EXTERNAL PUBLIC DEBT: IS IT A BOON OR BANE FOR BANGLADESH?

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Abstract: This work tries to analyze the effect of external public debt on the economy of Bangladesh with the help of debt overhang effect and crowding out effect. The data set used for this purpose ranging from 1982-2016. The debt overhang theory was firstly used by Krugman and later supported by other authors. For the case of crowding out effect, there are two popular views, the classical view and the Keynesian view. The finding of this works shows that the existence of debt overhang effect and the crowding out effect for the case of external public debt for the case of Bangladesh. For the case of other explanatory variables in these two model most of the variables are showing expected results. This is a time series work. Firstly the unit root property of the variables are checked followed by determining appropriate lag and Johansen cointegration test. Based on cointegration test results VECM has been used.

Keywords- Unitroot, Cointegration, VECM, OLS, Debt Overhang, Crowding out, Bangladesh.

I. INTRODUCTION

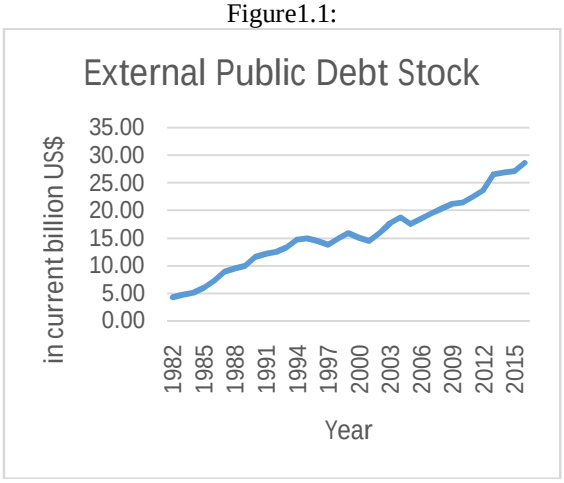
External debt can be defined as a part of the total debt in a country that owed to lenders outside the country. Government of other countries, international organizations or international financial institutions can be the creditors. External debt can be an important tool if it is invested efficiently for the development of a country. When the returns of investment from the external debt is higher than the debt servicing cost then it can increase growth rate in economy. On the other side, if returns from investment is lower than debt servicing cost then it can affect adversely towards the growth.

Generally the developing countries are facing deficit in financing their development program which force them to borrow from domestic and international sources. Generally domestic sources are not sufficient fulfill the deficit and they have to borrow from outside sources like developed countries, international organizations and financial institutions. This study covers the part of external sources. Debt from the external sources are generally used to stimulate economic growth by reducing the deficit and investing in more development programs like education, health, infrastructure etc.

On the other side external debt can also affect economic growth and other economic variables adversely if debt burden is very high. This high debt burden work as a constraint for government to take its planning properly. Also there are restrictions from the debt providing institutions.

Like other developing countries Bangladesh is no other exception. Bangladesh also facing huge deficit on her development program. There are two broad sources of financing the deficit; (i) domestic sources and (ii) external sources. Domestic sources are not sufficient for Bangladesh. In that case Bangladesh have no other option to take loan from the external sources. External public debt stocks from 1982 to 2016 can be shown by the following graph:

Figure1.1:



Data source: World Development Indicators

1.1 Sources of External Public Debt

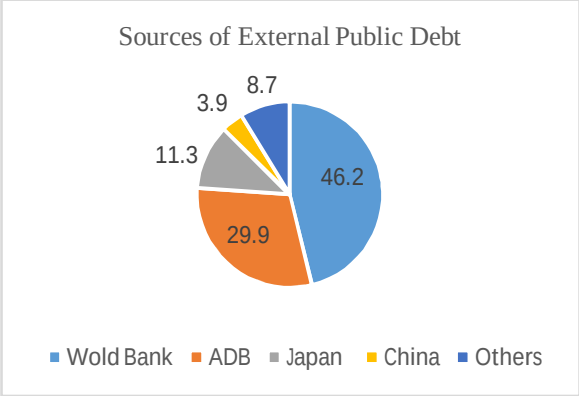
At the end of the Fiscal Year 2016 the external public debt stock was 13 percent of GDP and 77 percent of exports of goods and services. The creditors from whom Bangladesh are borrowing can be divided into two broad categories:

II. MULTILATERAL

1. Bilateral

Among multilateral creditors, World Bank (IDA) and Asian Development Bank are the biggest creditors. These two institution provided 76.1 percent of Bangladesh's total external borrowings. Total 79.8 percent came from the multilateral sources. Total 20.2 percent came from the bilateral sources. Among bilateral sources biggest creditors for Bangladesh are Japan, China and South Korea which contribute to the debt of Bangladesh by 11.3 percent, 3.9 percent and 1.4 percent respectively.

