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Public Debt and Economic Growth in Nigeria

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Abstract:

This study investigates the effect of public debt on economic growth and development in Nigeria within the VAR methodological framework using annual data for 35 yearly from 1981 to 2015. While economic growth measured by the real GDP, public debt is measured by total domestic debt and total external debt. All variables are converted into logarithms. The results show evidence of a significant causal relationship between domestic debt and real GDP in Nigeria. Real GDP responds negatively to a one standard deviation shock to domestic debt and the effect of this shock stays in the system even after the third period. However, there is no significant relationship between external debt and real GDP. Although, real GDP responds positively to a shock to external debt, the effect of external debt shock dies out at the third period. Further, there is no long-run relationship between public debt and real GDP in Nigeria. Based on these findings, the study recommends that Nigerian authorities should use more of external debt to finance any shortfalls in the National budget.

Keywords: Economic development, real GDP, domestic debt, external debt

1. Introduction

Rising public expenditure on critical infrastructure to accelerate economic growth has been identified as the cause of rising stock of the public debt in Nigeria. It is argued that rising debt profile (domestic and external) over the years has adversely influenced the development of the Nigeria economy. A portion of the recognized components in charge of this trend are high budget deficit, low income growth, substantial consumption increase, and high inflation rate. Experience however, has shown that government all over the world incur huge public debt mainly for budget deficiency financing. Thus, if the government is not able to meet its expenditure obligations from its internally generated revenue in form of taxes, levies and duties, it resorts to borrowing both domestically and externally to fund the deficit. This basically translates into stock of public debt for the government.

Several studies on the influence of public debt on economic growth have been carried out. Some scholars [for example, Adofu and Abula (2010), Charles (2012), Gbosi (1998), Nnamdi and Omojefe (2009) and Nwakanma and Nnamdi (2010)] have provided insights into the contributions of domestic debts and their effects on the Nigeria economy. For instance, Gbosi (1998) and Adofu and Abula (2010) are of the view that increases in domestic borrowing as a major source government's deficit financing are necessitated by the oil price shock in the international market. They argued that despite the numerous efforts by successive governments to rationalize public expenditure, very little has been achieved in reducing public spending and this has led to continuous rise in domestic debt. Other studies such as Nworji and Oluwalalye (2012) however, show significant evidence that public debt has positively influenced the growth and development of the domestic economy. Giving these divergences in position and in the light of recent development in Nigerian economy, this study intends to empirically ascertain the nature of relationship that exists between Nigeria's public debt and economic growth. The remainder of this paper is structured as follows: Section 2 contains both theoretical and empirical literature. Section 3 contains the research methodology. Section 4 contains data analysis and discussion of findings. Section 5 concludes the study.

2. Theoretical Framework and Review of Literature

2.1. Theoretical Framework

Considerable theories and arguments relating to the structure and influence of public debt have been propounded by several scholars. For instance, Learner's theory, which focuses on the debt burden on citizens, favours domestic debt over foreign debt because of its stringent repayment conditions often associated with foreign debts. Domestic debt has mixed

impacts on economic growth. In the traditional view, the immediate impact of government borrowing used to finance a tax cut is increase in consumer spending which also has both short run and long run effects on the economy. In the short run, the aggregate demand increases following an increase in consumer spending. This will also increase the level of employment and output. As the marginal propensity to consume (MPC) exceeds the marginal propensity to save (MPS), the increase in private savings will be lower than government dis-saving. This will increase the real interest rate and attract more foreign capital to the economy.

However, higher interest rate will reduce or crowd out private investment in the long run. Low domestic savings implies a small capital stock. The foreign capital inflow would lead to higher foreign debt. The higher aggregate demand would raise price level that adjusts over time and the economy returns to its natural rate of output. The decrease in investment will eventually lead to a lower steady state capital stock which lowers output. Therefore, the overall impact in the long-run period is a decrease in output, consumption and the general economic condition. This is also known as the burden of public debt, as each generation would leave a debt burden to the next by leaving behind a smaller aggregate stock of capital (Sheikh et al., 2010).

Both the World Bank and International Monetary Fund are of the view that extensive use of domestic borrowing can severely affect the economy adversely since a significant part of revenue can be used to service domestic debt especially, as domestic interest rates are always higher than foreign interest rates. The interest payment on domestic debt can rise quickly along with increases in the outstanding debt stock, especially in a shallow financial market. The high interest rate is even more pronounced when there are fewer investors, since a small group of investors can hold the government hostage. Domestic debt financing crowds out private investment as issuing domestic debt implies mopping up private savings that have been used for private investment. This induces high domestic interest rates, thereby reducing private investment. This is true even when government controls the interest rate because increase in domestic borrowing would lead to credit rationing which will also crowd out private investment (Fischer & Easterly, 1990).

