

PUBLIC INVESTMENT, PUBLIC DEBT AND ECONOMIC GROWTH IN NIGERIA

¹Mohammed Musa and ²Ilemona Adofu Ph.D

¹Ph.D Student, Department of Economics, Federal University of Lafia

²Department of Economics, Federal University of Lafia

Email: ¹bestmmb71@yahoo.com & ²ilemonaadofu@yahoo.com

Abstract

The study examines the effects of public debt public investment and economic growth of Nigeria. Using granger causality test, it was found that there is a uni-directional causality between public investment and public debt, running from public debt to public investment. An Autoregressive Distributed Lag Bound test of cointegration shows that there is a long run relationship between public debt and public investment, and that public debt negatively influences public investment. As for the effect of public debt on economic growth, a Threshold Autoregressive model shows 16.41% threshold level. Below the threshold, public debt has a positive effect on the economic growth. Above the threshold, public debt has negative effect on the economic growth. It is therefore concluded that public debt is a significant factor that determines the performance of public investment and economic growth of Nigeria. It is recommended that government put in place necessary policies that enhance its revenue to reduce excessive borrowings that can hinder the economic performances. It is further advised that public debt be utilized basically for capital investment projects that have direct bearing to the lives of the ordinary citizens in terms for job creation and social welfare. Government should inculcate discipline in terms of servicing of debts to avoid recapitalization of arrears which add further pressure to the existing debt burden of the country.

Keywords: Public investment, public debt, economic growth.

1.0 Introduction

The aftermath of the 2007-2008 financial crisis which was regarded as the most devastating financial crisis of all time since after the great depression of the 1930s had set in a stage of economic imbalance hence, a debt crisis that started with the private sector, shifted to government in the aftermath. This necessitates high borrowing by government to make up drop in revenue and to finance stimulus packages. In 2018, global debt has hit a record high of 225% of world GDP at a time when economic growth is robust (Mbaye & Moreno, 2019). However, according to International Monetary Fund (IMF), Japan has the highest national debt in the world at 235.96% of its GDP in the year 2019. Of the world major economic powers, the United States of America has the highest national debt at 108.02% of its GDP, while China as the second largest economy has a national debt ratio of 51.21% of its GDP("

Debt to Ratio by Country",2019). It is evident from the forgoing that despite huge piled debts advanced nations economies continues to grow, giving credence to the hypothesis that high level of debt is needed to support a given rate of economic growth (Michael P. 2019).

The Paris club cancellation of Nigeria's debt of \$30 billion on April, 2006, was seen as an opportunity to place the country's economy on a strong foundation that would usher in sustainable growth and development, however years down the drain that seems not the case as the country is gradually slipping in to another form of debt overhang. A strong apprehension is constantly registered by concern citizens, non governmental bodies and world financial institutions such as the World Bank and International Monetary Fund (IMF) on the possibility of relapsing the country back into another debt crisis. Though, constantly the federal government of Nigeria continues to assured its development partners of the sustainability of the debt and claims that it is within acceptable limit. Data from the Nigerian debt management office shows the nation total debt profile stood at \$10.43 billion at the end of 2012, (Linus, A. 2017). According to Amaefule (2014), Nigerian total debt profile had increased from \$48.36 billion to \$65.25 billion between March 31, 2013 and March 2014. Nigerians public debt accounted to 16.1% of its nominal GDP in December 2018 compared to 16.2% in 2017. The data reach an all time high of 80.5% in December 1992 and a record low of 7.2% in December 2008 ("Nigeria Government Debt: % of GDP, 1981-2019").However, the capital investment to GDP ratio between 2003 and 2018 has the highest record of 29.39% while an all time low of 15.4% in 2016 corresponding to the negative growth rate of the economy at -1.5% in 2016 ("Nigeria GDP|2019|Data|"). Since then, a sluggish growth rate of 0.8% in 2017 to 1.9% in 2018.

