Figure-1. It is clear that the variables are moving together and upwards trending for the economy of Bangladesh.

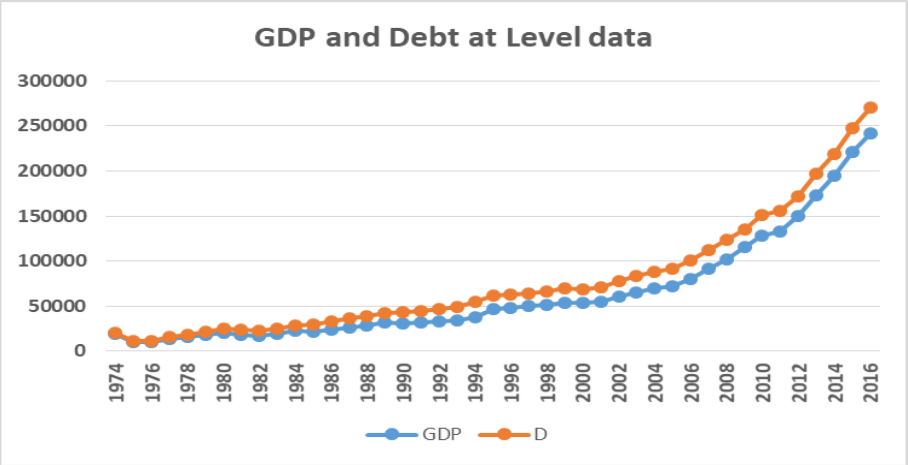

Figure 1: Level form of the selected variables

Specification of Model

This study applies the method of "Granger causality test" and the "Vector Autoregressive Model (VAR)" to estimate the effects of public borrowing on economic growth in Bangladesh. In order to test the causal relationships, the following model is specified:

$$RGDP = f(PD) \qquad (1)$$

Where *RGDP* = Real gross domestic product; and *PD* = Public debt. Public borrowing can be further specified as follow:

$$PD = f(EXTD, DD) \qquad (2)$$

Where *EXTD* = External debt outstanding; *DD* = Domestic debt; and for this paper to capture the stated objective, equation (1) for public debt-growth nexus is represented in a VAR model as:

$$RGDP_t = a_{10} + \sum_{j=1}^{k} a_{1j} RGDP_{t-j} + \sum_{j=1}^{k} b_{1j} PD_{t-j} + u_t \qquad (3)$$

$$PD_t = a_{20} + \sum_{j=1}^{k} a_{2j} PD_{t-j} + \sum_{j=1}^{k} b_{2j} RGDP_{t-j} + u_t \qquad (4)$$

Where: $RGDP_t$ = Proxy for economic growth

PD_t = Debt outstanding as a proxy for public debt

u_t = A zero mean white noise error term

For this paper to examine whether domestic or external debt that promotes economic growth, we disaggregate public debt into external debt and domestic debt.

Testing for Unit Root: The ADF test

This study applies the "Augmented Dickey Fuller (ADF)" test to investigate the unit root property of individual time series. The ADF test essentially runs the following regression:

$$\Delta y = \beta_1 + \lambda y_{t-1} + \delta_i \sum_{i=1}^{n} \Delta y_{t-i} + u_i \qquad (5)$$

In equation 5, *Y* represents any time series variable under consideration, RGDP or PD, while Δy denotes first difference of the variable under investigation. Again, *u* is a white noise error term and *n* refers to number of lags chosen. The ADF test evaluates the hypothesis H_0: $\lambda = 0$, implying the time series has unit root. Rejection of H_0: $\lambda = 0$ reveals that the series is stationary, although series may become stationary in levels or in other higher orders.

Table 3: The results of ADF and Phillips and Perron tests are presented below

Variable	ADF		Phillips-Perron	
	Level	First Difference	Level	First Difference
GDP	3.1951	-6.8989*	6.6287	-6.8283*
Debt	1.7126	-4.0064*	2.4589	-5.3236*

* indicates at 1% level of significance

Table 3 shows that the time series are nonstationary i.e. *I(0)* at their levels, while first difference makes them stationary. That is each of the series Debt and GDP are integrated of order 1, *I(1)*.

Cointegration Test

This study relies on the Johansen cointegration test to check the long-run association of the variables. Results are tabulated in Table 4.