2.2. Empirical Review

Iwedi and Onuegbu (2014) examined government's efforts and challenges in financing housing deficit in Nigeria and concluded that government should involve both private sector and international community in procuring the needed funds needed for efficient housing delivery.

Adesoye (2014) examined the effects of infrastructural financing on economic growth in Nigeria for the period from 1970 to 2010 using the OLS technique. The results showed that that government community service infrastructure spending, private infrastructure investment, broad money supply, and total population all have positive effects on economic growth. On the other hand, government economic service infrastructural spending and total domestic and external debt showed negative effects on economic growth.

Using the OLS regression method, Adofu and Abula (2010) examined the relationship between domestic debt and economic growth for the period from 1986 to 2005. The results show that domestic debt has negative influence on economic growth. The study recommended that government should use less of domestic borrowing to finance its public expenditure as well as increase its revenue base through tax reform programmes.

Using data for 93 low-income countries and emerging markets from 1975 to 2004, Ali Abbas and Jacob Christensen (2007) examined the effect domestic debt markets on economic growth. The results show that moderate levels of non-inflationary domestic debt relative to GDP and bank deposits have a positive overall impact on economic growth. The results show that, above a ratio of 35% of bank deposit, domestic debt begins to undermine growth, lending support for the traditional crowding out and bank efficiency concerns. They argued that the domestic debt would contribute more significantly to the economy if it is marketable, with positive real interest rates and held outside the banking system.

Charles (2012) examined the relationship between domestic debt and economic growth in Nigeria from 1994 to 2008 using OLS and ECM techniques. His result showed that the average of the domestic debt is 114.98 which is far above a healthy threshold of 35 percent of bank deposit. The study of course affirmed that the level of debt has negative effect on economic growth. He recommended that government should maintain a debt- bank deposit ratio below 35 percent, resort to increase use of tax revenue to finance its projects and divest itself of all projects the private sector can handle while providing enabling environment for private sector investors such as tax holidays, subsidies, guarantees and most importantly improved infrastructure.

Ijeoma (2013) assessed the impact of debt on selected macroeconomic indicators in Nigeria for the period from 1980 to 2010. The study found that Nigeria's external debt stock has a significant effect on her economic growth. It also revealed that there is a significant relationship between Nigeria's Debt service payment and her Gross Fixed Capital Formation. The researcher therefore recommended that government should avoid borrowing as much as possible however, since developing countries need to borrow at one time or the other to supplement internal savings, borrowing then should become an option only when high priority projects are being considered and borrowed funds should be strictly monitored and evaluated to ensure they are used for the purpose for which they are borrowed and government should make policies that will promote industrialization which will in turn attract foreign direct investment.

Godfrey and Cyrus (2013) investigated the effects of domestic debt on economic growth in Kenya using quarterly data from 2000 to 2010. The long run relationship between the variables was investigated using both Engel-Granger and Johansen

VAR based cointegration tests. There was evidence of cointegration hence an error correction model has been used to capture short run dynamics. The study showed that domestic debt expansion in Kenya has a positive and significant effect on economic growth.

Saifuddin (2016) examined the impact of public debt on economic growth in Bangladesh from 1974 to 2014 using two models; namely, investment and growth models. The investment model was used to examine the potential indirect effect through investment while the growth model was used to examine the direct effect. Results from TSLS regression showed that public debt has positive relationship with both investment and economic growth. The results also suggested that public debt has an indirect positive impact on growth.

Okwu, Obiwuru, Obiakor and Oluwalaiye (2016) examined the effects of domestic debt on economic growth in Nigeria for the period from 1980 to 2015. The results showed that there is both short run and long run positive impacts of domestic debt on economic growth. By contrast, debt servicing and bank lending rates both have negative impact on economic growth. However, the impact of bank lending rate is insignificant.

3. Methodology

3.1. Data

To examine the effect of public debt on economic development in Nigeria, we use 35 annual time series data for real GDP, total domestic debt (TDD) and total external debt (TEXD) from 1981 to 2015. We annual statistical Bulletin and are analysed in EViews 9. To minimize the presence of outliers, logarithmic form of the data is used for all the variables. Figure 1 shows the graphical plots of all the data. As figure 1 indicates, there is an observable upward trend in all the data, indicating that they are generated by a random walk process.

