ELIT
Economic Laboratory Transition
Research Podgorica

Impact of Public Debt on Economic Growth: Evidence from Nigeria

BENJAMIN IGHODALO EHIKIOYA[1] (*Corresponding author*) and ALEXANDER EHIMARE OMANKHANLEN[2]

[1] Department of Banking and Finance, College of Management and Social Sciences, Covenant University, Ota, Nigeria, e-mail: benjamin.ehikioya@covenantuniversity.edu.ng
[2] Department of Banking and Finance, College of Management and Social Sciences, Covenant University, Ota, Nigeria

ARTICLE INFO

ABSTRACT

The rising debt profile of developing economies like Nigeria has remained a concern for the policymakers and other agents of the economy. Thus, this study examines the impact of public debt on economic growth in Nigeria. The study used the Johansen cointegration test, Ordinary Least Square technique and Vector Error Correction Model to analyze data sourced from the Central Bank of Nigeria, Debt Management Office, International Monetary Fund and the World Bank for the period 1981-2019. The study demonstrates the presence of a long-run equilibrium relationship between public debt and economic growth in Nigeria. The analysis reveals evidence of an adverse impact of public debt on economic performance for the study period in Nigeria. However, the impact of the relationship is only significant with the lag variable. The study demonstrates that inflation, interest rates, oil price and investment exert influence on economic growth in Nigeria. Following the results of this study and the level of debt in Nigeria, policymakers must support private sector led investment drive for improved economic performance. Also, the government must make sure that borrowing is based on project specific needs that guarantee repayment of borrowed funds. Finally, the government must enforce good governance and institutional structures to discourage the misappropriation of resources and encourage economic growth.

INTRODUCTION

Since the 2008 global financial crisis, the build-up of public debt, as well as the slow economic growth rate have come with implications, especially in developing economies like Nigeria where the rate of poverty and unemployment have been a concern for the policymakers, professionals and other stakeholders of the economy. To address these issues and regain public confidence, the government needs to invest in infrastructure, human capital development and other essential parts of the economy. Government investment activities often involve substantial capital expenditures that are presently confronted by inadequate domestic savings and weak tax system to generate the required revenue (Egbetunde, 2012;

Babatope, Onyebuchi and Adekunle 2019). The challenges for the government to generate revenue domestically sometimes lead to budget deficits that require the use of alternative means of financing. For strategic reasons, government borrowing is considered an important policy instrument to finance development projects, budget deficits and other initiatives that would help to stabilize and stimulate economic growth and development.

According to C. Soludo (2003), E. Lucky and O. Godday, (2017), the need to address the consequences of an unfavourable balance of payment and budget deficits are the two essential reasons why the government engage in borrowing from both foreign and domestic sources. However, there are perceived concerns from the public that the present high levels of public debt may have effect on the Nigerian economic growth (Okoye et al., 2019; Chimezie et al., 2020).

Like in most developing countries around the world, Nigeria is faced with the challenge of economic growth and development, and the burden of debt accumulation due to budget deficits, drop in the net export balance, the decline in crude oil prices and increase in payments to foreign factors. Since the 2016 economic recession, the Nigerian government has renewed interest in the borrowing culture without capital investment insight to guarantee debt servicing. Starting from 1960 when Nigeria gained political independence down to 1978 when the country contracted the "jumbo loan" of about US$1 billion from foreign creditors, the size of public debt was relatively small, about 6.2% of the Gross Domestic Product (GDP). However, the situation quickly changed, and by 1985 the total size of Nigeria's external debt alone was about US$19 billion, which represented over 160% of the country's GDP. This activity further led to a debt crisis with the related adverse effect on economic growth.

By 1986, debt servicing to foreign creditors became a severe issue and Nigeria adopted the Structural Adjustment Program (SAP) proposed by international financial institutions such as the International Monetary Fund (IMF) and the World Bank, as a strategy to revamp the economy and enhance the burden of debt servicing. In December 2005, Nigeria was heavily indebted to the sum of US$36 billion, which was 58% of the total GDP. However, in 2007, Nigeria got debt relief that reduced foreign debt to approximately US$3 billion. The euphoria for debt relief lasted for a very short time as the government soon resumed borrowing in 2008. By December 2015, which is before the 2016 economic recession, Nigeria's total debt stock was US$65 billion. Furthermore, the Debt Management Office (DMO) reported that Nigeria's total debt structure as of December 2019 was approximately US$84 billion (made up of US$28 billion as external debt and US$56 billion for domestic debt), which is about 16.15% of the GDP (DMO, 2020). The present high level of debt is perceived to be due to gross misappropriation of resources, drop in oil prices and the lack of economic diversification to other sectors to enhance foreign earnings.

In recent times, the significance of borrowing for governments, including for infrastructure development, has been highlighted in the literature involving the influence of debt and the channel through which it can affect growth (Diamond, 1965; Elmendorf and Mankiw, 1999; Patillo, Poirson and Ricci 2011). Moreover, a number of studies have investigated the macroeconomic impact of public debt, but with divergent conclusions. For example, on the one hand, V. Owusu-Nantwi and C. Erickson, (2016); D. Alejandro and R. Ileana, (2017); O. Eze, A. Nweke and E. Atuma (2019) documented that public debt positively and significantly impact on economic growth. On the other hand, M. Abula and D. Ben (2016); M. Igbodika, I. Jessie and P. Andabai (2016) and P. Panagiotis, (2018) affirmed that public debt adversely affects economic growth. One important thing about these studies is that they were done in different settings with varying methods. Also, much of the studies done in Nigeria on this issue have used the Autoregressive Distributed Lag (ARDL), Vector Autoregressive (VAR) and Granger causality test. Moreover, the experiences of Mexico with debt overhang in 1982 as well as the events in recent past such as the 2016 economic recession, level of poverty, unemployment rate and high cost of living have led policymakers to be increasingly concerned about the possible impact of high levels of public debt on economic growth in Nigeria.