Government debt is one of the major sources for financing the government operational activities under the fiscal policy. Nevertheless, there are many criticisms against government's borrowings, they argue that uncontrolled borrowings may lead to a debt trap problem and thereby country's development process gets into a stalemate situation, but it will not be a detrimental impact always on the economy if borrowings are efficiently and productively used. For instance, if borrowed funds are used for long term development programs it will be advantageous for the country as higher returns reach the economy. Furthermore, borrowings play a major role in solving the Balance of Payment difficulties. Since borrowings pave the way to utilize resources than the potential resource level owned a country, it is not inherently bad for a country (Ranjith & Thilanka, 2018). According to Golden rule of public finance, borrowings are supposed not for financing recurrent expenditures, but to finance productive public investment that has potential to pay for itself over the long-term (Greiner, 2010). Given this interrelatedness between the public debt and project financing and investment, this study deems it fit to examine the nature of relationship between public debt and public investment.

Also relevant and much related to the above is the relationship between public debt and economic growth. This is because investments made from borrowings are expected to spur

economic growth. Recent studies conducted on the relationship between public debt and economic growth show that there is a turning point at which the positive contribution of public debt to economic growth becomes negative. Empirical evidence, led by Reinhart and Rogoff (2010), shows that at the initial stage, public debt has positive effect on economic growth. This is said to be possible through the multiplier effects of the long term investments that are made from government debts. But in the long run, the effects of governments debts on economic growth becomes negative. This occurs at a particular point, debt threshold, at which incurring of debt is discouraged. This hypothesis is supported by empirical evidence by Checherita-Westphal and Rother (2012); Syssoyeva-Masson and Andrade (2017); and Kamiguch and Tamaib (2019).

Contrariwise, other researchers like Chudik, Mohaddes, Pesaran and Raissi (2015) and Osinska, Kufel, Blazejowski and Kufel (2016) discarded the debt threshold hypothesis. They argued that the adoption of the correct methodology removes the existences of such, that the proponents of the hypothesis ignored the necessary methodology that is required model debt-economic growth relationship. Given the opposing arguments about the existence of a threshold, it becomes imperative to conduct a wide range of studies to ascertain the true nature of relationship between the two variables. In developing countries, where the public debts increase geometrically in the recent times, there is dearth of studies in this area. This study is therefore conducted to investigate (1) the nature of relationship between public debt and public investment; and (2) the nature of relationship between public debt and economic growth in Nigeria.

1. Literature Review

The literature review of this study is divided into two categories. The first category takes care of the relationship between public investment and public debt, while the second category takes care of that of public debt and economic growth.

Ncanywa and Masoga (2018) investigated whether public debt influence public investment and ultimately economic growth in South Africa. Using autoregressive distributive lag, Cointegration, Granger causality, impulse response function and variance decomposition, he found the presence of long-run relationship among the investigated variables. It was found that in the long run there is a negative relationship between public debt and investment. Since there is direct link between investment and economic growth, there is an inverse relationship in the public debt economic growth nexus. The error correction mechanism confirmed that the system can adjust to equilibrium at a speed of 17%. There is bidirectional Granger causality relationship between public debt and economic growth. The impulse response function has found that, one standard deviation shock in public debt inversely affect economic growth. Variance decomposition results indicate that a shock to public debt account for 16.39% fluctuations in economic growth. It is recommended that a capital scarce

country be encouraged to borrow so that more capital can be accumulated. However, the later stage of borrowing marked with high level of debt will lead to subdued growth.

Mabula & Mutasa (2019) investigates the effect of public debt on private investment in Tanzania. An Autoregressive Distribution Lag (ARDL) bound test to cointegration is used in the study from a secondary data within the period 1970 - 2016. The results confirm a significant relationship external debt and private investment, though the Granger causality test suggests the relationship is rather a co - movement than causal, implying that at 5% level of significance there is no evidence of long run and short run relationship between domestic debt and debt services on one hand and private investment on the other hand.

Emenike (2015) investigates the long-term relationship and dynamic short-term impact of public debt on foreign private investment for a developing country like Nigeria during the period 1962 to 2012. The paper deploys cointegration model to examine long-term relationship between the variables. The study also examines dynamic short-term impact and causality between public debt and foreign private investment using the VECM and Granger causality test. The study further examines the response paths of foreign private investment variable due to public debts shocks using variance decomposition. The results confirm absence of long-term relationship between public debt and foreign private investment in Nigeria. The results also show that external debt has negative impact on foreign private investment in the short-term. Finally, the results show that there is no causality between foreign private investment and public debt.

