External public debt and economic growth: empirical evidence from Bangladesh, 1974 to 2010

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EXTERNAL PUBLIC DEBT AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM BANGLADESH, 1974 TO 2010

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ABSTRACT

This research paper investigates the relevance of the dependence of Bangladesh economy on external public debt. Using some econometric tools, the study is conducted to find out the effect of external public debt on economic growth from the perspective of Bangladesh economy for the period 1974 - 2010. The study will probe debt overhang and crowding out effect of external public debt to represent the effect. To specify the debt overhang and crowding out effect of external public debt, the debt burden has been segmented into two part; external debt stock and external debt service. Long run significant negative effect of external public debt service and positive effect of external public debt stock on GDP growth have been found from this investigation. In short run, only external debt service has negative effect but the debt stock does not have any significant effect. Thus the investigation did not find any evidence of debt overhang provided that there is no significant adverse effect of debt stock on GDP growth. But crowding out effect was originated from the fact that there is evidence of adverse effect of debt service payment on economic growth for the period. As more debt stock means more service payment, the study shows a dichotomy in obtained results. So the reconciliation of debt should be prudent to optimize the growth of Bangladesh. Short run disequilibrium in the path of long run is corrected at a good speed.

Keywords: Crowding out effect, cointegration, debt overhang, external public debt, error correction mechanism.

INTRODUCTION

It is a contentious issue whether external public debt stimulates or retards economic growth. Some researchers found positive, some negative and some found no significance between the relationship of external debt and economic growth for different economic condition. External debt is the total public and private debt owed to nonresidents repayable in foreign currency, goods, or service. In Bangladesh external debt to GDP ratio fluctuates from 6.94 to 45.41 between the periods 1975 to 2010. In FY 2010-11, per capita debt burden stood at USD 163 that is 22.99 percent of per capita GDP. Out of total debt, external debt was 149.99. This large share of external public debt needs a large amount of debt service in interest payment and repayment of principal. Debt service ratio reduced to 2.95 in 2010 from 8.8 in 1980, 10.9 in 1990 and 7.2 in 2000 as the ratio of export earnings. Bangladesh`s total external public debt has been reduced from 527 percent of government revenues in 1993 to 267 percent of government revenues in 2006. Total debt service payment is nearly 100 percent of government revenues in Bangladesh.

If the rate of return from debt is higher than the service payment rate, it might be beneficial for the country and vice versa. High current stock of external debt may acts as future increasing tax to serve debt. Debt may also affect the growth through crowding out. These include all factors through which debt financed fiscal policy adversely affect economic growth i.e., growth is restrained by the lack of available investment resource. This research will investigate how the high stock of debt and service payment affects the economy.

REVIEW OF THE RELATED LITERATURE

Most of the studies found that debt interrupt GDP through debt overhang i.e., reducing and crowding out investment. Some found no significant relationship and some found a positive significant effect.

Cunningham (1993) studied for the period 1971 to 87 for the growth and debt burden in sixteen heavily indebted developing nations. Interestingly he found a dichotomy between two segments of his considering time period. A strong negative relationship between growth and debt burden was found during the 71-79 periods but no significance in 80-87 periods. Though same methodology was used for both the periods, the divergent result indicates the importance of the state of economy. Milton A. lyoha (1999) found a significant debt overhang as well as a crowding out effect in sub Saharan African countries using two-stage least squares method in simultaneous equation model for the 1971-1994 period. Maureen Were (2001), using time series data for the period 1970- 95 observed that external debt accumulation has a negative impact on economic growth and private investment which confirms the existence of a debt overhang problem in Kenya. But debt servicing does not appear to affect growth adversely but has some crowding-out effects on private investment. Abdur (2001) discovered a negative and significant correlation and negative and retarding effects of debt variable on economic growth in the study of HIPC (Highly Indebted Poor Country) thirty five countries and non-HIPC twenty five low and middle-income countries for the period of 1982-1999 from the extreme bound analysis and MRF (Mixed Fixed and Random) model respectively. The causal relationship also provides the same result of significant negative causality from debt burden to per capita real GDP growth for both of the groups. Erdal Karagöl (2002) investigated external debt service having a negative short -run impact on economic growth along with small long run negative elasticity of GNP with respect to debt service and a uni-directional causal relationship between debt service and GNP level in Turkey. Shahnawaz Malik *et al.,* (2010), Mehboob Ahmed and Maryam Shakur (2011) found that External Debt is negatively and significantly related to economic growth in Pakistan. Debt overhang stands as a discouraging factor of investment found in these studies. Crowding out is also accrued from debt overhang to strengthen the adverse effect.