Figure 1.2:



Data source: IMF

1.2 Research Question

From the above discussion it is clear that external debt stocks in Bangladesh is growing pretty quickly and it may have positive impact or negative impact or both in the economy. So, from this perspective my main research question is as follows:

► Figure out whether external debt is helpful or burden for Bangladesh economy.

To make final comment on the above issue following questions can be evaluated:

► Investigate the external debt overhang and

► Investigate the crowding out effect

III. THEORETICAL FRAMEWORK

How external debt can affect economy are discussed in various theories. Two related theories which will be used in this work are discussed below.

2.1 The Debt Overhang Theory

The literatures of economic growth and external borrowing is full with the perceived negative relationship between external debt and investment which consequently results into lower capital formation. Krugman (1988) defines this negative relationship as "debt overhang". The study gave a straight forward definition of the problem of debt overhang as being the anticipated current value of any potential resource allocation that is not up to its outstanding loan. Several scholars have supported the theoretical case for debt overhang. Some of the studies include Krugman (1988) and Sachs (1988). Others like Greene and Villanueva (1991), Elbadawi et al. (1997) and Chowdhury (2001) reaffirmed this by coming up with ample proof that backs the debt overhang phenomenon.

Model Specification: Debt Oriented Production Function

This study employed an extended model of classical production function which was originally adopted by Cunningham (1993) to investigate the effect of debt burden on economic growth in sixteen heavily indebted nations. Cunningham used debt burden as an explanatory variable in the classical production function.

$$Y = f(K, L, DB) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, Y stands for GDP, K for capital, L for labour and DB for debt burden. As domestic debt and external debt affect the economy different way, to make the analysis more specific only external public debt is included in this model. So, the following regression equation can be applied for testing the "debt overhang" hypothesis:

$$Y_t=\alpha+\beta X_t+\gamma D_t+u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, Y_t is the dependent variable (GDP), X_t represents the set of explanatory variables (gross fixed capital formation, and labor force growth rate), and D_t comprises the debt variables (external public debt stock, external public debt service).

2.2 The Crowding-out Effect

From the classical view public borrowing authority accumulates resources for its own use leaving private sector with lesser part. The increase in government expenditures in the absence of any change in the money supply raises output, income and the transaction demand for money. Given a constant money supply, it pushes interest rate upward. The increase in interest rate reduces firm's investment. The net implication of the crowding-out hypothesis is that expansion in the government sector inevitably comes at the expense of the private sector of the economy, unless the money supply is expanded during the process (Thomas 2000).

The Keynesian view, assumes that if there is unemployment in the economy and interest rate sensitivity of investment is low, the expansionary fiscal policy will lead to little or no increase in the interest rate and increase output and income. In addition it assumes that government spending increases private investment due to positive effect of government spending on the expectations of the investors. Therefore, there is crowding-in rather than crowding-out.

Model Specification

The theoretical framework has enabled us to understand the relationship between private investment, and public borrowing, GDP, interest rate and government expenditure.

It may be expressed in the function,

$$PI = f(PB, GDP, IR, GEX) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where, PI = Private investment, PB = Public borrowing from external sources, GDP = Gross domestic product, IR = Interest rate (Lending), GEX = Government Final Consumption Expenditure

IV. METHODOLOGY AND DATA

The effects of external debt on the economy of Bangladesh will be measured in this work by two points of views. These are:

1. Debt Overhang
2. Crowding out effect

Data and Methodology

The objective of this study is to observe the effect of public external debt on the economy of Bangladesh. For these purpose time series econometric tools will be used. The sample period of the study will be 35 years from 1982 to 2016. Annual Data will be used in this study and is collected from secondary sources.

Nature of the Variables: In this study different variables will be used based on the two types of relationships mentioned above. For the case of debt overhang model there will be Y_t, X_t and D_t where, Y_t is the dependent variable (GDP), X_t represents the set of explanatory variables (gross fixed capital formation, and labor force growth rate), and D_t comprises the debt variables (external public debt stock, external public debt service payment). For the case of Crowding out effect,

PI = Private investment, PB = Public borrowing from external sources, GDP = Gross domestic product, IR = Interest rate (lending) and GEX = Government final consumption expenditure will be used.

Data Sources: Sources of data are Bangladesh Economic Review (various issues), Statistical Year Book of Bangladesh (various issues), World Development Indicators (WDI) and World Economic Outlook by IMF.