Canhand and Phong (2018) assessed the impact of public investment on private investment and economic growth in Vietnam based on data from 22 economic industries over a 27-year period (1990-2016) by applying PVAR model combined with GMM. The results show that public investment and state sector investment (including public investment and state-owned enterprise investment for production and business activities) has the same positive impact economic growth in most economic industries in the long term, but state sector investment also creates more growth effects in the short term. Public investment has a cyclical impact on private capital stock (domestic private + FDI capital stock) and FDI investment; it has the effect of boosting domestic private investment, FDI investment in the short and long term. Meanwhile, state-sector investment has decreased the private capital stock in the short term, crowds out domestic private and FDI investments in the short term, and in the long term. Both public investment and state sector investment has the effect of increasing public debt in the long term. Based on these results we have some policy recommendations to increase efficiency of public investment and state sector investment.

Thilanka and Ranjith (2018) examined the impact of public debt on private investment in Sri Lanka using the annual data for the period 1978-2015. The study follows some econometric steps respectively unit root test, Johansen co-integration test and finally employing the Vector Error Correction Model (VECM) to find out the long-run impact. Empirical findings of our

study show the evidence for the presence of crowding-in effect of public debt on private investment in the long-run implying that government has diverted borrowing funds as spurring private sector. Further, real GDP also affects positively on private investment suggesting further expansion of the economy is inevitable. Hence, the policy compilation with regard to fiscal operations should be aimed at the well-managed borrowing for the purpose of boosting private investment further.

Ekperiware and Oladeji (2012) used the quarterly time series of external debt, external debt service and real gross domestic product to determine the structural break effect of external debt on economic growth in Nigeria as a result of the debt relief for a period of 1980 to 2009. The result of the chow test reveals that the 2005 external debt relief caused a structural break in economic growth relationship with external debt in Nigeria. The result further indicate that the debt relieve package made it possible to redirect funds which would have been used for debt servicing but for investment into some critical sectors of the economy such as in transport, health, education.

Kamunfia S., Gitahi S., and Mwilarias M.(2015), examined the effect of public debt on private investment in Kenya using time series data from a span of 1980 to 2013. Granger causality test was carried out to determine the direction of causality between public debt and private investment while on the other hand Ordinary Lease Square was conducted to estimate the model. The result of the Granger causality test shows the presence of unidirectional causality from private investment.

Akomolafe, Bosade, Emanuel & Mark (2015) investigates the effect of public borrowing on private investment in Nigeria using Johansen Co-integration text and Vector Error Correlation Model (VECM). The result indicates that while domestic debt crowds out domestic investment both in the short and long run period on the other hand external debt only crowds out domestic investment in the long run.

The second category of studies that investigated the relationship between public debt and economic growth are reviewed as follows. Reinhart and Rogoff (2010) investigated the relationship between high public debt levels, growth and inflation of 44 countries. They found that whereas the link between growth and debt seems relatively weak at “normal” debt levels, median growth rates for countries with public debt over roughly 90 percent of GDP are about one percent lower than otherwise; average (mean) growth rates are several percent lower. But for inflation, they found no systematic relationship between high debt levels and inflation for advanced economies and presence of relationship between high public debt levels and higher inflation. is that across both advanced countries and emerging markets, high debt/GDP levels (90 percent and above) are associated with notably lower growth outcomes. They concluded that traditional debt management issues should be at the forefront of public policy concerns.

Checherita-Westphal and Rother (2012) investigated the average impact of government debt on per-capita GDP growth in twelve-euro area countries over a period of about 40 years starting in 1970. They found a non-linear impact of debt on growth with a turning point beyond which the government debt-to-GDP ratio has a negative impact on long-term growth – at about 90–100% of GDP, and that the negative growth effect of high debt may start already from levels of around 70 to 80% of GDP. They equally found that government debt has a non-linear impact on the economic growth rate through private saving, public investment and total factor productivity.

Chudik, Mohaddes, Pesaran and Raissi (2015) investigated the long-run impact of public debt expansion on economic growth and investigates whether the debt-growth relation varies with the level of indebtedness. Developing tests for threshold effects in the context of dynamic heterogeneous panel data models with cross-sectionally dependent errors, they illustrated the threshold modeling approach by means of Monte Carlo experiments that they perform well in small samples. On the empirical side, using data on a sample of 40 countries (grouped into advanced and developing) over the 1965-2010 period, they found no evidence for a universally applicable threshold effect in the relationship between public debt and economic growth, once we account for the impact of global factors and their spillover effects. Regardless of the threshold, they however found a significant negative long-run effects of public debt build-up on output growth. Provided that public debt is on a downward trajectory, a country with a high level of debt can grow just as fast as its peers in the long run.

