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## **PUBLIC DEBT AND THE REAL SECTOR OF THE NIGERIAN ECONOMY**

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### **Abstract**

*The motivation for this paper stems from the rising debt profile in Nigeria and the implication on the growth prospect. In that regards, the study sought to establish the linkages between public borrowing and the growth in productivity. The Cobb-Douglas production function modified to include debt accumulation and other variables – broad money supply, inflation rate, exchange rate, trade openness, and interest rate – was used to achieve the objectives. The Central Bank of Nigeria and the World Development Indicators served as the sources of our data. The data covering 1981 to 2019 were analysed using the unit root test, Autoregressive Distributed Lag bounds test for cointegration, the error correction model and threshold regression. Findings from the study revealed that both domestic and foreign borrowings exhibit negative effect on growth of the Nigerian economy in the short-term and in the long-term, thereby suggesting a crowding out effect of debt on the economy. Further, an optimal debt threshold level of 15.021%, 2.735% and 4.384% for total public debt, external debt and domestic debt respectively was determined. The finding therefore points out the need for sustainable management of the public debt to achieve the desired policy objectives.*

**Keywords:** Public Debt; Real Sector; Economic Growth; Debt Crowding-out; Debt Burden

## INTRODUCTION

Debt or borrowings can be viewed as an essential fiscal policy tool accessible to governments to support a country's development. Debt is used to cause the settlement of expenditures, which will ultimately raise productivity and promote the economy's growth (Ayaji and Edewusi, 2020). When the revenue obtained by the government is inadequate to cover its expected expenditures, public debt, which includes both internal (domestic) and external obligations, is considered (Rahman, 2012). The “aggregate of borrowings acquired by a country's government organizations is referred to as public debt” (Ayaji and Edewusi, 2020). Public debt is one of several methods for financing government expenditures; while governments can instruct the Central Bank to produce and release funds to them in order to avoid the interest payments associated with government debts, this method will undoubtedly control interest costs but will not eliminate the debt (Idenyi, Igberi and Anoke, 2016). Hyperinflation is the end effect of such behaviour.

The necessity to finance expanding government expenditure has been recognized as the cause of Nigeria's fast growth in debt stock (Charles, 2012). As such, debt accumulation can be as a result of bridging the gap between revenue and expenditure. Bacha (1990) and Taylor (1993) utilized the three-gap model to portray why debt can be accumulated in any economy. Such avenues include savings-investment gap, foreign exchange gap, and the fiscal-constraint gap. The fiscal-constraint gap is associated with the idea of Charles (2012), where the accumulation of debt is to augment the revenue of the government for expenditure programmes. The savings-investment gap argument for debt accumulation is linked to developing countries where there is inadequacy of investment capital to finance investment ideas. As such, borrowing is carried out to fill such gap. Meanwhile, the foreign exchange gap is based on the premise that “export earnings are usually insufficient to generate enough foreign exchange to finance imports making overseas borrowing the indispensable means of gaining access to the technology that is vital for the expansion of the export sector that ultimately leads to rapid economic growth” (Tiruneh, 2004).

Debt, whether private or public, is central for the running of a free enterprise economy. For instance, the private sector needs credit to spur productive investment and growth over time. Whether at the private or public sphere, debt can have useful influence when it comes to levelling consumption and financing huge investments (Burriel, Checherita-Westphal, Jacquinot, Schön, and Stähler, 2020). Before the 2009 *Global Financial Crisis*, borrowing have been regarded to be safe in some progressive nations (Coeuré, 2016). It has been argued that public borrowing plays a significant role towards the effectiveness of the financial system and in the monetary policy transmission mechanism (Burriel, *et al.*, 2020). This argument is based on the

condition that such debt must carry low credit risk, thereby providing relatively safe and liquid asset which facilitates the refinancing operations.

Nonetheless, high debt can be risky for the economy as such, debt is not risk free as argued above. The burden of high public borrowing can thus be challenging. At the first instance, high degree of borrowing makes the economy to be much prone to macroeconomic tremors. As pointed out by Buriel *et al.* (2020), public debt overhang can deepen instability, gaol economic recovery or upset the economy even in the short-run. This is because high debt profile gaols the room for *counter-cyclical fiscal policy* and also have externality effects to the private sector. Also, perceived sovereign vulnerability, which is captured in the high risk premia and borrowing cost can spill over to other sectors or jurisdictions at the international level. Moreover, a country with high public borrowing can be pushed to 'liquidity shocks and defaults'.