Against this backdrop, the object of this study is to examine the impact of public debt on Nigerian economic growth. The study employs the Johansen cointegration test, Ordinary Least Square (OLS) regression technique and Vector Error Correction Model (VECM) to analyze the monthly data from 1981–2019. The study hypothesized that public debt negatively induces economic growth in Nigeria. In addition, the study assumed a positive impact of the control variables on growth. The result of this study

leads to the conclusion that public debt negatively impacts economic growth in Nigeria. By focusing on developing country like Nigeria, the current study contributes to the literature on this issue in some ways. First, unlike other studies that used a single model, this study combined the Johansen cointegration, OLS regression technique and VECM to investigate this issue in Nigeria. Second, the study highlights the channel public debt can impact on economic performance in Nigeria. Finally, the findings provide policy-makers, investors, professionals and other agents of the economy with policy implication of public debt in developing countries such as Nigeria.

The remaining part of this paper is structured as follows. In section 2, the study discussed the theoretical and empirical impact of public debt on economic growth. While section 3 evaluates the empirical strategy which covers the data source and model specification, section 4 presents and interprets the results of the estimations. Section 5 concludes the study with recommendations.

1. LITERATURE REVIEW

1.1 Theoretical Framework

Several theoretical and empirical studies have examined the importance of public debt on economic growth in both developed and developing countries. Public debt represents the total sum of indebtedness a country is owing to both foreign and domestic creditors. In M. Christabell (2013), public debt is a critical macroeconomic indicator that requires prudent management because of its ability to create employment, stabilize prices and enhance economic growth. In a well-functioning economy, debt is essential to finance public investment projects that could add value to economic growth (Isaac and Rosa, 2016). However, there are indications that poor management of debt may lead to debt overhang and reduced output (Obi, 2014 and Chimezie et al., 2020).

Emerging from the economic crisis occasioned by the great depression of the 1930s, Keynes developed the modern theory of public debt to address the disequilibrium in the economic system due to unemployed resources in the private sector. The Keynesian theory postulates that for a nation to stimulate aggregate demand and achieve economic growth, government fiscal policy should focus on how to increase public debt and expenditure while decreasing tax rates. Keynes argued that the government could use borrowed funds from the private sector to finance its expenditure, and this way, idle funds in the private pockets are withdrawn without necessarily changing the consumption patterns of the people. According to Keynes, injecting such borrowed funds into the economy will help to quickly increase the aggregate demand, improve employment and economic outlook (Essien, Agboegbulem, Mba and Onumonu1, 2016). The theory maintained that when countries are experiencing low economic activity, public borrowing is particularly helpful to gain full employment and get the economy to converge to the state of equilibrium (Matthew and Mordecai, 2016). However, public borrowing, as argued by Keynes has received criticism because of the effect it has on investment. The argument is that government borrowing will reduce the resources available for investments in the private sector, which will, in turn, impact on economic growth (Jhingan, 2010).

Furthermore, the neoclassical growth theory as captured in Solow (1956) posits that with incremental savings rate, the economy can achieve high growth rates in assets from investments that are needed to attain aggregate output. The theory expanded to recognize the importance of technological change and the influence of debt on productivity, particularly in developing countries where there are enormous challenges in mobilizing the required savings for development. According to the neoclassical growth theory, the government can use debt to deploy technology, labour and capital to enhance economic growth provided such funds are invested in productive economic activities in a stable system (Engel, 2010; Babatope et al., 2019).

There are diverse channels with implications public debt can impact on economic activities. The neoclassical growth model argued the crowding out effects on economic growth. For example, to fund budget deficits, the government may issue government bonds or borrow from external sources. Where the government decided to issue bonds, such a policy can trigger higher interest rates in the markets

because of higher demands for credit facility at the financial markets. Consequently, there will be a high cost of capital, which may, in turn, crowd-out investment from the private sector and diminished economic growth due to low aggregate demand for goods and services. According to D. Elmendorf and N. Mankiw (1999) and L. U. Okoye et al. (2019), any increase in government expenditure backed by public debt may lead to an unbalanced system due to induced higher interest rates and decline in spending power both at the private sector and individual households. The empirical study of A. Attapattu and H. Padmasiri (2018) suggests that higher accumulated debt can lead to higher long-term interest rates, primarily when debt is not invested in good projects. Another transmission channel is through taxes that may lead to debt overhang (Tornell and Velasco, 1992). Other channels are total factor productivity and increased uncertainties in the environment due to inconsistencies in government policy decisions that may affect the choice of investment in short-term instruments as against long-term investments (Patillo et al., 2011).