Osinska, Kufel, Blazejowski and Kufel (2016) examined the possible relationship between economic growth rate and debt-to-GDP ratio, and other macroeconomic determinants. Using the level and first difference states of the macroeconomic variables as thresholds variables (public debt, rate of inflation, interest rate, and rate of unemployment), they detected the most important variable (threshold variable) that has more influence on the economic growth (proxied by GDP and industrial production growth rates) of each of the countries. The level of growth (GDP and industrial production growth rates) itself was also used as the threshold variables. They found that the monetary mechanism played the most important role in diagnosing the phases of business cycle of the investigated European economies, and that threshold variables differ across countries.

Syssoyeva-Masson and Andrade (2017) investigated the statistical properties of the Debt-to-GDP ratio, and whether there is a common threshold for government debt ratios above which long-term growth rates may drop off significantly. Using Westerlund Panel cointegration approach they found that government is not cointegrated with economic growth. Using the relative weight of debt, level of the GDP per capita, a variable representing the time, instability of the relative weight of debt as threshold variables, they found the presence of thresholds contrary to the conventional 90% in most literature.

Related to the above study is a theoretical study conducted by Kamiguch and Tamaib (2019). They investigated the relationship among public investment, economic growth, and population aging under the specified fiscal rule. Using an overlapping generations model with

debt-financed public investment and assuming that government is subject to the golden rule of public finance and that households are finitely lived in the sense of Yaari–Blanchard, the study showed that the growth-maximizing tax rate is not equivalent to the welfare-maximizing one, and that both tax rates are lower than the output elasticity of public capital. The study also derived the threshold value of public debt to GDP ratio that maximizes the equilibrium growth rate and social welfare, confirming the inverted-U relation between the public debt to GDP ratio and economic growth rate suggested by empirical studies. It was shown that both tax rates and the public debt to GDP ratio positively depend on longevity. Their finding provided a possible explanation for the rising tendency of the public debt to GDP ratio under population aging in countries such as the United Kingdom, Germany, and Japan.

Isibor, Babajide, Akinjare, Oladeji, & Osuma (2018) studied the effect of public debt on economic growth in Nigeria using two-staged least square regression for a period between 1982-2017. For the first equation, both internal and external debt and their lags were regressed against GDP, the result showed that external negatively impacts the economy while internal debt positively does the same. For the second equation, GDP, total savings deposits in the Nigerian deposit money banks and capital expenditure were regressed against internal debt, the result showed that all the variables have significant relationship with internal debt. The study thus, recommended that first; Corruption of borrowed funds should be tackled at all cost and also, government should minimize external borrowing, since, it impacts the economy negatively.

In Nigeria, studies like Ogunmuyiwa (2011), Nwannebuike, Ike and Onuka (2016); and Akhanolu, Babajide and Victoria (2018) have been conducted to investigate the nature of relationship between external debt and economic growth. They found that external debt and economic are linearly related. As a departure from these studies, the current study uses an up-to-date data to examine the non-linear relationship between public debt and economic growth. This was done using Threshold Autoregressive (TAR) model.

LE A and AFRREV I (2012), studied the effect of the various types of external debt on Nigeria's economic development using Multiple Regression technique. The result reveals that while London Club shows negatively significant only past values of gross domestic product (GDP), taken as independent variable, was found to be positively significant. Hence it was recommended based on the result for government to be careful in taking loans and if it must take one then the fund should be channelled to productive purposes to enable repayment.

3.0 Research Methodology

3.1 Nature and sources of Data

This study used time series data on GDP per capita growth, inflation rates, interest rates, population growth, and broad money supply growth extracted from World Bank Development

Indicators, while debt to GDP ratio data was sourced from IMF Historical Data. The data ranges from 1968 to 2017. The need to enrich the data from historical perspective to date necessitate the time frame between 1968 to 2017 hence, essential variable of interest to the study were captured. Treasury bills were first issued in 1968 which constitute one of the largest between 1983 and 1988. It even surpassed treasure bills issued between 1976 and 1980.

