Volume 20 Issue 32
Originally issued as E5



Global Journal of HUMAN-SOCIAL SCIENCE: E
Economics
Volume 20 Issue 5 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

The Causal Nexus between Public Debt and Economic Growth, A Multivariate Time Series Analysis: Experience from a SAARC Nation

By Subroto Dey, Subrata Saha & Dipti Bhowmik

Mawlana Bhasani Science and Technology University

Abstract- This research paper enquires about the topicality of the dependence of Bangladesh's economy on public debt. Several authors examined the bearings of public debt and economic growth in different counties and they provided mixed results about the direction of the relation. This study is conducted to find out the causal relationship between public debt and growth from the perspective of Bangladesh's economy, and we use export as a control variable. We excerpted annual time series data from the World Bank website (WDI), IMF, and fiscal year 1986 to2018 data were gathered. One can treat budget deficit as the mother of public debt because the incarnation of the former usually precedents to the creation of the later. Several econometric tools have been behaved as Augmented Dickey-Fuller (ADF), Phillips – Peron (PP), Johansen co integration, Vector error correction model, and Granger casualty to explore short-run causality of public debt on growth.

Keywords: GDP, PUBLIC DEBT, EXPORT, ADF, PP, johansen cointegretion, VECM, granger causality.

GJHSS-E Classification: FOR Code: 149999



Strictly as per the compliance and regulations of:



© 2020. Subroto Dey, Subrata Saha & Dipti Bhowmik. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

The Causal Nexus between Public Debt and Economic Growth, A Multivariate Time Series Analysis: Experience from a SAARC Nation

Subroto Dey[α], Subrata Saha[σ] & Dipti Bhowmik[ρ]

Abstract- This research paper enquires about the topicality of the dependence of Bangladesh's economy on public debt. Several authors examined the bearings of public debt and economic growth in different counties and they provided mixed results about the direction of the relation. This study is conducted to find out the causal relationship between public debt and growth from the perspective of Bangladesh's economy, and we use export as a control variable. We excerpted annual time series data from the World Bank website (WDI), IMF, and fiscal year 1986 to2018 data were gathered. One can treat budget deficit as the mother of public debt because the incarnation of the former usually precedents to the creation of the later. Several econometric tools have been behaved as Augmented Dickey-Fuller (ADF), Phillips – Peron (PP), Johansen co integration, Vector error correction model, and Granger casualty to explore short-run causality of public debt on growth. From ADF and PP test we have received, the concerned variables are nonstationary at the level, and they would be stationary if we convert them into the first difference. Overall the results reincarnate the findings of empirical literature that Government debt hinders economic growth. By adapting the granger causality Wald test, we traced that public indebtedness and economic growth have a bidirectional causal relationship in the short-run. The invention from the study elicits that the concerned variables are co integrated into the long-run.

Keywords: GDP, PUBLIC DEBT, EXPORT, ADF, PP, johansen cointegretion, VECM, granger causality.

I. Introduction

The issue of public debt and debt sustainability has long been a concern for policy makers of both fiscal and monetary authority in Bangladesh. Bangladesh recorded a government debt equivalent to 27.90 percent of the country's Gross Domestic Product in 2018. The public debt rose to 32.5 percent of the gross domestic product (GDP) in December 2018, up by 2.1 percentage points from a year earlier, according to estimates of the Institute of International Finance (IIF).

Author α: Lecturer, department of Economics. Mawlana Bhasani Science and Technology University, Tangail (1902), Dhaka, Bangladesh. e-mail: subrotodey2216@gmail.com

Author σ: Assistant professor, department of Economics. Mawlana Bhasani Science and Technology University, Tangail(1902), Dhaka, Bangladesh. e-mail: sh_ju733@yahoo.com

Author ρ: Lecturer, Department of Economics. Mawlana Bhasani Science and Technology University, Tangail (1902), Dhaka, Bangladesh. e-mail: bhowmikdipti39@gmail.com