1.2 Empirical Review

The observed evidence on the connection between public debt and economic growth provides mixed predictions about the direction and strength of the relationship (Elmendorf and Mankiw, 1999; Cochrane, 2011; E. Lucky and O. Godday, (2017); Attapattu and Padmasiri, 2018). In a related study, C. Checcherita-Westphal and P. Rother (2010) used the fixed effects technique to assess the impact of public debt on economic performance in 12 European countries during the period 1970 – 2010. They concluded that once the debt is between 90 –100 percent of GDP, there is a non-linear negative relationship between public debt and economic growth. C. Reinhart and K. Rogoff (2010a) employed data from 20 developed economies to observe the impact of public debt on economic growth from 1949 - 2009 and reported a negative correlation between a high level of debt and economic growth. They, however, concluded that at a public debt threshold of 90 percent of GDP, there was no evidence to establish a link between public debt and economic growth

In another study, N. Reza, R. Michael, and T. Mona (2014) employed the autoregressive distributed lag (ARDL) method to assess the connection between savings and economic growth in Iran for the period 1972-2010. Their result revealed a bi-directional long-run causal relationship between savings and economic growth. Furthermore, they documented a positive and significant connection between savings and economic growth. Using the Ordinary Least Square (OLS) approach, L. Precious (2015) evaluated the effects of public debt on economic performance in Swaziland from 1988-2013. The variables in the study were external debt, real GDP growth rate, domestic debt, inflation and government expenditure. The study reported that while external debt has an insignificant influence on economic growth, domestic debt was found to show a positive and significant impact on economic growth in Swaziland. In a similar study, S. Isaac and G. Rosa (2016) employed the dynamic panel data and the Generalized Method of Moments (GMM) to study the connection between public debt and public investments on economic output in Mexico between 1993 and 2012. They found that public debt has a positive relationship with economic growth. In a cross-country study, D. Alejandro and R. Ileana (2017) used data from 16 Latin American economies (Bolivia, Argentina, Chile, Brazil, Costa Rica, Mexico, Honduras, Panama, Nicaragua, Peru, Paraguay, Venezuela, Colombia, Dominican Republic, and Uruguay) to evaluate the influence of government debt on GDP during the period 1960- 2015. The study applied the 2-Stage Least Squares (2-SLS) for the analysis. The result of the study showed a positive impact of debt on GDP growth. They concluded that at public debt-to-GDP ratios of 64% to 71% threshold, economic growth would reduce to near zero.

In Nigeria, the empirical study by T. Egbetunde (2012) employed the Vector Autoregressive Model to examine the impact of public debt on economic growth in Nigeria during the period 1970 to 2012. The result showed that public debt has a positive relationship with growth. The study documented that public debt has a bi-directional relationship with economic performance in Nigeria. A study by S. Essien, N. Agboegbulem, M. Mba and O. Onumonu1 (2016) examined the impact of public sector borrowings on variables such as real gross domestic product, prime lending rate, domestic debt, composite consumer price index and external debt in Nigeria. The study used the Vector Autoregressive (VAR), Granger causality test, impulse response and variance decomposition for analysis. They reported too that both external

and domestic debts have no significant influence on the general price level and economic performance in Nigeria. In another study to evaluate the impact of debt on economic activities in Nigeria, M. Igbodika, I. Jessie and P. Andabai, (2016) applied the OLS technique to empirically assess the impact of domestic debt on economic growth in Nigeria from 1987 - 2014. They employed GDP, domestic debt, interest rate and inflation as the variables for analysis. They concluded that domestic debt positively and significantly impact on the Nigerian GDP. On the other hand, the interest rate showed a negative and significant influence on the GDP in Nigeria.

Furthermore, using the cointegration test, VECM and Granger causality test, O. Elom-Obed, S. Odo, O. Elom, and C. Anoke (2017) studied the connection between public debt and economic growth in Nigeria between 1980 and 2015. The result of the study which employed the real GDP, domestic private savings, external debt, and domestic debt as the variables of interest, disclosed that domestic debt and external debt negatively and significantly impact economic growth in Nigeria. They concluded that both domestic and external debts granger cause real gross domestic product (RGDP). In a similar study, O. Eze, A. Nweke and E. Atuma (2019) appraised the impact of public debts on economic growth in Nigeria from 1981-2017. They adopted the ARDL model and Chow Breakpoint test as methods for the analysis in the study. The findings of the study revealed that domestic and external debts have an adverse and significant impact on GDP, though only the external debt is significant with the GDP. Other variables in the study, such as government expenditure, national savings and consumer price index, have a positive impact on GDP. Also, they found from the result of the Chow test that there was no indication of a significant structural break between external debt and economic growth in Nigeria.

2. DATA AND METHODOLOGY

2.1 Data Description and Source

To investigate public debt and its influence on economic growth in Nigeria, this study employs monthly time series data from 1981 to 2019. This period of study is essential because of the early part that marks the beginning when debt began to take a toll on the Nigerian economy with much of the available resources employed to service debt with little or nothing for investment drive. During the period 1985 to 2001, Nigeria government spent more than US\$32 billion to service her debt (DMO, 2006). The study sourced data from the Central Bank of Nigeria (CBN) Statistical Bulletin, Debt Management Office, World Bank Development Indicators produced by the World Bank and World Economic Outlook as maintained by the International Monetary Fund.

2.2 Model specification

Following the transmission channels and the neoclassical growth model, the econometric model for this study is specified as follows;

$$\log g_t = \beta_0 + \beta_1 \log g_{t-1} + \beta_2 \log PDEBT_t + \beta_3 \log Z_t + \mu_t \quad \text{.......................} (1)$$

Where g denotes the real GDP growth rate, g_{t-1} is one year lagged real GDP, PDEBT is the total public debt stock measured as a percentage of real GDP, Z denotes the control variables, t indicates time and μ represents the residual or error term. The control variables are public investment (PINV) which is measured as a percentage of capital expenditure to real GDP, consumer price index (CPI) proxy for inflation and prime rate (PR) a proxy for interest rates. The study used population growth (POPG) and crude oil prices (COP), which represents the West Texas Intermediate (WTI). The selected variables are based on the study objective as well as their connection with economic growth, as highlighted in various theoretical and empirical studies on growth. Data availability was also a consideration. The study analyzes the variables in the form of their natural logarithm.