Augmented Dickey Fuller unit root test was performed to establish the order of integration of the variables. The test is necessary to know the level of stationarity of the variables (Dickey and Fuller 1979; 1981). It can be specified as below:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^p \Delta Y_{t-i} + \varepsilon_t \dots \dots \dots 1$$

Where, y is the variable in consideration, Δ is the first difference operator, α_0 is intercept constant, α_1 is a trend term, p is a lag order of the autoregressive process, and ε_t is the error term.

3.3 Granger Causality

A granger causality was carried out to investigate the nature of relationship between public debt and investment rate. This is necessary to know how the public debt and public investment nexus equation is to be specified.

3.4 Model Specification

For the first objective, gross capital formation was used as the dependent variable and public debt as the explanatory variable. This is based on the result of Granger Causality that public investment granger-cause public debt. The control variables, in the model, are Inflation rates, interest rates, population growth and broad money supply growth. The choice of estimation technique and variables are based on Ncanywa and Masoga (2018), Canh and Phong (2018) and EF that have been conducted on the relationship.

The implicit form of the models can be specified below:

$$GCFGR = f(GDPDEBT, INF, INT, POPG, BMGRT)$$

The structural form of the models can be specified below:

$$GCFGR_t = \beta_0 + \beta_1 GDPDEBT_t + \beta_2 INT_t + \beta_3 INF_t + \beta_4 BMGRT_t + \beta_5 POPG_t + U_t \dots 1$$

Where : GCFGR stands for gross capital formation growth, GDPDEBT stands for debt to GDP ratio, INT stands for interest rate, INF stands for inflation rate, INT stands for the interest rate, BMGRT stands for broad money supply growth rate and POPG stands for population growth.

For the second objective, economic growth (proxied by GDP per capita) was used as the dependent variable, while public debt (proxied by debt to GDP ratio) was used as the main independent variables. Inflation rates, interest rates, population growth and broad money supply growth were also used as control variables. The choice of the variables is in line with the existing studies, like Reinhart and Rogoff (2010); Checherita-Westphal and Rother (2012); Syssoyeva-Masson and Andrade (2017); that investigated the non-linear relationship between public debt and economic growth.

The implicit form of the models can be specified below:

$$GDPPCG=f(GDPDEBT,INF,INT,POPG,BMGRT)$$

The structural form of the models can be specified below:

$$GDPPCG_t = \beta_0 + \beta_1 GDPDEBT_t + \beta_2 INT_t + \beta_3 INF_t + \beta_4 BMGRT_t + \beta_5 POPG_t + U_t$$

.....2

Where

Equation (2) represents the OLS regression that was estimated. The results of the model were compared to that of TAR model represented by equation (3). In the models, GDPPCG represents GDP per capita growth, INF represents inflation rates, INT represents interest rates, POPG represents population growth, and BMGRT represents broad money supply growth. The parameter of equation (2) are $\beta_0, \beta_1, \beta_2, \beta_3$ and β_4 , while U_t is the error term.

The linear equation (2) can be expressed as a non-linear equation under a two-regime Threshold Autoregressive (TAR) model as follows:

$$GDPPCG_t = (\beta_{10} + \beta_{11}GDPDEBT_t + \beta_{12}INT_t + \beta_{13}INF_t + \beta_{14}BMGRT_t + \beta_{15}POPG_t) \cdot d(GDPDEBT_t \leq \gamma) + (\beta_{20} + \beta_{21}GDPDEBT_t + \beta_{22}INT_t + \beta_{23}INF_t + \beta_{24}BMGRT_t + \beta_{25}POPG_t) \cdot d(GDPDEBT_t > \gamma)$$

.....3

Equation (3) represents the TAR approach, which stands for the non-linear relationship between public debt and economic growth. TAR model allows us to test the existence of non-linear relationship and to determine the number of thresholds in the model. The equation is estimated under the null hypothesis of no threshold effect ($H_0: \beta_{1i} = \beta_{2i}$, where $i = 0, \dots, 5$) against an alternative hypothesis where ($H_1: \beta_{1i} \neq \beta_{2i}$, where $i = 0, \dots, 5$). The threshold value ' γ ' is unknown, which makes it impossible to be estimated through the traditional OLS method. The first regime of equation (2) shows where the threshold variable is less than or equal to public debt coefficient, while the second regime shows where the threshold variable is greater than or equal to public debt.