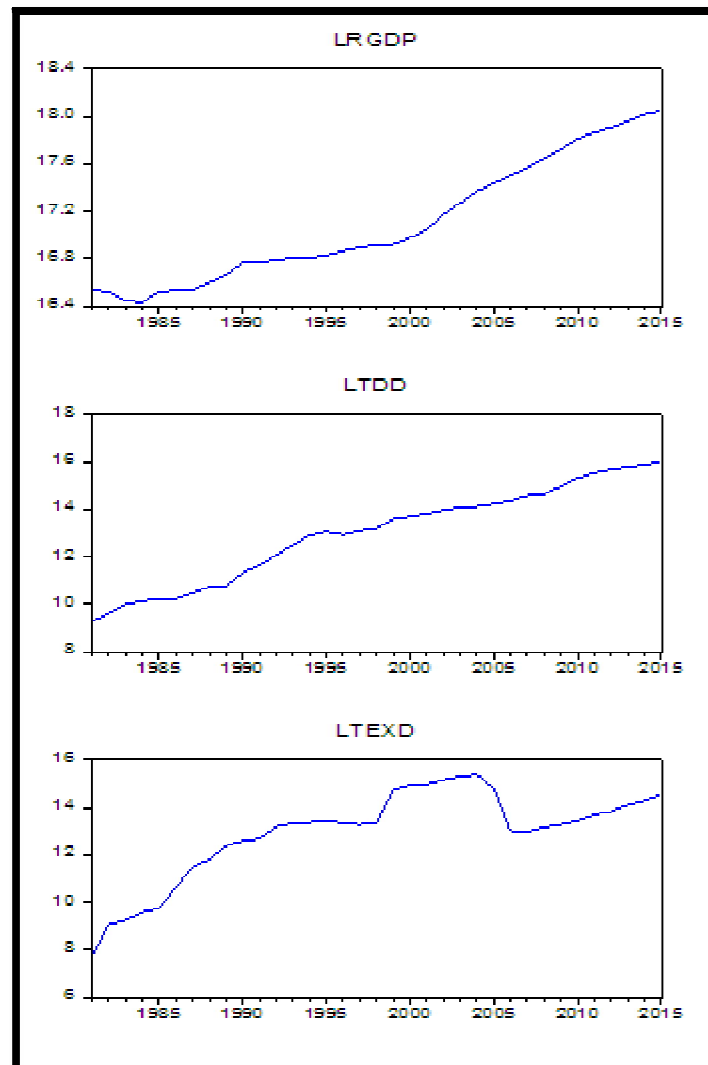


Figure 1: Data Plot for the Variables

3.2. Methods

In this study, the structural VAR methodology is used to examine the relationship between both domestic debt and external debt on real GDP in Nigeria. To this end, impulse response function, Granger causality test and variance decomposition are used to examine the dynamic relationships of interest. The success of structural VAR models in capturing the joint dynamics of macroeconomic and financial series is well documented. The trivariate reduced-form VAR model, incorporating domestic debt, external debt and real GDP is given by:

$$LRGDP_t = \beta_{01} + \beta_{11}LRGDP_{t-1} + \beta_{21}LTDD_{t-1} + \beta_{31}LTEXD_{t-1} + u_{1t}$$

$$LTDD_t = \beta_{02} + \beta_{12}LRGDP_{t-1} + \beta_{22}LTDD_{t-1} + \beta_{32}LTEXD_{t-1} + u_{2t}$$

$$LTEXD_t = \beta_{03} + \beta_{13}LRGDP_{t-1} + \beta_{23}LTDD_{t-1} + \beta_{33}LTEXD_{t-1} + u_{3t}$$

where u_{it} are white noise error terms, which capture any shocks to the VAR system, $LRGDP$ = log of real GDP, $LTDD$ = log of total domestic debt, and $LTEXD$ = log of total external debt. The model assumes that all variables endogenously enter the system and there are no exogenous shocks. Thus, exogenous shocks are examined through structural analysis.

4. Data Analysis and Discussion

4.1. Stationary Test

To determine the number of unit roots contained in each of our data series, we conduct the ADF stationarity/unit root test. The test is applied on both the level data and the first differenced data. Schwarz information criterion (SIC) is used to automatically select the optimum lag length for the ADF test, allowing a maximum of 8 lags. The results are presented in table 1. While panel A contains the results of the level data test, panel B contains the results of the differenced data test.