Ogunmuyiwa (2002), observed no significant causal relationship between External Debt and economic growth for lag length 2-4 in Nigeria for the period 1970-2007. Thus, it was affirmed that the variables are exogenous of one another. The findings stated that external debt is not a specific factor for determining the rate of economic growth or economic slowdown in Nigeria. Albert Wijeweera *et al.,* (2005) did not find any significant debt overhang problem in Sri Lanka for the period 1952 to 2002 using cointegration and error correction both for in long term and short term. Arshad Hasan and Safdar Butt (2008), using ARDL (autoregressive distributive lag) model for period 1975 to 2005 found that external debt has no effect in the long and short run. The study probed that Labour force and trade are important determinant of growth but not the debt. It is concluded that the debt has not been productively and efficiently used which is a cause of slow economic growth in Pakistan. Debt would be a growth promoting factor if it`s potential utilization is ensured.

Ramesh Chandra Paudel and Nelson Perera (2009) studied the cointegrated relation of real GDP growth, trade openness, labour force and foreign debt for the period 1955 to 2006 from the evidence of Sri Lanka. The result of the study reveals that all the variables positively affect the real GDP growth and the main effective variable is labour force. The included other independent variables may boost up the productivity of labour force. If debt is optimally used to achieve the potential returns of the resources, it may expedite economic growth. To mobilize resources of Bangladesh, debt can play a pivotal role as it has a large share in GDP. In the line of these studies, an econometric study is completed to investigate the real cases for Bangladesh.

Objective of the Study

One of the objectives of the study is to find out whether external public debt is really a hurdle or not for Bangladesh economy. Relief of debt is demanded by the civil society of Bangladesh. Some papers recommend that debt in Bangladesh is sustainable. (ADB) (2005) analyzed external debt and its sustainability in Bangladesh and argued that Bangladesh has capacity to borrow more. Reasonably this is an interest to see actually how external debt affects economy and why the civil society demand debt relief. Quantitative analysis is not available in Bangladesh about how external public debt affects growth though it is always discussed in a descriptive view. It is the point of interest of this paper to work with external public debt and economic growth. This is also an objective to observe the short run dynamism in the path of long run if there is equilibrium. The results of the empirical research make a bridge with the channel of descriptive analysis through which the debt can affect the economy.

This paper is a precise concept provision in the growing debate on external public debt in the context of Bangladesh economy. It is outmost objective to contribute in policy implementation by providing a baseline results on the external public debt effect on economic growth.

MATERIALS AND METHODS

Data

Following neo classical growth model GDP growth rate is dependent variable and the independent variables are labour, capital, and external debt. The GDP growth (GDPG), Population of working age group (15-64) as percentage of total population (WARP) used as proxy of labour force and Gross capital formation (GKF) used as capital variable data are derived from world development indicator (WDI) of World Bank. Gross capital formation data is converted to natural logarithm data (lnGKF). The debt variable has been divided into two segments i.e., External debt stock as percentage share of GDP (EDGDP) and total debt service as percentage of foreign exchange earnings (TDSEX). The division of debt variable has been done to observe the debt overhang hypothesis and crowding out effect separately. EDGDP and TDSEX data are collected from sixth five year plan (part 3) of Bangladesh and economic review of Bangladesh 2010 respectively. EDGDP and TDSEX are included to capture the effect of debt on economic growth and hypothesized to have adverse effect on GDP growth. lnGKF and WARP are expected to be positive.

The Model

Empirical model is formulated from the analysis of neoclassical production function. Following Cunningham (1993) the production function is used to explain the relationship of GDP growth and debt burden. The production function is similar as export considering production function. The debt burden affects the productivity of labour and accumulation of capital. So it is rational to include debt burden in the production function.

$Y= f (K, L, DB)$

Where, Y= GDP growth, K= capital, L=labour, DB=debt burden

Only external public debt burden is included in this model though Cunningham model includes nation`s total 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. Milton A. lyoha (1999) used external debt stock to GNP and total debt service payments to export of goods and services to capture the debt overhang and crowed out respectively in the investment equation. Following Iyoha, in this paper the debt burden is divided into debt stock burden as total external debt stock to GDP ratio and debt service payment to total foreign exchange earnings ratio. So the model is specified as

$GDPG = \alpha + \alpha_1 lnGKF + \alpha_2 WARP + \alpha_3 EDGDP + \alpha_4 TDSEX + \mu$

GDPG = gross domestic product growth

lnGKF = natural logarithm of gross capital formation

WARP = percentage share of working age population to total population

EDGDP = percentage share of external public debt to GDP

TDSEX = percentage share of total external public debt service to total foreign exchange earnings

α = constant term

α_i = responsiveness coefficient of independent variable to dependent variable.

μ =random error term

Eviews 5.1 has been used for the necessary calculations.