To check the properties of the data, the study employed the Augmented Dickey-Fuller (ADF) test as well as the Philips-Perron (PP) test for the analysis of stationarity. The unit root analysis is essential to determine whether the data are stationary or not and the order of integration, that is whether it is to order one, 1(1) or order zero, 1(0). The ADF test equation is:

$$\Delta \lambda_t = \alpha + \beta T + \delta \lambda_{t-1} + \sum_{i=1}^{k} \beta_i \Delta X_{t-1} + \mu_t \quad \text{.....................................} \quad (2)$$

Where Δ represents the first difference, k denotes the lag operator, t is the time subscript and μ is the residual or error term. The study used the Akaike Information Criterion (AIC) to select the lag-length. The lag variable is important to test for the first and higher order serial correlation with the error term, and where necessary, to take remedial action to correct for possible serial correlation. The PP model has the same distribution as the ADF. The order of integration after the unit root analysis provides the opportunity to carry out the cointegration test between the variables using the Johansen Cointegration test. The trace test is expressed as $\lambda_{Trace} = -T \sum_{i=r+1}^{P} In(1 - \lambda'_t)$ and maximal eigenvalue test is defined as $\lambda_{max} = -T(1 - \lambda'_{r+t})$. The null hypothesis is that there is no long-run equilibrium relationship between economic growth and other variables. The study employs the OLS model and the VECM as methods to analyze the data and establish the impact of public debt on economic growth in Nigeria. The OLS is one of the most frequently used techniques to investigate large samples and it is an essential component of most other techniques for analysis. On the other hand, the VECM can on its own select the appropriate lag length and combine information from both the short-run and long-run for analysis. The model helps to avoid possible misspecification bias and other drawbacks inherent with VAR.

3. EMPIRICAL RESULTS AND DISCUSSION

3.1 Descriptive analysis of the data

Table 1 presents the summary result of the descriptive statistical analysis of the variables in the study. The result shows that real GDP has an average value of 12.0094 and range from -8.1736 to 21.9420. The real GDP is positively skewed with a negative kurtosis. The average value of public debt is 9.0354 with a standard deviation of 1.7413. The average value of the public investment, prime rate and consumer price index is 13.1033, 11.3524 and 9.4051 with a standard deviation of 1.0335, 1.1309 and 2.0015 respectively. The result suggests that the variables are positively skewed. The result shows that most of the variables have a negative kurtosis within the benchmark of 3 for normal distribution. The probability of the Jarque-Bera test statistics for normality reveals that the variables in the sample study are normally distributed at the 5% level of significance.

Table 1: Descriptive statistics of the variables

	RGDP	PDEBT	PINV	PR	CPI	POPG	COP
Mean	12.0094	9.0354	13.1033	11.3524	9.4051	8.0635	9.0364
Maximum	21.9420	14.0218	8.9032	11.7327	10.0711	12.0066	12.0537
Minimum	-8.1736	8.4732	3.2839	0.0322	10.0253	10.0104	9.0637
Std. Dev.	0.8065	1.7413	1.0335	1.1309	2.0015	0.4319	1.2005
Skewness	1.0434	0.9253	1.0352	0.8263	0.8374	0.3642	1.0352
Kurtosis	-4.3028	2.8361	2.0639	3.0028	2.9637	1.5273	0.3528
Jargue-Bera	43.0527	4.7292	2.0487	2.1648	5.0726	1.9651	4.8935
Prob.	0.1745	0.4252	0.1046	0.6203	0.1111	0.3542	0.3310
Obs.	468	468	468	468	468	468	468

Source: Authors' computation, 2020

3.2 Correlation matrix

The result of the correlation matrix, as presented in Table 2, suggests that the variables are fairly correlated. Specifically, the result reveals that there is a strong negative correction between growth rate and public debt in Nigeria. This result suggests that there is a possibility of the mismanagement of public resources. The positive correlation between real GDP growth and investment signals the importance of public investment to economic output and development. Also, while oil price shows a positive influence on growth, variables such as prime rate and inflation proxy by consumer price index exhibit a negative correlation with growth. This finding suggests that inflation and interest rates are harmful to economic growth. Overall, the results of the correlation matrix indicate that variables have no issue about multicollinearity.

Table 2. Result of the correlation matrix

Variables	RGDP	PDEBT	PINV	PR	CPI	POPG	COP
RGPD	1.0000						
PDEBT	-0.0513	1.0000					
PINV	0.0406	-0.0411	1.0000				
PR	-0.0316	0.0402	-0.0333	1.0000			
CPI	-0.0381	0.0174	-0.0325	0.0163	1.0000		
POPG	-0.0013	0.0021	-0.0089	0.0454	0.0118	1.0000	
COP	0.0343	-0.0174	0.0431	-0.0356	0.0246	0.0407	1.0000

Source: Authors' computation, 2020

3.3 Unit root and cointegration tests

To establish whether the data are stationary and the integration order, the study used the Augmented Dickey–Fuller and Phillips–Perron tests. The lag length was selected using the Akaike Information Criterion (AIC). The result in Table 3 reveals that the variables were stationary at their first difference and integrated of order one that is, 1(1) in both ADF and PP tests. The study, therefore, rejects the null hypothesis that there is no unit root in the series at the 5% level of significance. With this result, the study proceeds with the cointegration analysis using the Johansen Cointegration test to evaluate the likelihood of a long-run relationship between economic growth and other variables in the model. The results of the cointegration test in trace and maximum eigenvalues statistics is presented in Table 4. The result indicates the presence of five cointegrating equations in the model at the 5% level of significance. This result implies that the null hypothesis of no cointegration is rejected. The result demonstrates that there is a long-run equilibrium relationship between economic growth and the explanatory variables.