At the second instance, "high public borrowing can hinder economic growth" (Checherita & Rother, 2012; Woo & Kumar, 2015). As argued by Checherita-Westphal, Hughes-Hallett, and Rother (2014), such situation can occur when debt is contracted to finance unproductive expenses or beyond sustainable (growth-maximizing) levels of the stock of public capital. In this regards, Masuch, Moshammer and Pierluigi (2016) opined that quality of the institutional framework of a country can really affect the pattern in which debt influences growth. Thus, countries with weak institutions can experience low growth along with high debt; but debt will have a stifling effect in countries with strong institutions.

Studies conducted so far indicates that high public borrowing can adversely affect growth through the channels of sovereign spread (Codogno, Favero and Missale, 2003; Attinasi, Checherita and Nickel, 2010; and Corsetti, Kuester, Meier and Muller, 2013) which is the confidence effects and sovereign yields (Laubach, 2009; Baum, Checherita-Westphal and Rother, 2013), financial intermediation via bank credit (De Bonis and Stacchini, 2013; Jorda Schularick and Taylor, 2016), higher future distortionary taxation (Barro, 1979), future crowding-out of private investment (Woo and Kumar, 2015; Ostry, Ghosh and Espinoza, 2015) where debt is vied as a '*deadweight loss*', lower scope for counter-cyclical fiscal policy, including a reduced capacity to finance future public investments (Chalk and Tanzi, 2004; Checherita and Rother, 2012; Attinasi, Lalik and Vetlov (2017), and increased uncertainty and catalyser for banking crisis (Hemming *et al.*, 2013; Brunnermeier, *et al.*, 2016).

These scenarios therefore necessitate an examination of the debt-growth effect in Nigeria. Data in Nigeria on the growth rate of gross domestic product (economic growth) and the growth in public debt can be depicted below.

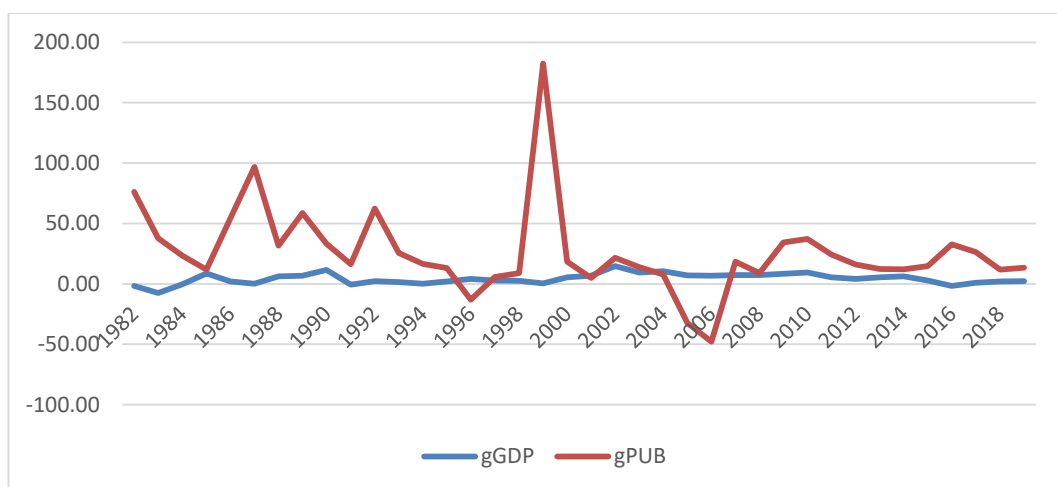


Figure 1: Trend in the Growth Rate of GDP and the Growth Rate of Public Debt

Given Figure 1, there have been some sort of volatility in the growth rate of public debt while the growth rate of the gross domestic product has been quite sluggish. The period 1982 – 1983 was marked with high growth rate in public debt, accounting for about 76.19% and 37.66% respectively. In the same period, GDP grew by -1.79% and -7.58% for 1982 and 1983 respectively, and still maintained a negative growth of -0.51% when the growth rate of public debt was 23.42%. Meanwhile, periods with negative growth rate in public debt (1996 and 2005 – 2006) were marked with high growth rates (4.05%, 7.01% and 6.73% respectively). A look at the Figure 1 also revealed that when the growth rate in public rate was as high as 182.46% as at 1999, the economy witnessed a 0.52% growth rate of output. This nature of behaviour could therefore make one to think whether growing debt stock could crowd out private investments, which could in turn restrain economic growth.