It is high time the government took a prudent debt management plan, otherwise, risk will abound. The government debt went on rising in the year 2018, mainly due to an increased sale of the national savings certificate (NSCS). Sustainability may emerge as a challenge. The high public debt stems from persistent fiscal deficit can have a significant negative effect on economic activity. It leads to high taxes and puts upward pressure on real interest rates, which may crowd out private investment. When a government no longer able to finance its deficit, it is forced to cut spending on raise revenues, often, at times when expansionary fiscal policy is needed to stabilize the economy. Government debt, also known as public debt, national debt, and sovereign debt, a contrast to the annual government budget deficit, which is a flow variable that equals the difference between government receipts and spending in a single year. Government debt can be categorized as internal debt (owed to the lenders within the country), external debt (owed to the foreign lenders). The government has increased its bank borrowing target by more than 54 percent to nearly taka 730 billion to partly finance the budget deficit of the current fiscal year. The government revised the net bank borrowing target at taka 729.51 billion from the original goal of taka 473.64 billion for FY-2019-20. Bangladesh's national debt is sharply increasing year to year. In 2018, per capita debt was 567 dollars, which was 501 dollars in the previous year. This is due to budget deficit (in 2018, 33.99 %of GDP), which was $271 in 2009 per capita debt. How should the budget deficit be funded? Public finance provided three alternative sources of financing deficits: taxes, debts, and user fees (Rosen and Gayer, 2008). Developing nations faced with weak tax regimes and low incomes; opt for debt as the best option for financing government budget. Economic theory tells that if debt financing is met by borrowing from the central bank, it is inflationary if borrowing it from commercial banks, there is a possibility of crowding out private investment, and if it met by issuing bonds, the cost of debt financing will be high. The external debt is like an unfavorable tax on future generations, which they have to pay for nothing. Excessive dependency on public debt will not only hamper the current economic growth but also will affect the economy negatively in the long run, as the future generations have to bear the burden of

© 2020 Global Journals

the large amounts of debt servicing. Close coordination is needed to choose an appropriate mix of financing and policy adjustment to facilitate economic recovery while preventing the build-up of an unsustainable debt burden (Islam and Biswas, June 2005). Most policymakers do seem to think that high public debt reduces long-run economic growth. A negative effect of government debt on long-run growth is consistent with both neoclassical and endogenous growth models (Diamond, 1965; saint-paul, 1992). My policy question is, do high levels of public debt reduce economic growth? And is there any causal relation among the concerned variables.

II. Literature Review and Theoretical Background

Jacobs, J., Ogawa, K., Sterken, E., & Tokutsu, I. (2020) found no causal link from public debt to growth, irrespective of the levels of the public debt ratio. Rather, they have found a causal relationship from growth to public debt.

Le, M. G., Murillo, J. W. R., & Hern, E. A. R. (2019) examined the effect of public indebtedness on economic growth in Latin American economies. Their main findings indicate that a Public Debt-GDP ratio of 75% leads to a deceleration in growth. By using a Panel VAR, they also found that external shocks, such as the foreign capital flows and the terms of trade, influence the public debt effect on economic growth.

Wang, Z. (2019) showed that the local government debt and economic growth in China are the second-order sequences that are of a single integer. And there may not exist long-term cointegration relationship between DEBT and GDP. In the short term, the economic growth of local government is Granger causes of local government debt, but the local government debt is not a Granger cause of economic growth of local government. In the long term, economic growth and government debt of local government exit the Reciprocal causation relationship.

Onafowora, O., & Owoye, O. (2019) confirmed that the examined variables are co integrated. FDI, domestic investment, trade openness, human capital (HC), and institutional quality were found to have significant positive effects on economic growth, while higher public debt and inflation rates hampered growth. The results also indicate one-way causality from output growth to public debt in three countries and bidirectional causality between these two variables in two other nations.

Yusuf, S., & Omar Said, A. (2018) utilized co-integration and Vector Error Correction Mechanism (VECM) Approach to test the relationship between public debt and economic growth and granger causality test to examine the causal relationship between variable. The unit root tests showed that all variables were integrated after taking the first difference: the Johansen co-integration result showed that the variables were co-integrated. The VECM estimate showed that there is a negative relationship between public debt and economic growth in Tanzania over the study period.

Munasinghe, M.A.A., Attapattu, A.M.C.P, and Padmasiri, H.M.N. (2018) used domestic debt, external debt, and educational expenditure as explanatory variables to determine their effect on GDP in the long run. The long run is estimated by employing the Johansen test of cointegration analysis relies on Vector Error Correction Model (VECM). The coefficient of Error Correction Term (ECT) suggests disequilibrium that is corrected at the speed of 58 percent over each year. Significant ECT is proof of the existence of a long-run relationship.

TARIQ, M. N. B. (2017) found that external public debt hurts 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 hurts 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.