From panel A of table 1, the ADF test for the level data is insignificant at all conventional levels for all the variables, indicating that they are all non-stationary. The unit root hypothesis is therefore rejected. From panel B, the test is significant at 1% level for both LTDD and LTEXD and at 5% level for LRGDP. This indicates that all the data series are stationary at first difference. Thus, LRGDP, LTDD and LTEXD are all I (1) series.

Variable	ADF Statistic	p-Value	Decision
Panel A			
LRGDP@ Level	-2.219401	0.4639	Nonstationary
LTDD @ Level	-1.615604	0.4639	Nonstationary
LTEXD @ Level	-2.020924	0.2769	Nonstationary
Panel B			
LRGDP @ First difference	-3.602994	0.0450	Stationary
LTDD @ First difference	-4.348589	0.0016	Stationary
LTEXD@ First difference	-4.516152	0.0010	Stationary

Table 1: ADF Test of Stationarity for the Study Variables

4.2. System Based Co integration Test

Table 2 reports the results of Johansen system co integration test. This test is motivated by the results found in the previous section that all variables are integrated of the first order. An evidence of co integration implies that there is a long-run relationship between the variables, and this will motivate the use of vector error correction model VECM to estimate the dynamic relationship being studied. As we can see, there is no evidence of a long-run relationship between public debt and real GDP as the two test statistics (Trace and Max-Eigenvalue) fail to reject the null hypothesis of zero cointegration at all conventional levels. Thus, we proceed to use VAR to estimate the dynamic relationship between the study variables.

Hypothesized No. of Cointegration	Trace Test		Max-Eigenvalue Test	
	Statistic	p-value	Statistic	p-value
0	19.00220	0.4927	14.81304	0.3022
1	4.189161	0.8877	4.168030	0.8412
2	0.021131	0.8843	0.021131	0.8843

Table 2: Johansen System Co integration Test

4.3. VAR Analysis and Interpretation

4.3.1. Lag Length Selections

To determine the appropriate lag order for a parsimonious VAR model, we use two information criteria; Akaike information criterion (AIC) and Schwarz information criterion (SIC) estimation. According to information criterion, the appropriate lag order is one that corresponds to the lowest information. The results are shown in table 3. As we can see, the

value of each criterion is minimized at lag 1 as indicated by the asterisks (*), suggesting that a VAR with only one lag is appropriate for estimating the relationship being studied. We therefore, proceed to estimate a VAR (1) model.

Lag	AIC	SIC
0	5.688809	5.826222
1	-3.417844*	-2.868193*
2	-3.380323	-2.418434
3	-2.988582	-1.614455

Table 3: Lag Selection Criteria; * Indicates Lowest Information

4.3.2. VAR (1) Estimation

Table 4 presents the estimation results for the preferred VAR(1) model. As this table shows, the estimated VAR (1) model has no specification problem as indicated by the post estimation diagnostic test. Both LM and Q statistic up to lag 3 have a p-value that is above all conventional significance levels, and thus failing to reject the null hypothesis of no serial correlation. This implies that the fitted VAR (1) model can be trusted. However, since VAR models are required to be stable for their coefficients to be evaluated and interpreted, we therefore proceed to check the stability of the fitted VAR(1).

	LRGDP	LTDD	LTEXD
LRGDP (-1)	0.764091	0.517466	-1.720434
LTDD (-1)	-0.086472	0.897346	-0.005470
LTEXD (-1)	0.003887	0.051513	0.716699
Constant	4.611274	-7.694958	31.40482
@Trend	0.030139	-0.016130	0.107971
R-squared	0.997019	0.995248	0.938089
LM-Stat (3)	9.613587 (0.3827)	Q-stat (3)	21.51430 (0.2543)

Table 4: VAR (1) Estimation Results; P-Values Are in Bracket

4.3.3. VAR Stability Check

Figure 2 shows the VAR roots plot in relation to unit circle which helps to check the stability of a VAR model. A VAR model is stable if all its roots lie inside the unit circle. Otherwise, the model is not stable. As we can see from figure 2, the three roots are all contained in the unit circle, indicating that the estimated VAR (1) model is stable. Thus, we proceed to evaluate the estimated coefficients through structural analysis using the impulse response function, forecast error variance decomposition and Granger Causality.