4.0 Presentation of Result

4.1 Unit Root Results

Table 4.1 shows the results of the unit root tests of the variables. It is extracted from section 1 of the appendix

Table 4.1 Results of Unit Root Tests

Variable	Level		First Difference		Decision
	statistics	P-values	Statistics	P-values	
GDPPCG	0.4426	0.8059	-3.2329	0.0018	I(1)
INTR	-1.2226	0.8936	-4.1757	0.0019	I(1)
GDPDEBT	-2.8321	0.0630	-	-	I(0)
INF	-4.0071	0.0030	-	-	I(0)
POPG	-3.6980	0.0080***	-	-	I(0)
BMGRT	-4.3155	0.0012	-	-	I(0)
GCFGR	-3.3438	0.02208	-	-	I(0)

Source: Author's computation based on E-View Version 10

In the table 4.1, it can be seen that GDP per capita growth (GDPPCG) and interest rate (INTR) are stationary at first difference. This is can be concluded that their probability vales are greater than 5% statistical significance level. Gross capital formation growth (GCFGR), GDP to total debt ratio (GDPDEBT), inflation (INF), population growth (POPG) and money supply growth (BMGRT) are stationary at levels. The probability values ofGCFGR, INF, POPG, and BMGRT are greater than 5% statistical significance level, while GDPDEBT are greater than 5% statistical significance level.

1.2 Granger Causality

Table 4.2 shows the result of the granger causality that was carried out. The result is extracted from section 2 of the appendix

Table 4.2: Granger Causality between Public debt and public Investment

Null Hypothesis	Observations	F-statistics	Probability
GDPDEPT does not Granger Cause GCFGR	34	4.3676	0.0220
GCFGR does not Granger Cause GDPDEPT		1.8566	0.1743

From the table, it can be seen that there is a unidirectional relationship between public debt and public investment. There causality runs from public debt to public investment. Given that the p-value of non-causality between public debt and public investment is less than 5%, we can reject the non-causality hypothesis, and conclude that public debt granger-cause public investment. The reverse is the case for causality from public investment to public debt. The

non-causality hypothesis cannot be rejected; we can therefore conclude that public investment does not granger cause public investment.

4.3 Regression Results

As shown in the table 3 of the appendix, there is long run relationship between public debt and public investment. Having ascertained that, the impact analysis between public debt and public investment are estimated and presented in table 4.3. The result is extracted from section 3 of the appendix.

Table 4.3 Long-run Relationship between Public Debt and Public Investment

Variables	Long-run ARDL Bound Test Results	
	Statistics	P-vales
GDPDEBT	-0.3475	0.0020
INTR	0.0773	0.9553
INF	0.7803	0.0117
BMGRT	-0.9782	0.0014
C	-8.9688	0.4058

Table 4.3 shows that the coefficient of public debt is negative and statistically significant 5% level of statistical significance, a one percent increase in public debt leads to decrease in public investment by 0.3475units, all other factors being constant. Also, inflation rate and broad money supply growth are statistically significance in influencing public investment. At 1% level of statistical significance, a one percent increase in money supply growth leads to decrease in public investment by 0.9782 units, all other factors being constant. At 1% level of statistical significance, a one percent increase in inflation leads to increase in public investment by 0.7803 units, all other factors being constant. Interest rate is not statistically significant in influencing public investment.

Table 4.4 the Threshold Autoregressive Model and Post-Estimation Tests for the Threshold Regression

Variables	Threshold Regression Results				Diagnostic tests	Model 1		Model 2	
	Regime1		Regime2			Statistics	P-values	Statistics	P-values
	Statistics	P-Values	Statistics	P-Values					
GDPD EBT	67.2727	0.0031	-3.4143	0.0000	Autocorrelation (Breusch-GodfreyLM Test)	0.4105	0.7952	0.2421	0.7863
INTR	43.3996	0.0020	8.4163	0.2003	Heteroskedasticity (Harvey)	0.7677	0.5082	1.2536	0.2887
INF	0.85503	0.3745	1.3420	0.3745	Ramsey RESET Test	0.0305	0.9701	1.3176	0.5175
POPG	617.4675	0.0078	904.1237	0.0000	Normality Test	0.1788	0.9145	1.0932	0.5790
BMGR T	-3.5240	0.0113	5.3587	0.0019					
Threshold Level	16.41%								
Adjusted R ² DW	0.9018								

Source: Author's computation based on E-View Version 10

The threshold regression, in the second panel of table 4.4, shows that the threshold of debt is 16.41%. and that the effects of public debt on economic growth is divided into two regimes. The first one is when the debt to economic growth ratio is less than 16.41%, while the second one is when the public debt to economic growth is or equal to or greater than 16.41%. In the first regime, public debt positively and significantly influences economic growth. At 1% level of statistical significance, a one percent increase in public debt leads to increase in economic growth by 67.27 units, all other factors being constant. Interest rate, and population growth and was were also to positively and significantly influences economic growth, while broad money supply growth negatively and significantly influences economic growth.