Owusu-Nantwi, V., & Erickson, C. (2016) revealed a positive and statistically significant long-run relationship between public debt and economic growth. Also, in the short run, a bidirectional Granger causality link exists between public debt and economic growth.

Panizza, U., & Presbitero, A. F. (2014) used an instrumental variable approach to study whether the public debt has a causal effect on economic growth in a sample of OECD countries. The results are consistent with the existing literature that has found a negative correlation between debt and growth. Theirfinding t hat there is no evidence that public debt has a causal effect on economic growth is important in the light of the fact that the negative correlation between debt and growth is sometimes used to justify policies that assume that debt has a negative causal effect on economic growth.

Alam, N., & Taib, F. M. (2013) studied a dichotomous analysis that covers the panels of a group of six “Debt Trap Countries (DTC)” namely as, India, Indonesia, Nepal, Pakistan, Sri Lanka, and Thailand and eight “Non-Debt Trap Countries (NDTC)” as Bangladesh, Fiji, Korea, Malaysia, Myanmar, Papua New Guinea, Philippines, and Singapore, of Asian Pacific Developing Countries (APDC). Findings showed a positive relationship between external public debt (EPD) with the budget deficit (BD), current account deficit (CAD), and exchange rate depreciation (ERD).

Dritsaki, C. (2013) evaluated that the short and long-run relationships exist among these variables. Specifically, the results show that there is a unidirectional Granger causality that runs from exports to economic growth as well as from economic growth to

© 2020 Global Journals

government debt. In contrast, there is no short-run causal relationship between exports and government debt. In the long run, the results show that there is a unidirectional Granger causality that runs from economic growth to government debt.

Mahmud and Shahida (2012) investigated the relevance of the dependence of the Bangladesh economy on external public debt. Long run significant negative effects of external public debt service and positive effect of external public debt stock on GDP growth have been found from this investigation. In the short run, only external debt service has a 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.

Egbetunde, T. (2012) examined the causal nexus between public debt and economic growth in Nigeria between 1970 and 2010 using a Vector Autoregressive (VAR). The co-integration results show that public debt and economic growth have long-run relationship. The findings of the VAR model revealed that there is bi-directional causality between public debt and economic growth in Nigeria. The paper concluded that public debt and economic growth have long-run relationship, and they are positively related if the government is sincere with the loan obtained and use it for the development of the economy rather than channel the funds to their benefit.

Rahman, M. M., Bashar, M. A., & Dey, S. (2012) explored the relationship between external debt and Gross Domestic Products in Bangladesh for the period of 1972-2010. The results show that there is a positive significant correlation between Gross Domestic Products (GDP) and External Debt (ED). The empirical results suggest the existence of a long-run relationship between GDP and ED. The result of Granger's Causality test implies that there is bi-directional causality runs through GDP to ED as well as ED to GDP.

Akhter, T., & Hassan, H. (2012) reported that a significant positive relationship exists between total public debt & investment and between total public debt & government's reserves. On the other hand, a negative relationship exists with the manufacturing sector and government subsidy. However, no strong statistical evidence has been found regarding the negative impact of external debt on the GDP growth. But with domestic debt, it has been found a negative relationship with little statistical significance.

Ferreira, M. C. (2009) analyzed the Granger-causality relationship between the growth of the real GDP per capita and the public debt, here represented by the ratio of the current primary surplus/GDP and the ratio of the gross Government debt/GDP. They conclude that there is clear Granger causality and that it is always bi-directional. These results have important policy implications since not only does public debt restrain economic growth, but also real GDP per capita growth influences the evolution of public debt.

III. Data & Methodology

The Current study investigates the relationship between GDP and Public debt in Bangladesh. For this purposes, annual time series data of GDP and public debt as well as export as a control variable, spanning of the period of 1976 to 2018, has been used. GDP and export data collected from the World Development Indicators database (World Bank) and public debt data collected from the World Economic Outlook (IMF). Data are expressed in billion US dollars.

Following procedures have been used to conduct this study:

- Time series unit root tests
- Test of the co-integration among the variables
- Granger causality test based on VECM

For diagnostic checking Jarque-Bera test for normality and Lagrange-multiplier test for residual autocorrelation has been employed.