3.1 Research Methodology for Debt Overhang and Crowding out effect

As we know most of the macroeconomic time series are non-stationary. By using unit root test, stationarity of a variable can be checked. If a series is non-stationary in a regression, then all the regression results suffer from spurious regression problem. If the series follow the same order of integration, then there can be a meaningful long-run relationship among them which can be explored by identifying a combination of the non-stationary series that gives a stationary combination through co-integration techniques.

Testing for co-integration involves two steps. In the first stage time series are tested for the presence of unit roots or non-statoinarity. In the second stage, co-integration test is performed to identify the existence of a long-run relationship. To test the stationary properties of the series the standard Augmented Dickey-Fuller (ADF) test can be applied. The general Augmented Dickey-Fuller equation is:

$$\Delta X_t = \alpha + \delta X_{t-1} + \sum_{i=2}^{p} \beta j \Delta X_{t-j} + \epsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

To test the presence of co-integration among the variables, procedure developed by Johansen (1988, 1991), Johansen and Juselius (1990) can be used. The simplest form of Johansen co-integrating regression equation is as follows:

$$\Delta Y_t = \pi Y_{t-1} + \sum_{i=1}^{p-1} \lambda i \Delta Y_{t-i} + u_t \quad \ldots\ldots\ldots\ldots \quad (5)$$

The number of co-integrating vectors is presented by the rank of the coefficient matrix π . If cointegration exists then the vector error correction method (VECM) can be applied. For the case of crowding out model it will follow the same research methodology discussed above for the case of debt overhang.

V. EMPIRICAL RESULT

All the variables used in these models are in real terms. The nominal values of the variables have been changed to real values by dividing it by deflator. For the case of debt overhang model, five variables are used. These are real GDP, real capital formation, labor force growth rate, real external public debt stock and real external public debt service payment. These variables are taken in US$ except labor force. For crowding out model, five variables have been used. These are real private investment, real GDP, real external public debt, lending interest rate and government final consumption expenditure. For analytical convenience natural log has been taken for every variables. The data period is ranging from 1982 to 2016.

4.1 Long run relationship

4.1.1 Unit Root Test

Firstly the stationary property of the variables of both the models will be checked by Augmented Dickey Fuller unit root test.

For lgdp, lcftr, llfg, ledsreal, ldspreal ADF test statistics are 0.085, -1.821, -1.597, -2.543, -2.848 at level and -5.065***, -5.636***, -5.216***, -4.755***, -7.696*** at first difference respectively. For lpi, leds, lgdp, lir, lgex ADF test statistics are -2.905, -2.543, -0.085, -1.067, -2.187 at level and -4.722***, -4.755***, -5.065***, -3.555**, -4.617*** at first difference respectively. (** (***) denotes rejection of the hypothesis at 5 %(1%) significance level respectively). It can be concluded from here that for both the model variables are integrated of order 1. Therefore it is possible that there may be a long run relationship among these variables.

4.1.2 Cointegration Test

For both debt overhang model and crowding out model VECM model will be used. Firstly the appropriate number of lag will be determined then it will be check how many cointegration equation exists in these model by comparing the trace statistics with 5% critical value. For the case of debt overhang model lags 4 will be used (lag 4, SBIC -13.62*) and for the case of crowding out model lags 1 will be used (lag 1, SBIC -17.75*) to determine the number of cointegrating equation and to determine the target cointegrating equation.

The number of cointegration equation in the debt overhang model and crowding out model can be determined by trace statistics comparing with critical value which is known as Johansen tests for cointegration. For the debt overhang model and crowding out model the results are as follows:

Table 1.1: Johansen tests for cointegration for debt overhang model

Maximum rank	Eigenvalue	Trace statistics	5% critical value
0	.	219.92	68.52
1	0.97	105.85	47.21
2	0.77	59.47	29.68
3	0.60	31.05	15.41
4	0.498	9.68	3.76
5	0.26		

From the above table it can be seen that the trace statistics is higher than 5% critical value when rank is 0 means at least 1 cointegration equation exists in the model. This process will go sequentially which shows maximum number of cointegration equations exist in this debt overhang model.

Table 1.2: Johansen tests for cointegration for crowding out model

Maximum rank	Eigenvalue	Trace statistics	5% critical value
0	.	85.1	68.52
1	0.75	38.0*	47.21
2	0.36	22.66	29.68
3	0.34	8.68	15.41
4	0.17	2.16	3.76
5	0.061		

From the above table it can be seen that the trace statistics is higher than 5% critical value when rank is 0 means at least 1 cointegration equation exists in the model. When maximum rank is 1 the trace statistics is lower than the critical value means in crowding out model one cointegration equation exists using the SBIC criterion which suggests lags 1.