In the second regime of the threshold regression, when the public debt to economic growth ratio is greater or equal to 16.41%, public debt negatively and significantly influences economic growth. At 1% level of statistical significance, a one percent increase in public debt leads to decrease in economic growth by 3.41 units, all other factors being constant.

Population growth and broad money supply growth were also found to positively and significantly influence economic growth. The adjusted R^2 for the threshold regression is 90%, it implies that the independent variables best explain the dependent variable at 90%, while the Dub-Watson of 1.8 implies absence of serial correlation of the residuals of the model.

The table 4.4 also, shows the post-estimation tests (autocorrelation, heteroscedasticity, Ramsey reset and normality tests) of the two models. The probability values of all the tests are greater than 5% level of statistical significance. This implies that the models are free from serial correlation errors, heteroskedastic, misspecification errors, and that the models are normally distributed.

3.1 Discussion of Result

This study is conducted to investigate two objectives: (1) the nature relationships between public debt and investment, and (2) public debt and economic growth in Nigeria. It investigated the nature of relationship between public debt and economic growth. To ascertain the nature of causality between public debt and public investment, a granger causality test was conducted. It was found that there is uni-directional causality between public investment and public debt, running from public debt to public investment. Thereafter, an ARDL Bound test was estimated. It was found that there is long run relationship between public debt and public investment, and public debt negatively influences public investment.

The finding is similar to that of Ncanywa and Masoga (2018) reviewed in this study. For the second objective, it was found that the effect of public debt on economic growth is divided into regimes. In the first regime, public debt has a positive effect on the economic growth. This corresponds to the positive relationship found in the OLS regression. It was however found that at the 16.41% threshold level, the positive relationship between public debt and economic growth turns negative. This corresponds to findings of Syssoyeva-Masson and Andrade (2017), Checherita-Westphal and Rother (2012) where it was also found that there exists a threshold at which debt-economic growth relationship changes.

Contrariwise, the findings of this study differ from that of Chudik, Mohaddes, Pesaran and Raissi (2015); Osinska, Kufel, Blazejowski and Kufel (2016), who found absence of threshold level in the debt-economic growth relationship. Osinska, Kufel, Blazejowski and Kufel (2016) argued that a high level of debt-to- GDP ratio does not necessarily mean a decrease in the growth rate in subsequent periods, that other macroeconomic factors like external debt-to-GDP ratio, long- and short-term interest rates, real estate cost indicators, consumer price index (CPI) and exchange rate play significant role in determining the present and future rate of economic growth.

Even though most of the existing studies are panel in nature, the finding of the current study provides a comparison to those already conducted. The presence of the threshold level in

Nigeria can be explained by the current backwardness in the country's economy, in spite of the increasing debts being incurred by the government. When the money is borrowed and spent productively, it could have positive effect on the economy. But continuous accumulation of debts could lead to negative effects in the economy.

5.0 Summary and Recommendations

The study found that there is a long run relationship between public investment and public debt, and that public debt influences public investment negatively. Secondly, it was found that there is a threshold level in the positive relationship between public debt and economic growth of Nigeria. It was found that there exists a threshold of 16.41%, at this point the initial positive relationship between the two variables turns negative. This has huge policy implications. It implies that policy makers have to be cognizant of the negative influence of public debt on public investment and the existence of threshold level in the debt-economic growth nexus. The policy makers need to try as much as possible to avoid borrowings because of its long term negative effects. This study will also be useful for future researchers, particularly in the similar topic. More studies are also needed at country level, as the most of the existing studies are cross-country. This will inform a country-specific solution to the problems that are associated with in the negative relationship between public debt and public investment and debt-economic growth relationship.

Government should inculcate discipline in terms of servicing of debts to avoid recapitalization of arrears which add further pressure to the existing debt burden of the country.