The significance of investment is heavily emphasized in studies that look at the relationship between debt and growth. Large debts are normally predicted to decrease growth via a route of reduced investment, as stated by the debt overhang theory. According to Claessens (1990), the burden of big debt might eventually lead to excessive shortage of liquidity, which has a detrimental influence on *capital formation* and *economic growth*. This hypothesis' impact relates to poor public and private investment since a big portion of resources are shifted overseas for debt payment. Agenor and Montiel (1996) take a different stance on the debt overhang hypothesis, emphasizing the fact that big debt increases the assumption that debt services would be paid by distortionary tactics. According to Serven (1997), in such an uncertain environment, private investors prefer to exercise their choice of waiting and may choose to invest less or transfer their money elsewhere.

Based on this, could domestic and foreign debt have a crowding-out effect on the Nigerian economy? Which component of public debt exerts the greatest crowding-out effect in Nigeria? Is there any long-run effect of domestic and foreign debt on the real sector of the Nigerian economy? Based on the above research questions, the paper seeks to ascertain the crowding-out effect of public debt on the real sector of the Nigerian economy. The specific objectives are:

- i. To examine the effect of public debt on the growth of the Nigeria's economy,
- ii. To determine the component of public debt that have the highest crowding-out effect on the real sector of the Nigerian economy, and
- iii. Determine the presence of a long-run link between public debt and the Nigerian economy's real sector.
- iv. To investigate the existence of a non-linear relationship between public debt (domestic, external and total debt) on economic growth.
- v. To ascertain the optimal debt threshold for Nigeria.

The paper is structured in five sections. The first section being the introduction is followed by section 2 which is the literature review. Here, both the theoretical and empirical literatures are reviewed. In section 3, the methodology of the research is discussed; while in section 4, the empirical findings of the paper are presented and discussed. Finally, section 5 presents the conclusion and recommendations of the paper.

## **LITERATURE REVIEW**

### **Theoretical Literature**

The theoretical literature reviewed in the study include the Cobb-Douglas production theory, the Harrod-Domar growth model, and the growth-cum-debt theory.

#### ***The Cobb-Douglas Production Theory***

The Cobb-Douglas production function is normally applied to denote the association of outputs to inputs overtime. It was suggested by Wickseil (1851-1926), and verified alongside statistical proof by Cobb-Douglas in 1928. Cobb and Douglas (1928) printed a work in which they organized American economic growth between 1899-1922. The authors acknowledged an abridged economic view whereby productive activities are based on the quantity of labour and capital used.

The equation they adopted to represent production was in this form:  $Y = P(L,K) = AK^\alpha L^\beta$

Where;

P = Aggregate outputs (representing the financial value of all final good and services created in a year)

L = Labour input (the aggregate number of man hour per year)

K = Capital input (the financial value of all machinery, equipment as well as buildings)

A = Aggregate factor output

$\alpha$  and  $\beta$  are the production elasticity of labour as well as capital. These values are static which are based on the existing know-how.

Given the stated production function, the marginal productivities of factors will be given as:

$$MPP_K = \frac{\partial Y}{\partial K} = A\alpha K^{\alpha-1}L^\beta \text{ and } MPP_L = \frac{\partial Y}{\partial L} = A\beta K^\alpha L^{\beta-1}.$$

Therefore, the productivity of the factor inputs is what can propel output growth.

### ***The Harrod-Domar Growth Model***

Harrod independently discovered this idea in 1939, and Domar independently developed it in 1946. The Harrod-Domar growth model establishes a clear link between savings and economic growth. According to the idea, an economy's growth rate is determined by the amount of national saving and the productivity of capital investment. As a result, a rise in the savings rate and the marginal productivity of capital will result in an increase in the rate of production growth. According to the model, economic growth is dependent on policies that enhance investment by boosting saving and utilizing that investment more effectively through technical developments (Harrod, 1939; Domar, 1946).

Although the Harrod–Domar model was used to explain the source of economic growth, the theory has also been adapted to explain the effect of debt on economic growth in developing countries. This is because labour is plentiful in such nations, but physical capital is scarce, resulting in slower economic advancement. Furthermore, developing nations lack adequate per capita income to encourage high rates of saving, resulting in inadequate capital stock buildup through investment. External borrowing is viewed as capital that helps to cover the funding gap in emerging nations in order to boost growth (Eaton, 1993).

### ***The Growth-cum-Debt Theory***

This theory was developed by Chenery and Strout (1966) and is rooted in the traditional neo-classical growth model. According to growth-cum-debt theory, external borrowing is used to tie the gap between domestic savings and investment. The theory assumes that with perfect

capital mobility (which allows countries to borrow and lend), external borrowing contributes positively to economic growth. Under growth –cum- debt framework, it is postulated that debt was procured for investment purpose and that the investment will generate multiplier effect on economic growth (Nyong, 2005).