IV. Model Specification

The econometric relationship among GDP, export, and public debt has been studied by the following model:

$$lnGDP_t = \alpha_0 + \beta_1 lnExport_t + \beta_3 lnDebt_t + e_t$$

But the problem is that if GDP, Export and Public debt are non-stationary and I(1) when the residual (e_t) is stationary at the level I(0) then it follows that the linear combination of integrated variables given by the right-hand-side of the following equation must also be stationary.

$$e_t = lnGDP_t - \alpha_0 - \beta_1 lnExport_t - \beta_3 lnDebt_t$$

If the above equation becomes stationary, we can say that the illustrated concept is co-integrated as introduced by Engle and Granger (1987).

V. Unit Root Test

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are used to determine the presence of unit roots in the data sets. In the ADF test, different lag values of the dependent variable should be used as an independent variable for considering residual autocorrelation. The ADF test is based on an estimate of the following regression:

$$\triangle Y_t = \delta_0 + \delta_1 t + \delta_2 Y_{t-1} + \sum_{i=1}^{k} \alpha_i \triangle Y_{t-i} + \varepsilon_t$$

© 2020 Global Journals

Table 1: Unit root test

Augmented Dickey Fuller (ADF)					Phillips-Perron (PP)			
	Level		First Difference		Level		First Difference	
Variable	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept
GDP	-2.895 (0.0459)	-6.039 (0.0000)	-11.015 (0.0000)	-11.019 (0.0000)	-6.141 (0.0000)	-10.610 (0.0000)	-19.862 (0.0000)	-19.711 (0.0000)
Export	-0.439 (0.9034)	-2.527 (0.3144)	-4.705 (0.0001)	-4.635 (0.0009)	-0.572 (0.8771)	-2.765 (0.2101)	-6.593 (0.0000)	-6.511 (0.0000)
Debt	-1.837 (0.3624)	-3.205 (0.0834)	-5.511 (0.0000)	-5.494 (0.0000)	-1.779 (0.3907)	-2.930 (0.1527)	-7.501 (0.0000)	-7.777 (0.0000)
Residual	-6.150 (0.0000)	-6.114 (0.0000)			-10.745 (0.0000)	-10.783 (0.0000)		

Notes: p-values shown in parentheses.
Source: Authors' computation

Unit test result presented in Table 1 that show all the variables are stationary at first difference because the respective p-value is less than 5%, hence, we reject the null hypothesis that the data has unit root, but GDP is also stationary at level, Phillips-Perron unit root test also conclude the same result. Residual is also presented in table 1, which shows residual is stationary at the level because the p-value is less than 5% at the level. We can see that all the variables are stationary at first difference. Still, residual is stationary at the level, so we can say that there exists a linear combination of these non-stationary variables become stationary. So the variables are co-integrated that was suggested by Engle and Granger (1987). For checking co-integration, we further conduct Johansen multivariate co-integration test in the next section.

VI. Selection-Order Criteria

Table 2: Lag selection criteria

Lag length	Final prediction error (FPE)	Akaike information criterion (AIC)	Schwarz Bayesian information criterion (SBIC)	Hannan-Quinn information criterion (HQIC)
0	.00427	3.05743	3.1854	3.10334
1	3.8e-06	-3.96406	-3.4522	-3.78041
2	3.1e-06	-4.17141	-3.27565	-3.85002
3	2.3e-06	-4.48826	-3.20859	-4.02912
4	1.2e-06*	-5.19645*	-3.53289*	-4.59958*

Source: Authors' computation

In the VAR model, one use the dependent variable in one side and different lagged value of the dependent and independent variable of the other side. Different level of lag provides different result in the model, so the appropriate lag selection is an important task in every model. In this study, we use the following selection criteria, i.e., Final prediction error (FPE), Akaike information criterion (AIC), Schwarz Bayesian information criterion (SBIC), and Hannan-Quinn information criterion (HQIC). Table 2 shows all of that lag selection criteria, and all criteria suggest that the appropriate lag length should be four in this study. So here we should use four lags for every variable.

VII. Co-Integration Test

Since all the variables are integrated of order one, I(1) and residual is stationary at a level, so the variables are co-integrated. For testing co-integration of the variables, we further conduct the Johansen co-integration approach as the following form:

$$\lambda_{\text{trace}}(r) = -T\sum_{i=r+1}^{g}\ln(1-\hat{\lambda}_i)$$

and

$$\lambda_{\max}(r, r+1) = -T\ln(1-\hat{\lambda}_{r+1})$$

Where r is the number of co-integrated vectors under the null hypothesis, and $\hat{\lambda}_i$ is the estimated value for the *i*th ordered Eigen value from the long-run coefficient matrix. The term T is the available observations under consideration. A significantly non-zero Eigen value indicates a significant co-integrating vector (Chris Brooks, 2014).