An export oriented strategy should be formulated and vigorously pursuit in order to provide an export base economy that could reduce the deficit financing as a result of imbalance of trade in the country.

References

- Akhanolu, I. A., Babajide, A. A., & Victoria, A. (2018). The effect of public debt on economic growth in Nigeria: An empirical investigation. *International Business Management*, 12 (6),436-441.
- Agbo, L.(2017). Global Debt Management and Nigeria's Debt profile. *International Journal of the Arts and Sciences*, 12(01).
- Canh, N. T. & Phong, N. A. (2018). Effect of public investment on private investment and economic growth: Evidence from Vietnam by economic industries. *Applied Economics and Finance*,2(5), 95-110.
- Checherita-Westphal, C., & Rother, P., (2012). The impact of high and growing government debt on economic growth: an empirical investigation for the Euro area. *European Economic Review*,56s, 1392–1405.

- Chudik, A., Mohaddes, K., Pesaran, M., H. & Raissi, M. (2015). Is there a debt-threshold effect on output growth? *IMF Working Paper WP/15/197*
- Dickey, & Fuller, (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74, 427- 431.
- Greiner, A., (2010). Does the 'golden rule of public finance' imply a lower long-run growth rate? A clarification. *Economic Bulletin*, 30 (2), 975–982
- Dickey, & Fuller (1981). Likelihood ratio statistics for autoregressive time series unit root. *Econometrica*, 49, 1057-1072.
- IMF (2019). *Historical public debt database*. (Retrieved on 15th of May, 2019 from: https://www.imf.org/external/datamapper/DEBT1@DEBT/OEMDC/ADVEC/WEO_WO_RLD/NGA).
- Kamiguch, A. & Tamaib, T. (2019). Public investment, public debt, and population aging under the golden rule of public finance. *Journal of Macroeconomics*, 60, 110–122.
- Mbaya, S. Badia, M, & Chaek, K. (2018, 5 14). IMF's Global Data Base. Retrieved from publication @imf.org
- Mbaya, S., & Basis, M. (2019, Jan 02), New Data on Global Debt. Retrieved from <https://blogimf.org>.
- Ncanywa T. & Masoga, M. (2018). Can public debt stimulate public investment and economic growth in South Africa? *Cogent Economics & Finance*, 6, 1-13.
- "Nigerian Government Debt:% of GDP[1981-2019]". Retrieved from www.ceicdata.com>gov.
- Nwannebuikwe, U. S., Ike, U. J. & Onuka, O. I. (2016). External debt and economic growth: The Nigeria experience. *European Journal of Accounting Auditing and Finance Research*, 2(4), 33-48.
- Ogunmuyiwa, M. S. (2011). Does external debt promote economic growth in Nigeria? *Current Research Journal of Economic Theory*, 3(1), 29-35.
- Osinska, M., Kufel, T., Blazejowski, M. & Kufel, P. (2016). Modeling mechanism of economic growth using threshold auto regression models. *MPRA paper No. 89029*. (Retrieved on 10th May of 2019 from <https://mpra.ub.uni-muenchen.de/89029/>).
- Pan, H. & Wang, C. (2012). Government debt in the Euro Area-evidence from dynamic factor analysis. *Econ. Lett.*, 115, 272–275.
- Reinhart, C. & Rogoff, K. (2010). Growth in a time of debt. *American Economic Review*, 100 (2), 573-78.
- Pettis, M. (2019, Feb. 07). Why US Debt Must Continue to Rise: Retrieved from <https://carnegianendowment.org>
- Syssoyeva-Masson, I. & Andrade, J.D. (2017). The effect of public debt on growth in multiple regimes in the presence of long-memory and non-stationary debt series. Center for Economics and Business Research. *Working Paper N07*.
- Thilanka, H. R. & Ranjith, J. G. (2018). The impact of public debt on private investment: Sri Lankan experience. *International Journal of Business and Social Research*, 8(8), 1-10.

- Tsay, R. (2013). *An introduction to analysis of financial data with R(Willey series in probability and statistics(1st Ed.)*. Retrieved from Amazon.Com on 12/5/2019
- (2019). Nigerian GDP|2019|Data|. Retrieved from <https://tradingeconomics.com>>GDP
- (2019). Nigerian Economic Indicator, n.d. Retrieved from <https://www.tradingeconomics.com>