Table 4: Results of multivariate cointegration tests

Maximum rank	Eigenvalue	Trace statistic	Critical value	Max Statistic	Critical value
None*	0.475239	28.30899	15.49471	27.08213	14.26460
At most 1	0.28788	1.226858	3.841466	1.226858	3.841466

From Table 4, the trace-statistic and max-statistic tests of Johansen and Juselius (1991) suggest that the considered time series are cointegrated. This implies that there is stable long-run relationship between GDP and debt outstanding (PD) in Bangladesh. As the series are integrated in a same order i. e. *I(1)* , which confirms from the previous section, we may use the Vector Error Correction (VEC) model for the variables.

Testing for Causality:

To detect the nature of causality this study applies the "Granger causality test" (Granger, 1969) and the results are tabulated in Table 5.

Table 5: Granger Causality tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LNPD does not Granger Cause LNGDP	42	19.7039*	0.00007
LNGDP does not Granger Cause LNPD		0.99277	0.3252

In the Table 5, there is a unidirectional causality identified from debt outstanding (D) to GDP implies that the debt outstanding for the economy affects the economic growth for Bangladesh economy in the long run. The expansion in debt for the economy causes the burden for us and we have to pay the debt services for it, squeezes the economic activities and hamper the economic growth.

Vector Error Correction Model

To examine the short-run dynamic relationship between economic growth and public debt, Vector Error Correction Model (VECM) will be incorporated. The results of the unrestricted VECMs considering up to *1* lag for both economic growth and public debt are tabulated in Table 6.

Table 6: Vector Error Correction Estimates

Standard errors in ( ) & t-statistics in [ ]		
Error Correction:	D(LNGDP)	D(LND)
CointEq1	-0.001985	0.072643
	(0.02083)	(0.01248)
	[-0.09534]	[5.82129]
D(LNGDP(-1))	-0.190628	0.090163
	(0.11920)	(0.07143)
	[-1.59920]	[1.26229]
D(LND(-1))	-0.527218	-0.131700
	(0.20492)	(0.12279)
	[-2.57278]	[-1.07254]
C	0.122824	0.086694
	(0.02740)	(0.01642)
	[4.48314]	[5.28080]
R-squared	0.358759	0.647943
Adj. R-squared	0.308135	0.620149
Sum sq. residuals	0.477647	0.171507
S.E. equation	0.112114	0.067181
F-statistic	7.086706	23.31238
Log likelihood	34.41220	55.92136
Akaike AIC	-1.448200	-2.472446
Schwarz SC	-1.282708	-2.306953

On the above table, CointEq1 is the error correcting term of the system and as it is negative and statistically significant, it indicates that this term is adjusting the error of the system.

From table 6 it is evident that public debt is negatively affecting the country's GDP growth, which is statistically significant at less than 5 percent level. This indicates public debt is a barrier for the GDP growth. It however, the existence of crowding out effect cannot be inferred with certainty as it is out of the scope of the model used in this study. When government faces crisis in funding, it is obvious and logical to cut the subsidy amount. These findings are only valid for short term and comply with the previous findings partly.

Recommendations and Conclusion:

In order to financing the deficit budget, normally government of the developing countries rely on debt, and as a consequence public debt is increasing day by day. Bangladesh, which just overcomes its status from the least developed countries, is not an exception from this. Borrowing from the other countries is not always bad, rather economic theory advocates that moderate borrowing to cover deficit budget is good for an economy (Pereira, 2000). When the government uses these loans to promote economic growth by investing more in education and heath to build a strong human capital base, in infrastructure, roads and highway, in social development, etc. then the country will enjoy the benefit of the public debt by eradicating poverty (Amakom, 2003) and enhancing individual well-being. In order to analyzing the dynamic relationship between public debt and economic growth in Bangladesh, yearly data of Real GDP and external debt outstanding from 1970 to 2016 have been covered in this study. In this regard, multivariate time series techniques have been employed and it is found that public debt is cointegrated with economic growth in Bangladesh. This study finds a short-run as well as the long-run association between the economic growth and the public debt. Moreover, the results of this study also uncover that public debt causes the economic growth in Bangladesh. However, government should be careful of spending money and once prepares the deficit budget, reduce the dependency on the public debt, especially on the external sources.

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