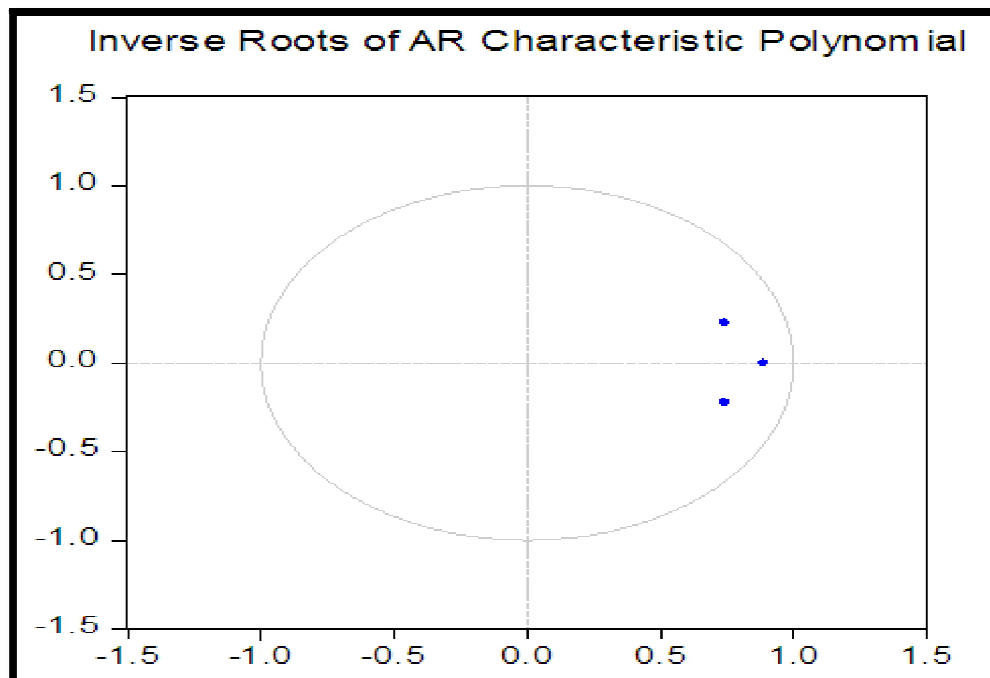


Figure 2: VAR Stability Plot

4.4. Structural VAR Analysis

4.4.1. The Impulse Response Function

To examine the effect of public debt on real GDP, we graphically plot the response of LR GDP to a one standard deviation shock to LTDD and LTEXD for three periods. The responses are shown in figure 3. As this figure clearly shows, LR GDP responds positively to both own shock and shock to LTEXD but responds negatively to shock to LTDD. However, while the effect of own shock decreases as the period increases, the effect of shock to LTEXD peaks at the second period and dies out at the third period. The effect of shock to LTDD increases as period increases. These results and those reported in table 4 are largely comparable. Further, these results agree with the findings of Adofu and Abula (2010), Charles (2012), but disagree with the findings of Godfrey and Cyrus (2013) as reviewed in the literature.

4.4.2. Granger Causality/Exogeneity Test

To examine whether there is a causal relationship between the study variables, we apply the Granger Causality/Exogeneity Wald test. As it is well known, if an endogenous variable is found to be significant in VAR equation, it is considered to have a causal relationship with the dependent variable. Table 5 presents the test results. As we can see from this table, the Chi-square statistic for LTDD is highly significant, suggesting strong evidence of causality from domestic debt to real GDP. On the contrary, there is no evidence of causality external debt and real GDP as the Chi-square statistic is not significant at conventional levels. However, LTDD and LTEXD are jointly significant at 1% level, indicating that both domestic debt and external debt jointly have significant explanatory power for real GDP.