The growth-cum-debt model also considers debt capacity in terms of the benefits and costs of borrowing in the process of economic growth. The basic argument is that a country will maintain its capacity to service debt provided that additions to its debt over time contribute sufficiently to growth. The model states that “to maintain debt service capacity over time, the growth rate of output should equal or exceed the cost of borrowing, measured by the rate of interest” (Hjertholm, 1999). The model indicates that the debt plan will only succeed in the long run if there is enough economic growth to support it.

## Empirical Literature

### ***Effect of Debt on Economic Growth***

Empirical research on debt and economic growth have piqued the interest of academics all across the world. Udejaja and Okeke (2005) explored external debt management in Nigeria and its effects on economic growth and investment in Nigeria in their study. Using the ordinary least squares (OLS) regression approach on Nigerian data from 1980 to 2000, the actual results of the error correction model demonstrate that increasing current debt flows as a percentage of GDP leads to a decrease in economic growth, implying that debt flows impede economic growth. On the other side, the beneficial impact of debt payments on economic growth defied expectations of a negative impact. According to the study, this suggests that such an influence will be unfavourable in the short term but positive in the long term.

Folorunso and Felix (2008) studied the influence of foreign borrowing on the growth of Nigeria and South Africa's economy. Analysis of the data from the two countries indicated that *debt service ratio* propelled the growth of output in Nigeria, but retarded such in South Africa. They based the reason for their findings on the repayment patterns of such debts. Within their study period, Nigeria was only repaying a minute chunk of her foreign debt while South Africa was repaying it assiduously. Further, it can be asserted that even though debt service likely has a positive effect on the growth of output in Nigeria, “the more serious the debt, the more likely it is to compress output growth” (Forgha, *et al.*, 2014).

Adesola (2009) explored the link between weak economic growth and debt services in Nigeria, with a particular focus on the effects of debt payment to creditors on Nigerian economic growth. The study used time series data from 1981 to 2004 and the ordinary least squares regression approach. The empirical outcomes revealed that debt payments to other creditors



and London Club creditors had a considerable negative impact on Nigeria's GDP and gross fixed capital formation.

Malik, Hayat, and Hayat (2010) investigated the relationship between foreign debt and economic growth in Pakistan from 1972 to 2005 using time series econometric techniques of the Ordinary Least Squares. The findings revealed that foreign debt has a negative and substantial relationship with economic growth. This suggests that a rise in foreign debt will result in a slowing of economic development. Similarly, empirical evidence indicates that debt servicing has a considerable and negative influence on GDP growth. According to the report, if debt servicing costs rise, there would be less prospects for economic growth.

Kumar and Woo (2010) used a panel of advanced and developing countries across four decades to study the impacts of high public debt on long-run economic development, accounting for a wide range of growth drivers as well as substantial estimating challenges such as “reverse causality and endogeneity” (The Statistica Forum, 2016). After controlling for other development variables, the data suggest a negative relationship between initial debt and later growth.

Rais and Anwar (2012) looked at the *consequences of external debt on the Pakistani economy* from 1972 to 2010. This study used a straightforward *Ordinary Least Squares regression methodology* to discover that both domestic debt as a ratio of GDP and overseas debt as a ratio of GDP have a negative relationship with growth. The report finds that because both forms of debt are not adequately managed and properly employed, they have a detrimental influence on the nation's economy. The study, on the other hand, suggests that favorable benefits may be obtained if debt is effectively managed and employed primarily in productive areas, while staying away from corrupt persons.

Chinaemerem and Anayochukwu (2013) used time series data from 1969 to 2011 to study the effects of foreign loan funding on economic development in Nigeria. The estimation was done using the Vector Error Correction Model (VECM). The results of VEC estimation showed that external debt financing has positive and significant effect on economic development in Nigeria. Specifically, the results showed that debt financing of London has positive impact on the economic development. However, the result showed that Paris debt, multilateral debt and promissory debt financing have significant negative impact on the economic development in Nigeria. In a similar manner,

Forgha, Mbella & Ngangnchi (2014) investigated how external debt affect the growth of the economy of Cameroon through investments. The study employed annual data which spans through 1980 to 2013. The *two-stage least squares* approach was used in the estimation process. Their findings showcased that investments accelerates growth in the Cameroon

economy while debt hampers growth. As a result, their data support the debt overhang concept in Cameroon.