Table 3: Results of the unit root test

Variables	ADF Test			PP Test		
	Level	First Difference	Order of integration	Level	First Difference	Order of integration
LogRGDP	-1.20164	-3.54111	1(1)	-1.26032	-5.41301	1(1)
LogPDEBT	-1.52873	-3.80535	1(1)	-1.01844	-7.07063	1(1)
LogPINV	-1.60044	-6.46019	1(1)	-1.40649	-3.06314	1(1)
LogPR	-0.84204	-2.90004	1(1)	-0.73111	-5.32371	1(1)
LogCPI	-0.49258	-3.45398	1(1)	-0.54701	-3.40026	1(1)
LogPOPG	-1.38201	-3.202241	1(1)	-1.85376	-3.31301	1(1)
LogCOP	-1.59907	-4.40544	1(1)	-8.05632	-5.09051	1(1)

Source: Authors' computation, 2020

Table 4: Results of cointegration tests (Trace and MaxEigen Statistics)

Hypothesized No. of CE(s)	Trace value			Max-Eigen value		
	Trace Statistic	0.05 Critical value	Prob.**	Max-Eigen Statistic	0.05 Critical value	Prob.**
None **	164.011	126.617	0.0000	61.0524	46.241	0.0000
At most 1	112.3000	104.733	0.0260	56.5043**	40.077	0.0030
At most 2	77.1088**	97.111	0.0030	35.1132**	37.046	0.0645
At most 3	50.7056**	69.003	0.0311	26.2008**	33.835	0.0000
At most 4	41.4441**	42.374	0.0000	22.0083**	27.114	0.0301
At most 5	25.3926**	29.311	0.0374	16.1338**	18.016	0.0041
At most 6	5.0628	15.209	0.1638	5.0628	15.209	0.0372

Note that ** denotes the level of significance at 5%.

Source: Authors' computation, 2020

3.4 Results of the OLS regression analysis

In the analysis, the study estimates three separate regressions using the OLS method, and the results are presented in the three columns of Table 5. In Column (1), the study examines the impact of public debt on economic growth, taking into consideration the influence of the control variables. The result suggests that public debt demonstrates the expected sign of a negative relationship with economic growth, and it is significant at the 5% level. Furthermore, the result shows that public debt has a coefficient of -0.1618, which means that a proportionate increase in public debt will cause real GDP to decrease by 16%. This finding is in accordance with the submissions of M. Igbodika, I. Jessie and P. Andabai (2016) and P. Panagiotis, (2018).

Table 5: OLS estimation results

Variables	Model 1		Model 2		Model 3	
	Coefficient	standard errors	Coefficient	standard errors	Coefficient	standard errors
$logRGDP_{t-1}$	0.0303*	0.2190	0.01733**	0.02811	0.0210**	0.0112
logCPI	0.0392*	0.0120	0.0535**	0.0340		
logPDEBT	0.1618*	0.8373	−0.0921**	0.05841	0.0261**	0.0214
logPINV	0.0411**	0.0213			0.0473	0.0167
logPR	0.0835**	0.0310	0.0394**	0.0171		
logCOP	0.0742	0.0597			0.0884**	0.0406
logPOPG	−0.0306**	0.0465	−0.0114**	0.0341	0.0390**	0.0299
Constant	2.3185**	0.2089	5.0042***	0.3116	0.8236*	0.5002
Observations	468		468		468	
R-squared	0.6352		0.7403		0.6857	
Adjusted R-squared	0.5601		0.6866		0.6233	
F-statistic	33.0265		28.4721		23.6532	
Prob(F-statistic)	0.0402		0.0000		0.0137	
Durbin-Watson stat	2.0175		1.9019		2.1049	
Normality	0.5160		0.3279		0.1034	
Serial Correlation	0.1452		0.1360		0.3201	
Heteroscedasticity	0.1083		0.4192		0.4522	

Note that *, ** and *** denote the level of significance at 10%, 5% and 1%.

Source: Authors' computation, 2020.

Still on Column 1 of Table 5, as expected, investment with a coefficient of 0.0411 and oil prices with a coefficient of 0.0742 both exerts a positive impact on economic growth at the 5% level of significance. This result is in line with the studies by V. Owusu-Nantwi and C. Erickson, (2016) and O. Eze, A. Nweke

and E. Atuma, (2019). Interestingly, against the expectation of the study hypothesis, population growth showed a negative but insignificant correlation with economic growth. The result of inflation and interest rates with a coefficient of -00392 and –0.0835 respectively, reveals a negative impact with growth. This result is consistent with the findings of M. Abula and D. Ben (2016). The F- statistics of 33.0265 with a p-value of 0.0402 and the R^2 of 0.6352 suggests that the model is of good fit and 64% of the factors influencing economic growth are explained by the changes in public debt and the control variables. The Durbin-Watson statistics of 2.0175 implies that there is no problem with autocorrelation in the sample study.