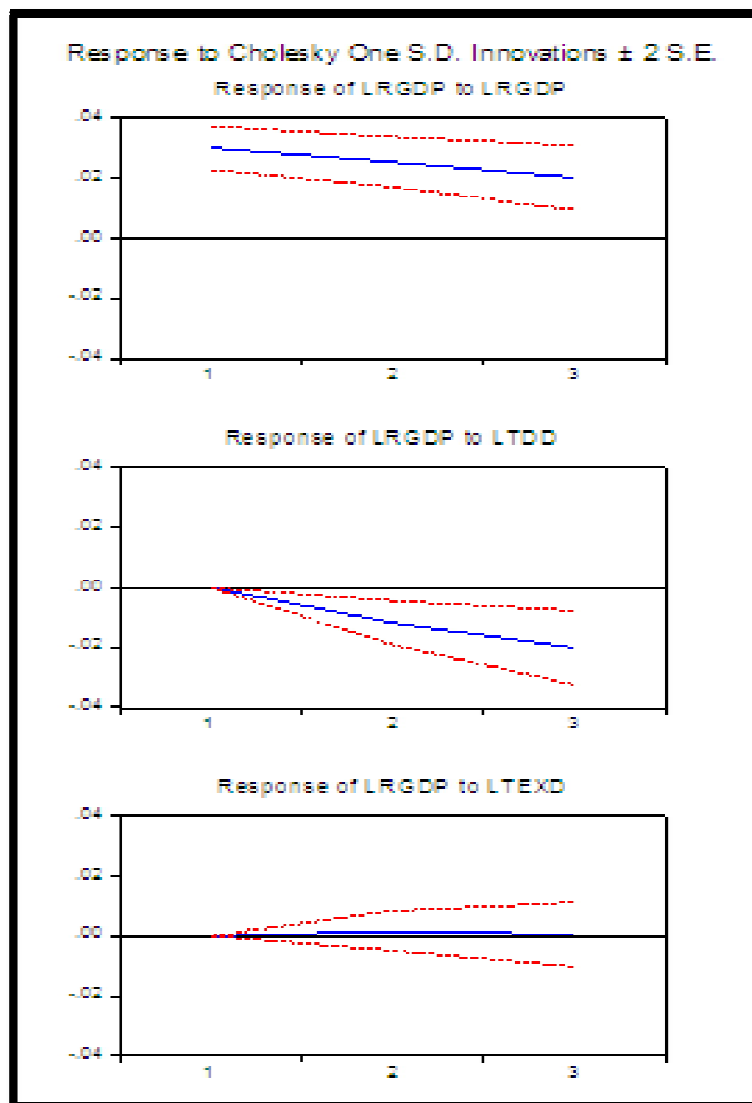


Figure 3: Impulse Response Function

Excluded	Chi-sq.	DoF.	Prob
TLDD	12.89400	1	0.0003
TLEXD	0.279900	1	0.5968
All	12.90664	2	0.0016

Table 5: Granger Causality/Exogeneity Wald Test

4.4.3. Forecast Error Variance Decomposition

To determine the contribution of both domestic debt and external debt to the variation in real GDP, we decompose the forecast error variance of LR GDP into its component sources. Table 6 shows the results. As we see from this table, own shock explains all the error variance of LR GDP in the first period. However, as the period increases, the contribution of own shock decreases. For instance, in own shock contributes approximately 91% to the error variance in real GDP in the second period, and approximately 78% and 65% in third and fourth periods respectively. Further, as the table indicates, the contribution of domestic debt to the variation in real GDP is substantially higher than that of external debt. For example, in the second period, LTDD explains about 8% of the variation in LR GDP while LTEXD explains less than 1%. In the third and fourth periods, LTDD explains about 21% and 34% respectively of the changes in LR GDP, while LTEXD explains about 0.13% and 0.21% respectively.

Period	LR GDP	LTDD	LTEXD
1	100.0000	0.000000	0.000000
2	91.52809	8.294494	0.177419
3	78.09654	21.77021	0.133250
4	65.04321	34.74371	0.213084

Table 6: Variance decomposition of LR GDP

5. Summary and Conclusions

In this study, we investigate the effect of public debt on economic growth and development in Nigeria within the VAR methodological framework using the Impulse response function, Granger causality/Exogeneity test and Forecast error variance decomposition. The data used consist 35 yearly time series observations on real GDP, total domestic debt and total external debt from 1981 to 2015. All variables are converted into logarithms. The main conclusions are as follows:

There is a significant causal relationship between domestic debt and real GDP in Nigeria. Real GDP responds negatively to a one standard deviation shock to domestic debt and the effect of this shock stays in the system even after the third period. Thus, A change in domestic debt has adverse effect on the Nigerian economy. However, there is no significant relationship between external debt and real GDP. Although, real GDP responds positively to a shock to external debt, the effect of external debt shock dies out at the third period. Thus, a change in external debt has no significant effect on the Nigerian economy. Further, there is no long-run relationship between public debt and real GDP in Nigeria. We therefore, recommend that Nigerian authorities should use more of external debt to finance any shortfalls in the National budget.

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