Adedoyin, Babalola, Otekinri, and Adeoti (2016) studied the short run and long run impact of external debt on economic growth in Nigeria. The study covered a period of 34 years. Annual time series data were collected from different issues of CBN statistical bulletin. Annual time series data were gathered from several editions of the CBN statistics bulletin. The data was analyzed using the Autoregressive Distributed Lag (ARDL) and Bound test cointegration techniques, as well as the Granger causality test. The study's findings revealed that "there is a long-run link between Nigeria's external debt and economic growth" (Adedoyin, et al., 2016). The study also indicated a substantial association between foreign debt and economic growth in both the long and short term, although no causation between the variables was discovered. This report proposed, among other things, that a debt cap be created and maintained in order to minimize debt overhang.

Ndubuisi (2017) used yearly time series data from 1985 to 2015 to assess the influence of external debt on Nigerian economic development. The data was evaluated with the ordinary least squares regression approach, the Johannsen cointegration test, and the error correction method. The variables of interest used in the study were external debt stock and external debt servicing while exchange rate and external reserve were used as control variables. Gross domestic product was used as proxy for economic growth. The regression study revealed that debt servicing had a negative and minor influence on economic growth, whereas the foreign debt stock had a considerable positive influence on Nigeria's economic growth. GDP was significantly influenced by external reserves and exchange rates. As a result, the report advised that foreign debt be channelled toward infrastructure development.

Matandare and Tito (2018) examined Zimbabwe's state debt and economic development. The study made use of a quantitative research design. The World Development Indicators database was used to collect secondary time series data covering 36 years (1986-2016). The study's data were analysed inferentially. According to the study's findings, there is a negative significant association between external debt and economic development in Zimbabwe. The study also discovered that *the exchange rate and inflation have strong negative correlations with economic development in Zimbabwe, whereas external debt have a strong positive link with economic growth.*

Eze, Nweke, and Atuma (2019), explored the consequence of public debt on the Nigerian economy. Annual time series data spanning from 1981 to 2017 was collected from the CBN statistical bulletin and analysed using ARDL estimation technique and the Chow breakpoint test. According to the study's findings, external debt had a negative and substantial

influence on GDP in Nigeria, whilst domestic debt had a negative but minor influence on GDP. The research advised that the Nigerian government stop using external debt to pay its budget deficit and instead rely on locally generated revenue.

Recently, Inyang and Effiong (2020) in their study investigated the possible influence which external debt can have on the growth of the Nigerian economy using annual data for the period 1981 to 2019. The study used the *ARDL Bounds test approach to cointegration and the error correction model*. Their findings revealed that debt burden posed a positive but insignificant effect on the growth of the Nigerian economy. Meanwhile, both debt overhang and debt crowding out posed a negative and significant effect on the growth of the Nigerian economy. A long-run relationship was also established between external debt and the growth of the economy.

### ***Debt Threshold and Economic Growth***

Siddique and Malik (2001) investigated the debt-growth link in three South Asian nations, tested the connection's non-linearity, and demonstrated the threshold levels for the three economies. Their research found a nonlinear association between economic growth and all of their debt burden variables. The study identified two thresholds of 61 and 88% for the two debt/GDP ratios estimated, with Pakistan's debt impact on economic growth being negative after crossing the debt indicators. However, Sri Lanka and India have debt ratios that are lower than the crucial thresholds, and their influence on growth has been favourable. Their critical numbers for total debt-to-exports and debt service-to-exports were respectively 197.0% and 12.75%.

Nasa (2009) investigated the sustainable amount of debt that is desired for economic growth by predicting the debt threshold using Hansen's endogenous threshold model and yearly datasets from 1970 to 2000 for 56 nations. The study discovered a debt/GDP threshold ratio of 45%, showing that if the debt ratio hits this level, public debt becomes harmful to output growth. The author also demonstrated that the optimal amount of debt for growth, which debtors should strive for, was assessed to be 7%.

Reinhart and Rogoff (2010) were replicated by Herndon, Ash, and Pollin (2013), who revealed that coding errors, discriminatory omission of existing data, and eccentric weighting of summary statistics bring about errors that erroneously signified the connection *between public debt obligation and growth in GDP* across twenty cutting-edge economies. The authors demonstrated that the average growth rate of real GDP for countries with a public-debt-to-GDP proportion of more than 90% was 2.2%, not 0.1% as indicated by Reinhart and Rogoff,

indicating that average GDP growth at public debt/GDP proportions greater than 90% is not considerably different from average GDP growth at lower government debt/GDP proportions.

Reinhart, Reinhart, and Rogoff (2012) identified 26 eras of public debt overhang in advanced economies since 1800: occurrences in which the ratio of gross public debt to GDP in a specific nation surpassed 90% on a sustained basis. According to the analysis, such times of public debt overhang were associated with weaker growth than in other eras.