Sample: 1976 - 2018
Number of obs = 42
Lags = 4

© 2020 Global Journals

Table 3: Trace Statistics for Johansen co-integration test

Null Hypothesis	Alternative Hypothesis	Eigenvalue	Trace statistics	5% Critical Value
r = 0	r > 0	-	87.1959	29.68
r ≤1	r > 1	0.84340	14.8863*	15.41
r ≤2	r > 2	0.30652	0.6111	3.76
r ≤3	r > 3	0.01555	-	-

Source: Authors' computation

Table 4: Max Statistics for Johansen co-integration test

Null Hypothesis	Alternative Hypothesis	Eigenvalue	Max Statistics	5% Critical Value
r =0	r =1	-	72.3096	20.97
r =1	r =2	0.84340	14.2752	14.07
r =2	r =3	0.30652	0.6111	3.76
r =3	r =4	0.01555	-	-

Source: Authors' computation

Tables 3 and 4 presents the Johansen multivariate co-integration test result. The result consists of both the trace and maximum Eigenvalue tests. These tests determine the number of co-integration vectors.

The null hypothesis is that the number of co-integrating vectors is less than or equal to 0, 1, 2 or 3 and the null hypothesis is tested against the alternative hypothesis that the number of co-integrating vectors is greater than or equal to 0 or 1 or 2 or 3 for every particular case. In this study, trace statistics indicates that there is one co-integrated vector in the considered variables because 5% critical value is greater than the associated trace statistics value at order one, so we don't reject the null hypothesis that the co-integrated vector is equal or less than one. In this circumstance, we run an error correction model with one co-integrated vector.

VIII. Vector Error Correction Model (VECM)

Since all the variables are integrated of order one and also co-integrated, the appropriate procedure is to run an error correction model that considers the long-run association among variables. So we run the vector error correction model of the following form:

$$\triangle lnGDP_t = \sum_{i=1}^{k} \alpha_{1i} \triangle lnGDP_{t-i} + \sum_{i=1}^{k} \beta_{1i} \triangle lnExport_{t-i} + \sum_{i=1}^{k} \gamma_{1i} \triangle lnDebt_{t-i} + \beta_i \mathrm{ECT} + u_{1t}$$

$$\triangle lnExport_t = \sum_{i=1}^{k} \beta_{2i} \triangle lnExport_{t-i} + \sum_{i=1}^{k} \alpha_{2i} \triangle lnGDP_{t-i} + \sum_{i=1}^{k} \gamma_{2i} \triangle lnDebt_{t-i} + \beta_i \mathrm{ECT} + u_{2t}$$

$$\triangle lnDebt_t = \sum_{i=1}^{k} \gamma_{3i} \triangle \mathrm{lnDebt}_{t-i} + \sum_{i=1}^{k} \alpha_{3i} \triangle \mathrm{lnGDP}_{t-i} + \sum_{i=1}^{k} \beta_{3i} \triangle \mathrm{lnExport}_{t-i} + \beta_i \mathrm{ECT} + u_{3t}$$

	Null hypothesis	Implied restriction
1	Lags of Export do not explain current GDP	$\beta_{1i}=0$
2	Lags of Public debt do not explain current GDP	$\gamma_{1i}=0$
3	Lags of GDP do not explain current Export	$\alpha_{2i}=0$
4	Lags of GDP do not explain current Public debt	$\alpha_{3i}=0$

We will consider the above hypothesis to test the short-run effect of every variable. If we reject the above null hypothesis, then we can say that the considered lagged variable has a significant impact on the respective dependent variable.