The study objective in Column 3 and 5 of Table 5 is to observe whether certain control variables will influence the impact of public debt on economic growth. In column 3, investment and oil prices were removed from the series of variables to observe the power of public debt on economic growth. The analysis reveals that the relationship between public debts and GDP remains negative and significant, with a coefficient of -0.0921. On the other hand, in column 5, investment and oil prices were introduced into the model and inflation, and prime rates were taking off the model. The objective was to observe how investment and oil prices would influence the connection between public debt and economic performance. The result shows that the relationship between investment and economic growth recorded the a priori positive sign. The coefficients of investment and oil prices are positive and signify that investment and oil prices tend to enhance the economic growth in Nigeria. Interestingly, public debt to GDP recorded a positive coefficient of 0.0261. Although the result is insignificant, it, however, suggests the influence of oil price and investment to moderate the impact of public debt on economic output. This result on the positive influence of public debt on growth supports the findings of D. Alejandro and R. Ileana (2017) and E. Lucky and O. Godday, (2017). The diagnostic tests carried out using the Breusch-Godfrey LM test and the White test shows that there is no issue about serial correlation and heteroskedasticity.

3.5 Robustness check

To assess the robustness of the OLS results, this study used the Vector Error Correction Model (VECM). The importance of the robustness check is to evaluate whether both regressions will produce the same sign and strength of significance. In other words, the essence of the robustness check is to observe how far the results generated using the OLS regression estimate will be consistent with the results of another appropriate model. The result of the VECM as presented in Table 6, indicates that most of the variables and their lags are significant. Overall, the result shows that the VECM perform better than the OLS estimation method. The result of the $ECM_{(-1)}$ shows a coefficient of -0.63101 with a p-value of 0.0260 and it is significant at the 5% level. The negative and significant result of the $ECM_{(-1)}$ signifies the speed of change the short-run equation will converge to long-run equilibrium. The finding of the estimate reveals that public debt, prime rate and consumer price index have coefficients of -0.23050, -0.17121 and -0.01005 respectively and significant at the 5% level. The negative sign of the two periods lagged of public debt is consistent with the OLS estimator output. This result suggests that a 1% change in public debt will have a negative impact on economic growth by 23%. As expected, the result reveals that investment and oil prices have a positive and significant coefficient of 0.07329 and 0.05222 respectively. This indicates the power of these variables to impact positively on economic output in Nigeria. The finding of the lagged real GDP reveals a positive coefficient of 0.03902 and it is significant at the 10% level. This result confirms the result of the OLS estimate. The result shows that growth is continuous and the current economic growth is a function of past performance. The R^2 is 0.68013, which suggests that 64% of the explanatory variables in the model account for the variation in real GDP growth rate. The F-statistic of 41.0061 with a p-value of 0.01370 shows that the model is good.

Table 6: Results from VECM estimation

Dependent Variable: ΔRGDP				
Variable	Coefficient	Std. error	t-Statistic	Prob.
$ECM_{(-1)}$	-0.63101	0.30911	-2.04138	0.02605
$ΔRGDP_{(-1)}$	0.03902	0.20027	0.19484	0.01638
$ΔRGDP_{(-2)}$	0.00633	0.01506	0.42032	0.03511

ΔRGDP(-3)	0.05635	0.10011	0.56288	0.03208
ΔCPI(-1)	-0.17121	0.10150	-1.68680	0.05094
ΔCPI(-2)	-0.02044	0.04533	-0.45092	0.15201
ΔCPI(-3)	-0.08466	0.05088	-1.66392	0.03627
ΔPDEBT(-1)	-0.03602	0.20505	-0.17566	0.10355
ΔPDEBT(-2)	-0.23050	0.18005	-1.28020	0.04092
ΔPDEBT(-3)	-0.05305	0.02005	-2.64589	0.05122
ΔPINV(-1)	0.07329	0.11061	0.66260	0.04840
ΔPINV(-2)	0.03333	0.03003	1.10989	0.64721
ΔPINV(-3)	0.02101	0.13007	0.16153	0.00842
ΔPR(-1)	-0.01005	0.03405	-0.29515	0.03077
ΔPR(-2)	-0.01263	0.04311	-0.29297	0.04342
ΔPR(-3)	-0.03405	0.02444	-1.39321	0.36071
ΔCOP(-1)	0.05222	0.03347	1.56020	0.02590
ΔCOP(-2)	0.10408	0.06937	1.50036	0.18100
ΔCOP(-3)	0.00111	0.01497	0.07415	0.05931
ΔPOPG(-1)	-0.02737	0.03488	-0.78469	0.15206
ΔPOPG(-2)	0.00502	0.01818	0.27613	0.09519
ΔPOPG(-3)	-0.04623	0.03426	-1.34939	0.35220
C	0.20034	0.10197	1.96470	0.52736
R-squared	0.68013			
Adjusted R-squared	0.64751			
F-statistic	41.0061			
Prob(F-statistic)	0.01370			
Durbin-Watson stat	1.90464			

Source: Author's computation, 2020. Note that *, ** and *** denotes level of significance at 10%, 5% and 1%.

3.6 Discussion of Findings and Policy Implications

Public sector borrowing is important to enhance economic growth and development, especially in developing economies like Nigeria where there is poor revenue drive from domestic savings and taxes. However, the importance of public sector borrowing is limited to how well such funds can be managed and to the point where further borrowing may not impede economic performance. This paper examines the impact of public debt on economic growth in Nigeria. The result indicates the presence of a long-run equilibrium relationship between public debt and growth in Nigeria. The VECM analysis reveals that 63% of disequilibrium is adjusted to the long-run equilibrium in the current year due to shocks in the previous year.