According to Egert (2013), the nonlinear connection between debt and growth is not very strong, and the adverse link between debt and growth can occur at debt levels as little as 20% of GDP. Further a higher threshold may exist, but their size is indeterminate. He went on to say that individual nation estimates show a significant level of cross-country variation in debt-growth thresholds. Their findings provided evidence that the 90% public debt threshold reported by Reinhart and Rogoff (2010) is not valid.

In a panel OLS and threshold dynamics in 13 Caribbean nations, Wright and Grenade (2014) found a non-linear link between debt and growth. The sample nations had a debt/GDP ratio of 61%, with debt/GDP ratios beyond that threshold having a negative impact on investment and growth. At the national level, the results revealed a substantial difference between the actual debt/GDP proportions and the calibrated ideal proportions. According to the study, the negative debt-growth link buttressed the notion that government borrowing must be done not just on conditions commensurate with entrenching debt sustainability, but also on conditions that offer long-run growth benefits.

Pescatori, Sandri, and Simon (2014), on the other hand, found no indication of a debt threshold at which medium-term economic prospects are jeopardized. The study found that the debt trajectory has a significant impact on the relationship between debt level and growth. In other words, historically, nations with high but reducing levels of debt have risen at the same rate as their counterparts. Despite the lack of 'debt thresholds', the authors demonstrated that more debt was related with more unpredictable growth in output, which can be detrimental to economic wellbeing.

Using quarterly data, Omotosho, Bawa and Doguwa (2016) investigated the possibility of threshold effects in the link between public debt and economic development in Nigeria. Overall, they revealed empirical backing for a reversed U-shape link between different forms of public borrowing and economic growth. The model findings revealed a threshold level of 73.70 percent for total public borrowing as a proportion of GDP, while the anticipated inflexion points for foreign and domestic debts were respectively 49.4% and 30.9%. The conclusion of this finding is that debt build-up over the anticipated threshold levels may be detrimental to economic growth.

## Summary of Literature Reviewed

Studies on the effect of public debt on economic growth have revealed conflicting results. This could be due to the period covered in the study, the country or region of study, the methodology used; as well as the aggregation of public debt. In this light, our study disaggregates public debt into external and internal debt to ascertain the pattern in which the two debt components affect economic growth. Also, studies geared towards ascertaining the debt threshold is in dearth in the Nigerian context and this study aims at filling such gap as well.

## METHODOLOGY

### Basic Study Design

The study adopted both descriptive and econometric methods for data analysis and estimation. The descriptive technique employed descriptive statistical tools to analyse trend performance of the variables captured in this study. The Autoregressive Distributed Lag (ARDL) technique of estimation under the framework of multiple regression modelling was the econometric approach utilized in the study.

### Model Specification

The theoretical framework of this paper is based on the Cobb-Douglas production function. This is deemed fit for the study because it portrays the connection between input and outputs in the production process. The function is expressed as:

$$Y = AK^{\alpha}L^{\beta} \quad (1)$$

Where Y is the output, K is capital input, L is labour input,  $\alpha$  and  $\beta$  are positive constants. In the case where  $\alpha + \beta = 1$ , there is constant returns to scale. If  $\alpha + \beta > 1$ , then we have increasing returns to scale; but is  $\alpha + \beta < 1$ , then the production function exhibits a decreasing returns to scale. Transforming Equation (1) so as to make it amendable to estimation, we linearize the function by introducing the natural logarithm. This gives

$$\log Y = \log A + \alpha \log K + \beta \log L \quad (2)$$

Where log is the natural logarithm of a number.

Given the objectives of the study, we include key variables that can also affect economic growth. This gives rise to Equation (3) which is expressed in an econometric form.

$$\log GDP = \beta_0 + \beta_1 \log LAB + \beta_2 \log GCF + \beta_3 \log DMD + \beta_4 \log EXD + \beta_5 \log BMS + \beta_6 \log INF + \beta_7 \log EXR + \beta_8 \log TRP + \beta_9 \log INT + \mu \quad (3)$$

Where GDP is the gross domestic product (a proxy for economic growth); LAB is the labour force (a proxy for labour); GCF is the gross fixed capital formation (a proxy for labour); DMD is

domestic debt; EXD is external debt; BMS is broad money supply; INF is inflation rate; EXR is exchange rate; TRP is trade openness; INT is interest rate; and  $\mu$  is the random error term.  $B_0$  is the constant while  $\beta_1$  to  $\beta_9$  are the slope coefficients. It is expected that  $\beta_1, \beta_2, \beta_5$  and  $\beta_8 > 0$  while  $\beta_3, \beta_4, \beta_6, \beta_7, \beta_9 < 0$ .