4.1.3 VECM for debt overhang model for long run relationship estimation

As it is already seen from the Johansen cointeration test that for debt overhang model cointegration equation exist so VECM can be used to determine the long run relationship of debt overhang model. The results are as follows for the debt overhang model:

From the VECM, estimated β are (1, -0.54, 0.03, 0.56, -0.49). The long run relationship can be written as:

lgdp = 0.54*** lcftr – 0.03***llfg – 0.56*** ledsreal + 0.495*** ldspreal
(0.006) (0.004) (0.028) (0.026)

Chi2 = 45935.07***

This long run equation shows the effect of explanatory variables on dependent variable gross domestic product. Firstly, the target variable in the model means the effect of external public debt stock on gdp will be discussed then the other control variables will be discussed.

From the cointegrating equation it can be seen that 1% change in public external debt stock decreased the gross domestic product by 0.56%. This sign is expected in sense that this support the existence debt overhang for the case of Bangladesh although may not be good one for Bangladesh to depend more on external public debt.

From the cointegrating equation it can be seen that 1% change in capital formation increased gdp by 0.54%. This sign is expected from the theory as the capital formation shows total investment from both public and private sectors.

For the case of labor force growth, it has a negative coefficient which is not expected but the coefficient value is pretty small 0.03, which means 1 % increase in labor force growth will decrease the gross domestic product by 0.03%. Although this sign is not an expected sign but it can be understandable in the sense that Bangladesh is a country of 163 million people with small land size of only 147,570 square kilometers and higher labor force growth put pressure on the economy on the sense that there is not enough opportunity to turn all the labor in real production level.

For the case of external public debt service payment it can be seen that 1% change in public external debt service payment increases the gross domestic product by 0.49%. This sign is not expected and difficult to explain. But may be because of huge amount of remittance inflow and export earnings and a very strong foreign exchange reserve protects Bangladesh from a negative impact of public external debt service payment.

4.1.4 VECM for crowding out model for long run relationship estimation

As it is already seen from the Johansen cointeration test that for crowding out model cointegration equation exist so VECM can be used to determine the long run relationship of crowding out model. The results are as follows for the crowding out model:

From the VECM, estimated β are (1, -9.71, 1.3, 4.15, 4.89). The long run relationship can be written as:

lpi = 9.71*** lgdp – 1.3leds– 4.15*** lir - 4.89 lgex
(3.6) (0.88) (1.6) (3.39)

Chi2 = 118.2***

Given that leds and lgex are accepted at 15% signifycance level.

This long run equation shows the effect of explanatory variables on dependent variable private investment. Firstly, the target variable in the model means effect of external public debt stock on private investment will be discuss then the other control variables will be discussed.

For the case of public external debt stock, it has a negative coefficient which implies the existence of crowding out effect. From the equation it can be seen that 1 % increase in public external debt stock will decrease the private investment by 1.3%. This result is only acceptable at 15% significance level. If not accepted then public external debt stock does not have any effect on private investment.

From the cointegrating equation it can be seen that 1% change in gross domestic product increased the private investment by 9.71%. This sign is expected from the theory because overall increase in gross domestic product shows a growing economic condition which helps private investment positively.

For the case of interest rate, it has a negative coefficient which typically shows the negative relationship between interest and investment. From the long run relationship it can be seen that 1 % increase in interest rate will decrease the private investment by 4.15%. This is also an expected result.
From the cointegrating equation it can be seen that 1% change in government final consumption expenditure decreases private investment by 4.89%. This result also indicates that government expenditure crowds out private investment and supports the classical view of government expenditure.

CONCLUSION

The main purpose of this work is to see the effect of external public debt on the economy of Bangladesh. To find out the effect of external public debt on the economy of Bangladesh debt overhang effect and crowding out effect are analyzed.

For the case of debt overhang hypothesis it is found that external public debt stock has a negative impact on GDP which supports the debt overhang theory. Although Bangladesh heavily depends on external public debt as we see it earlier ultimately its effect is adverse on GDP.
For the case of crowding out model the main target variable shows that external public debt stock has a negative impact on private investment which means external borrowing crowds out private investment. It also helps us to understand the overall effect of public external debt stock on economic development.

As this crowding out effects means negative effects on private investment which reduces part of capital formation which ultimately effects negatively towards the GDP.
Apparently it can be thought that external public debt may have a positive effect on economy but this work shows ultimately external public debt overall effect is negative in terms of GDP and also in terms of private investment.

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