© 2020 Global Journals

Table 6: Vector Error Correction Model

Variable	Coefficient	Standard Error	T-Statistics	P-Value
ECT	-2.420665	.277201	-8.73	0.000
GDP (-1)	.7379467	.234405	3.15	0.002
GDP (-2)	.4661497	.1711965	2.72	0.006
GDP (-3)	.316428	.0975153	3.24	0.001
Export (-1)	-.6412148	.3426745	-1.87	0.061
Export (-2)	-.3574544	.3167044	-1.13	0.259
Export (-3)	.3722875	.2893063	1.29	0.198
Debt (-1)	-1.27794	.4595839	-2.78	0.005
Debt (-2)	-2.276607	.4599664	-4.95	0.000
Debt (-3)	-1.011148	.4803636	-2.10	0.035
Constant	.0287451	.1394992	0.21	0.837

Source: Authors' computation

Table 6 shows the long run and short-run individual coefficient. In this case, we consider GDP as the dependent variable and three lag values of GDP, export, and public debt as independent variable. We use four (k=4) lagged in VECM, but (K-1) lagged variable is created in this system. We can see that the coefficient of the error correction term is negative and statistically significant. We also see the short-run individual coefficient among them debt has a negative coefficient for all the three lag levels, so we can say that previous debt has a negative impact on current GDP.

Table 7: Granger causality Wald tests

	Independent variables – Chi-square value		
Dependent variable	$\sum_{i=1}^{k} GDP_{t-i}$	$\sum_{i=1}^{k} Export_{t-i}$	$\sum_{i=1}^{k} Public\ debt_{t-i}$
GDP		6.79 (0.0791)	29.67 (0.0000)
Export	1.54 (0.6738)		11.77 (0.0082)
Public debt	8.26 (0.0409)	1.100 (.7766)	

Notes: p-values shown in parentheses.
Source: Authors' computation

Table 7 shows the Granger causality Wald test result. In Granger causality, we test whether all the lag value of one variable jointly causes another variable. In this test, the null and alternative hypothesis is as follows:

Null hypothesis: H_0 = jointly one variable does not Granger causes to another variable.

Alternative hypothesis: H_a = jointly one variable does Granger causes to another variable

Considering the above hypothesis in this study, public debt has bidirectional Granger causes to GDP because p-value attached to both the coefficient public debt to GDP and GDP to public debt is less than 5% ,so we can reject the null hypothesis that both variables do not Granger cause to each other. On the other hand, export has unidirectional Granger causes to GDP at 10% level, and public debt has unidirectional Granger causes to export because we do not reject the null hypothesis that export does not Granger causes to public debt.

Diagnostics Checking: For diagnostics checking, we conduct the Jarque-Bera test for normality and Lagrange-multiplier test for residual autocorrelation.

Table 8: Jarque-Bera test

Equation	Chi-square value	df	P-value
ΔlnGDP	0.326	2	0.84952
ΔlnExport	0.425	2	0.80860
ΔlnDebt	0.956	2	0.62015
All	1.707	6	0.94461

Source: Authors' computation

Table 8 shows the Jarque-Bera test statistics. In Jarque-Bera test the null and alternative hypothesis is as follows:

Null hypothesis: H_0 = Variable is normally distributed

Alternative hypothesis: H_a = Variable is not normally distributed

© 2020 Global Journals

In this study, Jarque-Bera test shows all the variables are normally distributed because-value of associated Chi-square value is too high (above 5%), so we don't reject the null hypothesis, and the null hypothesis is that variables is normally distributed. When we consider all the variables at the same time that is also normally distributed because the associated p-value is 94.46% so in this case, we again not reject the null hypothesis. So the variables under consideration are normally distributed in this study.

Table 9: Lagrange-multiplier test

lag	Chi-square value	df	P-value
1	19.8798	9	0.01867
2	5.9185	9	0.74804
3	11.1662	9	0.26449
4	13.3978	9	0.14542

Source: Authors' computation

Table 9 shows the Lagrange-multiplier test for residual auto-correlation. Lagrange-multiplier test the null and alternative hypothesis is as follows:

Null hypothesis: H_0 = Residual is not auto-correlated

Alternative hypothesis: H_a = Residual is auto-correlated

Considering the above hypothesis, we can say that in this study among 4 lagged value, only lag one is auto-correlated.Still, the other residual is not serially correlated because the p-value of associated Chi-square value is too high (above 5%) so we don't reject the null hypothesis. In conclusion, we can say that the maximum lagged that was used in this study is not serially correlated.