Since our study utilizes the autoregressive distributed lag (ARDL) approach, the ARDL model in its generalised form is specified as follows:

$$\log GDP_t = \delta_0 + \sum_{i=1}^p \delta_i \log GDP_{t-i} + \sum_{i=0}^q \delta'_i X'_{t-i} + \sum_{i=0}^q \varphi'_i X'_{t-i} + \varepsilon_t \quad (4)$$

Where  $X' = [\log LAB, \log GCF, \log DMD, \log EXD, \log BMS, INF, EXR, TRP, INT]$ ;  $\Delta$  is the change operator;  $i$  is the lag length;  $p$  is the optimal lag length for the explanatory variables;  $q$  is the optimal lag length for the explanatory variables;  $\delta, \delta'$ , and  $\varphi$  are the parameters to be estimated. The ARDL is utilized in this study because it helps us to estimate both the short-run and the long-run estimates simultaneously.

In examining the existence of a non-linear relationship between public debt and economic growth in Nigeria, we utilized the threshold model that was developed by Doguwa (2012). This model has also been used in a study by Omotosho, Bawa, and Doguwa (2016). The respective threshold models are specified thus;

$$\log GDP_t = \pi_{tpd} + \alpha_1 d_t^{tpd} (tpd_t - tpd^*) + \alpha_2 (1 - d_t^{tpd}) (tpd_t - tpd^*) + \delta_{tpd} \mu_{t-1} + \varepsilon_t \quad (5)$$

$$\log GDP_t = \pi_{exd} + \beta_1 d_t^{exd} (exd_t - exd^*) + \beta_2 (1 - d_t^{exd}) (exd_t - exd^*) + \delta_{exd} \mu_{t-1} + \varepsilon_t \quad (6)$$

$$\log GDP_t = \pi_{dmd} + \gamma_1 d_t^{dmd} (dmd_t - dmd^*) + \gamma_2 (1 - d_t^{dmd}) (dmd_t - dmd^*) + \delta_{dmd} \mu_{t-1} + \varepsilon_t \quad (7)$$

Where  $\log GDP$  measures the percentage change in GDP being a proxy for economic growth;  $tpd$  is the total public debt as a ratio of GDP;  $exd$  is the external debt as a ratio of GDP;  $dmd$  is the domestic debt as a ratio of GDP;  $\mu_{t-1}$  is an autoregressive component employed to clear up the influence of other control variables with  $\delta$  as the corresponding coefficients. The variables  $tpd^*$ ,  $exd^*$ , and  $dmd^*$  are the values used for the iteration process in our search for the optimal threshold point. The effect of total public debt, external debt, and domestic debt are captured by  $\alpha_1, \beta_1$  and  $\gamma_1$  for periods in which the debt-to-GDP ratio is greater than the threshold (the high debt regime) while  $\alpha_2, \beta_2$  and  $\gamma_2$  represent the effect of total public debt, external debt, and domestic debt on GDP when the public debt level is lower than the threshold value (the low debt regime). The dummy variables for total public debt ( $d_t^{tpd}$ ), external debt ( $d_t^{exd}$ ), and domestic debt ( $d_t^{dmd}$ ) in Equations 5 to Equation 7 are defined as:

$$d_t^{tpd} = \begin{cases} 1 & \text{if } tpd_t > tpd^* \\ 0 & \text{elsewhere;} \end{cases}$$

$$d_t^{exd} = \begin{cases} 1 & \text{if } exd_t > exd^* \text{ elsewhere; and} \\ 0 & \end{cases}$$

$$d_t^{dmd} = \begin{cases} 1 & \text{if } dmd_t > dmd^* \text{ elsewhere} \\ 0 & \end{cases}$$

Given Equation 5 to Equation 7, the optimal threshold for the respective debt ratio is achieved by iterating the three equations, using diverse values of debt threshold levels. “The optimal threshold is identified at the point where the Sum of Squared Residuals of the iterated regressions is minimized” (Babatunde *et al.*, 2016).

### Sources of Data

The data utilized for this study are time series data that span through 1981 to 2019. The time frame is selected based on data availability; and it also captures both the era of military and democratic rule in the country. Data on gross domestic product, domestic debt, external debt, broad money supply, exchange rate, trade openness, and interest rate were all obtained from the central bank of Nigeria statistical bulletin; while data on labour force, gross fixed capital formation, and inflation rate were all obtained from the World Bank database.