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RESULTS

Unit Root Test

Most of the time series data show the nonstationarity in the level form but stationarity in their difference. Stationarity is tested using Augmentd Dickey-Fuller (ADF) and Phillips-Perron unit root tests. The ADF test consists of estimating the regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + \varepsilon_t$$

Where, Y_t is the relevant time series, ε_t is the residual term. The null hypothesis is that the variable under investigation has a unit rot, against the alternative that it does not. If null hypothesis is rejected it means that the series is stationary. Phillips-Perron test use nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. Table 1 and 2 represent the result of ADF and Phillips- Perron tests results respectively.

Table 1. Results of the ADF Unit Root Test

Variable	With constant and trend		Without trend	
	Level	1st difference	Level	1st difference
GDPG	-17.43619(0)**	-9.733786(1)**	-1.294887(2)	-9.903535(1)*
LnGKF	-2.794594(0)	-6.002613(0)**	-1.160038(0)	-6.099661(1)**
WARP	-5.237116(6)*	-4.737019(8)**	3.304342(9)	-4.183748(8)**
TDSEX	-1.570724(3)	-6.002613(1)**	-0.750015(4)	-3.270794(2)*
EDGDP	-2.336448(0)	-5.557904(0)**	-3.266504(0)*	-4.824353(0)**

**1% significance level, *5% significance level

Table 2. Results of the Phillips-Perron Unit Root Test

Variable	With constant and trend		Without trend	
	Level	1st difference	Level	1st difference
GDPG	-29.14344(10)**	-35.46516(4)**	-7.337808(4)**	-35.94300(4)**
LnGKF	-2.796897(2)	-6.002577(2)**	-1.206513(2)	-6.088382(1)**
WARP	-2.851305(4)	-3.036490(4)	5.113869(4)	-3.142036(4)*
TDSEX	-4.741170(4)**	-11.08535(3)**	-2.266537(3)	-11.50281(3)**
EDGDP	-2.311243(4)	-5.881778(7)**	-3.266504(0)*	-4.792394(2)**

**1% significance level, *5% significance level

The result tables show that all the data are not trend stationary in level but stationary at first difference. As all the variables are integrated of I(1), so the residuals from the regression is expected to I(0).

Cointegration Analysis

For long run relationship, variables have to be cointegrated in the same order that is, residual have to be stationary I (0). Although individually the variables are I (1), their linear combination is I (0) as their linear combination cancels out the stochastic trends. If the variables are not cointegrated in the long run they do not have equilibrium relationship and forecasting from that model is meaningless. If the obtaining value of the residual from the considering regression model show the stationarity i.e., I (0) we get assured that the regression is not spurious.

The model is estimated using White`s heteroscedasticity-consistent varience and standard errors as there is evidence of heteroscedasticity at 5% level of significance of F-Statistics and the result is presented in table 3.

Table 3. Results of the Long Run Model GDPG as Dependent Variable

Variable	Coefficient	Standard error	t statistics	Prob.
Constant	45.59941	24.22560	1.882282	0.0689
lnGKF	-2.632090	1.687697	-1.559575	0.1287
WARP	0.336964	0.297986	1.130802	0.2665
TDSEX	-0.723785**	0.238559	-3.033987	0.0048
EDGDP	0.157735**	0.056056	2.813887	0.0083

**1% level of significance

R-squared 0.607387 Durbin-Watson stat 2.189899

Cointegration is analyzed using ADF test of the following model of residual μ obtained from the regression of original model presented in table 3:

$\Delta\mu_t = \alpha_1 + \alpha_2 t + \delta\mu_{t-1}$

Here, t is trend variable, μ_t is stochastic disturbance term of the model, α & δ are coefficients.

Table 4. Cointegration Test: Augmented Dickey - Fuller (SIC Max-9)

With trend and constant		With constant only	
Level	1st difference	Level	1st difference
-7.772283(0)**	-14.09536(0)**	-7.772357(0)**	-14.36446(0)**

**1 % level of significance.

As stochastic error term of the model μ shows the stationarity, we get assured that the model is cointegrated.

Darbin Watson d statistics from the regression of original model can be used to test the cointegration of the variables as suggested by Angel Granger. In this case the d value is 0 for the null of no cointegration. The Durbin Watson d value in our regression is 2.189899, which is higher than 5% critical value 0.386. This reinforces the finding of cointegration of the variables in the model.

The variables are cointegrated and the regression result shows that there is significant impact of the total external debt service and external debt stock on GDP growth in the long run. Total debt service payment has negative effect and total debt stock has positive effect at 5% level of significance providing at table 3.

Error Correction Mechanism (ECM)

Although the model is in equilibrium in long run, it may not be in equilibrium in the short run. To rectify short run disequilibrium, error correction term is included in the model. ECM was first used by Sargam (1983) and later popularized by Engle and Granger to correct disequilibrium. The Granger representation theorem states that if two variables are cointegrated, then the relationship between the two can be expressed as ECM. The variables GDPG I(1), lnGKF I(1), WARP (I), EDGDP I(1), TDSEX I(1) and the error correction term μ_{t-1} are included in the following error correction model to correct the disequilibrium. The error correction term corrects the disequilibrium at a speed of β.