IX. Conclusion

This paper peruses the direction of causality between public debt and economic growth in Bangladesh within the context of the VECM framework. The paper also experiments Unit root and co integration tests among the series adapting ADF, PP, and Johansen tests. The unit root blazons that all the variables are stationary at first difference. The co integration test discloses that all the variables are co integrated, signification that they have a long-run relationship. The direction of causality between public debt and economic growth is bidirectional, whereas unidirectional bearing from export to economic growth has been found from using the granger causality Wald test. Overall the results impersonate the findings of empirical literature that public debt impedes economic activity. This study vindicates that debt negatively impacts economic growth both over the short and long run. Policy makers should be cautious in acquiring an unsustainable high level of debt. Debt limits and fiscal space are country-specific, as it often depends on the country's ability to tolerate a high level of debt. Debt is needed for growth but has to be careful about its use, rate of service payment and reconciliation. Above all ensuring transparency and reduction of corruption, is a crying need. If a high level of debt leads to contractionary policy or retrenchments in fiscal policy, it would be a serious problem and obviously reduce growth. Internal debt (borrowing from the central bank, commercial bank, other internal sources) and external debt (borrowing from outside from country boarder) must not become a common practice. Still, on the contrary, this option should be reserved especially for those situations in which economy is envisaged with unusual affairs, calling for large scale government intervention and important financial resources.

Bibliography

1. Jacobs, J., Ogawa, K., Sterken, E., & Tokutsu, I. (2020). Public Debt, Economic Growth and the Real Interest Rate: A Panel VAR Approach to EU and OECD Countries. *Applied Economics*, *52*(12), 1377-1394.
2. Le, M. G., Murillo, J. W. R., & Hern, E. A. R. (2019). Public Debt and Stability in Economic Growth: Evidence for Latin America. *International Journal of Economics and Financial Issues*, *9*(4), 137.
3. Attard, J. (2019). Public Debt and Economic Growth nexus: A Dynamic Panel ARDL approach.
4. Onafowora, O., & Owoye, O. (2019). Public debt, foreign direct investment and economic growth dynamics. *International Journal of Emerging Markets*.
5. Wang, Z. (2019). Local Government Debt and Economic Growth in China—An Empirical Study Based on Granger Causality Test. *Modern Economy*, *10*(02), 359.
6. Munasinghe, M.A.A., Attapattu, A.M.C.P. and Padmasiri, H.M.N. (2018) Long Run Association between Public Debt and Economic Growth in Sri Lanka. Modern Economy, 9, 775-789. https://doi.org/10.4236/me.2018.94051
7. Yusuf, S., & Omar Said, A. (2018). Public Debt and Economic Growth: Evidence from Tanzania. *Journal of Economics, Management and Trade*, *21*(7), 1-12. https://doi.org/10.9734/JEMT/2018/41504.
8. TARIQ, M. N. B. (2017). *EXTERNAL PUBLIC DEBT: IS IT A BOON OR BANE FOR BANGLADESH?* (Doctoral dissertation, THAMMASAT UNIVERSITY).
9. Saima, U., & Uddin, M.K. (2017). The Relationship between Budget Deficit and Public Debt in Bangladesh: A Vector Error Correction Model (VECM) Approach. *Imperial journal of interdisciplinary research, 3*.
10. Owusu-Nantwi, V., & Erickson, C. (2016). Public debt and economic growth in Ghana. *African Development Review*, *28*(1), 116-126.

© 2020 Global Journals

11. Panizza, U., & Presbitero, A. F. (2014). Public debt and economic growth: is there a causal effect?. *Journal of Macroeconomics*, *41*, 21-41.
12. Alam, N., & Taib, F. M. (2013). An investigation of the relationship of external public debt with budget deficit, current account deficit, and exchange rate depreciation in debt trap and non-debt trap countries. *European Scientific Journal*, *9*(22).
13. Dritsaki, C. (2013). Causal nexus between economic growth, exports and government debt: the case of Greece. *Procedia Economics and Finance*, *5*, 251-259.
14. Akhter, T., & Hassan, H. (2012). Impact of Public Debt Burden on Economic Growth: Evidence from Bangladesh. *Journal of Finance and Banking*, *10*(1).
15. Egbetunde, T. (2012). Public debt and economic growth in Nigeria: Evidence from granger causality. *American Journal of Economics*, *2*(6), 101-106.
16. Rahman, M. M., Bashar, M. A., & Dey, S. (2012). EXTERNAL DEBT AND GROSS DOMESTIC PRODUCT IN BANGLADESH: A CO-INTEGRATION ANALYSIS. *Management Research & Practice*, *4*(4).
17. Ferreira, M. C. (2009). Public debt and economic growth: a Granger causality panel data approach.

© 2020 Global Journals