The result of the OLS estimate demonstrates that there is a negative but insignificant impact of public debt on economic growth. This result is consistent with the findings of S. Essien, N. Agboegbulem, M. Mba and O. Onumonu1 (2016). The insignificant negative impact of public debt on economic growth suggests that public debt does not have a substantial impact on economic growth in Nigeria during the period in consideration. This may be ascribed to the cushioning effects of the oil revenue particularly when the oil price was high at the international markets. It also signals the effective management of public debt by the Debt Management Office (DMO). However, the VECM estimate which shows the long-run effects of public borrowing, reveals a significant negative relationship between public debt and economic growth in Nigeria. Consistent with the studies by C. Reinhart and K. Rogoff (2010a) and Checherita-Westphal and P. Rother (2010), the findings of this study indicate that higher public debt contributes negatively to economic growth in Nigeria. This suggests the challenges around debt servicing, especially the external debt stock due to the drop in foreign earnings because of the decline in oil price. The result also demonstrates how public borrowing has been utilized to finance deficits that were not investment oriented but mainly consumables.

The findings have equally shown how well public debt has been mismanaged and misappropriated over time due to weak governance and institutional structures in Nigeria. Therefore, policymakers need to improve on the current debt management strategies and strive to reduce the present debt-to-GDP

ratio to a threshold that is attractive to investors. For Nigeria to achieve economic growth and development, the government must ensure that all public borrowings are channelled into productive sectors that will help to create employment, stabilize prices and drive improved output. Also, public borrowing should be targeted for investment in projects that can be commercialized at affordable rates. The government must embrace the importance of strong governance and institutional structures at all levels.

The result from both the OLS and VECM estimates shows that interest rates (prime rates) and inflation (consumer price index) are negative and significant. This result suggests that the two variables adversely and significantly impact on economic growth in Nigeria. This result is contrary to the findings of O. Eze, A. Nweke and E. Atuma (2019). The negative impact of interest rates on economic growth may have influenced the negative impact of inflation on economic growth. The high interest rate in the economy is likely to be due to government borrowing and its effect on private sector investment. Moreover, the impact of interest rates and inflation may be ascribed to the global financial crisis and drop in crude oil prices at the global markets. Thus, the Nigerian government needs to avoid borrowing that will compete with the private sector of the economy. In addition, government borrowing should be done with the understanding to invest in infrastructure and other amenities that would engender economic growth and development. Furthermore, economic diversification to other sectors of the economy to enhance revenue generation outside oil and create employment is essential to reduce the effect of interest rates and inflation in the system. With the current drop in oil prices, the government needs to engage in long-term borrowing that is matched with long-term investment projects to ensure the ease of debt servicing as well as economic growth.

CONCLUDING REMARKS

This study examines the impact of public debt on the Nigerian economy, using the Johansen cointegration, OLS and VECM as methods to analyze data from 1981 - 2019. The study focused on variables such as real GDP growth, investment, consumer price index, prime rate, population growth and oil prices. These explanatory variables were considered important to enhance economic performance in Nigeria. The empirical analysis offers evidence to support a long-run equilibrium relationship between public debt and economic performance in Nigeria. The study reveals that public debt negatively and significantly impact on economic growth in Nigeria. One important implication of this finding is that public debt in Nigeria has not played the expected significant role to enhance economic growth and development. Consequently, a further rise in the level of public debt and the cost of debt servicing would further decrease the level of economic growth and development in Nigeria. Furthermore, this study shows that while investment and oil price demonstrates a positive and significant influence on economic growth, interest rates and inflation (CPI) indicate a negative and significant impact on economic output in Nigeria during the period under consideration.

In light of the results of this study, it is recommended that the government should embark on efficient investments and programs of economic diversification to improve revenue generation from other sectors of the economy as against the current concentration on earnings from crude oil. Also, effort must be put in place by the government to ensure that borrowing does not result in crowding out effect of the private sector investment that is equally important to drive economic growth and development. The debt management strategy to ensure public borrowing is kept far below the IMF prescription should be maintained by the government through the DMO. Moreover, apart from acquiring public debt to execute sustainable investment projects only, the government should focus on pursuing sound economic policies that would create an enabling environment for macroeconomic variables to stabilize and enhance economic growth.

This study is limited by the number of variables, scope and the nature of data employed to examine this issue in Nigeria. Thus, other studies can expand the present study by introducing other explanatory variables, measurements of variables and methods of analysis to other developing countries.

ACKNOWLEDGMENT

REFERENCES

Abula, M., Ben, D. M. (2016), "The impact of public debt on economic development of Nigeria", *Asian Research Journal of Arts and Social Sciences, Vol.*1, No.1, pp. 1-16.

Alejandro, D. J., Ileana, R. J. (2017), "The impact of government debt on economic growth: An overview for Latin America", *Department of Economics, University of Perugia (IT), working paper*, Vol. 28, pp. 1-11.