$\Delta GDPG = \alpha_1 + \alpha_2\Delta lnGKF + \alpha_3\Delta(WARP) + \alpha_4\Delta EDGDP + \alpha_5\Delta TDSEX + \beta\mu_{t-1} + \varepsilon_t$

The above is an error correction mechanism equation and at that μ_{t-1} is the error correction term which corrects the short run disequilibrium. β represents the speed of adjustment. β is expected to be negative and significant to restore the equilibrium. α_i are the short run response of the independent variables to the dependent variable.

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Table 5. Regression Result of ECM, ΔGDPG As Dependent Variable

Variable	Coefficient	Standard error	t statistics	Prob.
Constant	0.120275	1.413032	0.0.085281	0.9326
ΔlnGKF	-5.738783*	2.545891	-2.254136	0.0316
ΔWARP	0.522447	3.149691	0.165873	0.8694
ΔTDSEX	-0.815584**	0.138262	-5.898833	0.0000
ΔEDGDP	0.152084	0.117793	1.291110	0.2065
μ_{t-1}	-1.128752**	0.414314	-2.724390	0.0106

**1%level of significance, *5% level of significance
R-squared 0.874091 Durbin-Watson stat 1.685852

Table 5 represents that the speed of adjustment coefficient is statistically significant and negative. The coefficient indicates that the speed of adjustment rate is 1.29 to correct the previous year`s disequilibrium in the path of long run equilibrium growth. Changes in total debt service payment disturb the change in growth process in the short run as was the hypothesis but the debt stock change does not significantly affect the growth.

DISCUSSION

If the existing debt stock is more than the ability of repayment with some probability in the future, the expected debt service is likely to be an increasing function of countries output level. So some of the return from investment in domestic economy will be taxed away by external creditors and the investors from both domestic and abroad get disincentive to invest and consequently growth is adversely affected. This is the case what we say debt overhang. Empirical result found positive significant impact of debt stock only in the long run but no significance in the short run. So there is no evidence of debt overhang problem in Bangladesh. The obtained result of short run insignificance is reasonable as capital formulation need long period of time to actuate productive activities. With the increases of debt stock more capital is accumulated which promote growth in the long run. The capital stock increases as more debt is incurred, provided that at least part of the debt is used to finance investment. This finding supports the argument of ADB of the capacity of Bangladesh to borrow more.

Significant adverse effect of debt service both in long and short run has been found from the empirical result. Beyond the threshold level, debt repayment capacity declines. As Bangladesh is did not reach in the threshold level, increase in debt stock increases the debt services payment. External debt service potentially affects growth by crowding out private investment or altering the composition of public spending. It may be the reason behind the demand of civil society to cancel out debt. Indeed, in the view of some nongovernmental organizations (NGOs), high external debt service is one of the key obstacles to meeting basic human needs in developing countries.

Short run disequilibrium is corrected at a good speed. This provides with us the sanguinity about the prospect of debt in Bangladesh.

From our empirical result we found that debt stock affects the economy somewhat positively in the long run. Debt is accepted for the budget deficit of the government, basically by the developing country for the development of the economy. Out empirical result provide the relevance of the supportive role of debt stock to economic growth. But the effect of debt stock is less noteworthy as negative effect of debt service exceeds the positive debt stock effect. If optimum use of debt can be ensured the country would be beneficial.

CONCLUSION AND RECOMMENDATION

The paper attempts to investigate the debt stock and debt service effect on the economy of Bangladesh. A sophisticated result has been revealed indicating debt service adverse effect and debt

stock favourable effect on the GDP growth. The result clearly represents a dilemma. So the debt wing needs to be more careful about reconciliation of debt. Debt is needed for growth but have to be careful about its use and rate of service payment.

In the line of findings of the paper some policy recommendation is provided to get rid of the adverse effect of external debt. Debt policy should be stronger and more effective. When dealings are made among the groups, the expert should be included. The debt management wing`s(DMW) of ministry of finance prudence is inevitable to select the optimum source of financing the deficit. There is high savings and investment gap e.g., FY2009-10 worth Tk. 572861.5 million in the economy. If this excess savings can be properly invested, it may acts as alternative to foreign debt. Investment in human resource can be the best alternative to external debt in the long run. Optimal use and extraction of domestic mineral resources should be ensured to reduce import. Government has to interfere in international market of export and import to control foreign exchange reserve. To make the debt service optimum the debt policy might be revised which is scope for further research. Above all ensuring transparency and reduction of corruption is crying demand.

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