Attapattu, A. M. C. P., Padmasiri, H. M. N. (2018), "Long-run effect of public debt on economic growth in Sri Lanka", *Modern Economy*, Vol. 9, No. 4, pp. 775-789. https://doi.org/10.4236/me.2018.94051

Babatope, O. M., Onyebuchi, I. Adekunle, W. I. (2019), "Debt and economic performance in Nigeria (1982 -2016)", *The Nigerian Journal of Risk and Insurance*, Vol. 9, No. 1, pp. 112 -124

Checherita-Westphal, C. Rother, P. (2010), "The impact of high and growing government debt on economic growth: An empirical investigation for the Euro Area", *IMF Working Paper* No. 10/1237.

Chimezie, P. O, Omankhanlen, E. A & Eriabie, S. (2020). "Nexus between public finance and economic growth in Nigeria." *WSEAS Transactions on Business and Economics*, 7, 184-194

Christabell, M. (2013), "The relationship between public debt and economic growth in Kenya", *International Journal of Social Sciences and Project Planning Management*, Vol. 1, No. 1, pp. 1-21.

Cochrane, J. H. (2011), "Understanding policy in the great recession: Some unpleasant fiscal Arithmetic", *European Economic Review*, Vol. 55, pp. 2–30.

Debt Management Office (DMO) (2020), www.dmo.gov.ng

Diamond, P. (1965), "National debt in a neoclassical growth model", *American Economic Review*, Vol. 55, No. 5, pp. 1126–1150.

Egbetunde, T. (2012), "Public debt and economic growth in Nigeria: Evidence from Granger Causality", *American Journal of Economics*, Vol. 2, No. 6, pp. 101–106.

Elmendorf, D. W., Mankiw, N. G. (1999), "Government debt. Amsterdam: North-Holland", *Handbook of Macroeconomics*, Vol. 1C, pp. 1615-1669.

Elom-Obed, O.F., Odo, S. I., Elom, O. O., Anoke, C. I. (2017), "Public debt and economic growth in Nigeria", *Asian Research Journal of Arts and Social Sciences, Vol.* 4, No. 3, pp. 1-16

Engel, S. N. (2010), "Development economics: from classical to critical analysis. In R. A. Denemark (Eds.)", *The International Studies Encyclopedia*, Vol. 2, pp. 874-892, Blackwell Publishing, West Sussex.

Essien, S. N., Agboegbulem, N. T. I., Mba, M. K. Onumonu1, O. G. (2016), "An empirical analysis of the macroeconomic impact of public debt in Nigeria", *CBN Journal of Applied Statistics*, Vol. 7, 1, pp. 125-145.

Eze, O. M., Nweke, A. M. Atuma, E. (2019), "Public debts and Nigeria's economic growth", *Journal of Economics and Finance, Vol.* 10, No. 3, pp. 24 – 40.

Igbodika, M. N., Jessie, I. C., Andabai, P. W. (2016), "Domestic debt and the performance of Nigerian economy (1987-2014): An empirical investigation", *European Journal of Research and Reflection in Management Sciences, Vol.* 4, No. 3, pp. 34-42.

Isaac, S., Rosa, G. (2016), "Public debt, public investment and economic growth in Mexico", *International Journal of Financial Studies*, Vol. 4, No. 6, pp. 1-14.

Jhingan M. L. (2010), "Macroeconomic theory", 12th edition, *Vrinda publications* Ltd., New Delhi.

Lucky, E. U., Godday, O. O. (2017), "The Nigeria debt structure and its effects on economic Performance", *International Journal of Business and Management Review*, Vol. 5, No. 10, pp. 79-88.

Obi, C. K. (2014), "An estimation of the critical levels of external debt accumulation: The Nigerian experience", *International Journal of Sustainable Development*, Vol. 7, No. 12, pp. 73-82.

Okoye, L. U., Omankhanlen, A. E, Okorie, U. E., Okonh, J. I. & Ahmed, A.(2019). "Persistence of fiscal deficits in Nigeria: examining the issues." *Investment Management and Financial Innovations*, 16(4), 98-109.

Owusu-Nantwi, V. Erickson, C. (2016), "Public debt and economic growth in Ghana", *African Development Review, Vol.* 28, No. 1, pp. 116 –126

Matthew, A. Mordecai, B. D. (2016), "The impact of public debt on economic development of Nigeria", *Asian Research Journal of Arts and Social Sciences, Vol.* 1, No. 1, *pp. 1-16*

Panagiotis, P. (2018), "The effect of government debt and other determinants on economic growth: The Greek experience", *Economies*, Vol. 6, No. 10, pp. 1-19.

Patillo, C.A., Poirson, H., Ricci, L.A., (2011), "External debt and growth", *Review of Economics Institution,* Vol. 2, No. 3, pp. 1 - 30.

Precious, L. N. (2015), "Effects of public debt on economic growth in Swaziland", *International Journal of Business and Commerce, Vol.* 5, No. 1, pp. 1-24.

Reinhart, C. Rogoff, K. (2010a), "Growth in a time of debt", *American Economic Review*, Vol. 100, No. 2, pp. 573–78.

Reza, N., Michael, R. Mona, T. (2014), "Relationship between savings and economic growth: The case for Iran", *Journal of International Business and Economics*, Vol. 2, No. 4, pp. 107-124.

Solow, R.M. (1956), "A contribution to the theory of economic growth", *The Quarterly Journal of Economics*, Vol. 70, No. 1, pp. 65-94.

Soludo, C.C. (2003), "The debt trap in Nigeria: Towards a sustainable debt strategy", *Africa World Press,* New Jersey.

Tornell, A. Velasco, A. (1992), "The tragedy of the commons and economic growth: Why does capital flow from poor to rich countries?", *Journal of Political Economies*, Vol. 100, No. 6, pp. 1208–1231.