### Analytical Technique

The Autoregressive Distributed Lag (ARDL) model, which was fashioned by Pesaran, Shin, and Smith (2001), was used for estimation in this study. The ARDL method encompasses two stages for the estimation of the long run and the short run relationships. First, the examination of the existence of a long-run relationship among all variables in the equation is established. The second stage involves *the estimation of the long-run and the short-run coefficients* of the same equation. However, the second stage is mainly essential only when a long-run relationship in the first stage, as validated by the Bounds test, has been established (Pesaran *et al.*, 2000; Narayan, 2005).

The ARDL technique has numerous benefits, one of which it is that it can be employed in testing the cointegration association among the variables notwithstanding the integrating order of the variables. In other words, the bounds testing technique is applied with no consideration as to whether the series is integrated of order I(0), integrated of order I(1) and co-integrated mutually. This scenario prevented the usual problems common in the standard cointegration exercise involving the classification of the variables as I(0) and I(1). Moreover, this test is suitable for studies having small sample size.



## Estimation Procedures

The estimation procedures in the study include the unit root test, the Bounds test for cointegration, and the error correction model.

### Unit Root Test

The unit root test facilitates the detection of the order of integration of the time series variables utilized in the study. The execution of the test is to avoid the occurrence of a spurious regression result, and to ascertain the best estimation technique to be employed in the study. To achieve this, we utilize both the augmented Dickey-Fuller (ADF) and the Philip-Peron (PP) unit root tests approaches. The essence of using the PP test as well is to act as a confirmatory test to that obtained from the ADF. Meanwhile, the PP approach is often regarded to be more powerful as such, its result is often taken when there is a conflicting result between the ADF and the PP test.

The augmented Dickey-Fuller (1979) unit root test under the constant assumption is conducted by estimating the Equation (5) below:

$$y_t = \partial_0 + \partial_1 y_{t-1} + \sum_{k=1}^k \omega_k \Delta y_{t-k} + \varepsilon_t \quad \text{--- (5)}$$

Where  $y_t$  is the time series variable of interest;  $\Delta$  is the first difference operator;  $\varepsilon_t$  and is the random error term.  $\partial_0$ ,  $\partial_1$  and  $\omega$  are the parameters to be estimated. If  $\partial_1 = 1$ , the null hypothesis of non-stationarity is accepted.

In the same vein, the following equation can be estimated using Philip-Peron (1988) test.

$$y_t = \lambda_0 + \vartheta_1 y_{t-1} + \varepsilon_t \quad \text{--- (6)}$$

The null hypothesis using PP test requires that if  $\vartheta = 1$ , then the series is non stationary or has a unit root but if  $\vartheta < 1$ , then the series is stationary.

### Test for Cointegration

Given that the time series variables are stationary at level I(0) and at first difference I(1), the traditional Engel-Granger cointegration test cannot be used. In this situation, the ARDL Bounds testing approach developed by Pesaran, Shin and Smith (2001) is utilized. Based on Equation (3), the model for the test is specified generally as follows:

$$\Delta \log GDP_t = \beta_0 + \beta'_i X'_i + \sum_{i=1}^k \gamma'_i \Delta \log GDP'_{t-i} + \sum_{i=0}^k \phi'_i \Delta X'_{t-i} + v_t \quad \text{--- (7)}$$

Where  $X' = [\log \text{LAB}, \log \text{GCF}, \log \text{DMD}, \log \text{EXD}, \log \text{BMS}, \text{INF}, \text{EXR}, \text{TRP}, \text{INT}]$  and is the white-noise error term. The first part of the right-hand side of Equation (7) which starts from  $\beta_0$



to  $\beta'_i$  represent the long-run dynamics of the models and second part with parameters  $\gamma'_i$  to  $\phi'_i$  represent the short-run dynamics of the models. In conducting the test to examine whether there was the presence of cointegration and hence long-term equilibrium association among the variables, equation (3.5) was employed such that restrictions were placed on the coefficients of the estimated long-term equation. The null hypothesis for the test is that ‘there is no levels relationship’.

The F- statistics test based on the Wald test procedures is applied to ascertain the acceptance or otherwise, the rejection of the null hypothesis. This is accomplished by matching the theoretical F-statistics value with the bound critical values reported by Pesaran et al (2001). If the estimated F-statistics value is more than the upper bound critical value, the null hypothesis is rejected, and cointegration among the variables exists. However, if the estimated F-statistics value is less than the lower bound critical value, the null hypothesis is supported, and there is no cointegration among the variables. Meanwhile, if the computed F-statistics value falls between the upper and lower limit critical values, the result is inconclusive. In such a case, the traditional cointegration methodology must be used to determine the order of integration of the variables.

### Error Correction Model

The error correction model (ECM) is used to detect the short-term and long-term dynamics of a variable around its stationary equilibrium value. For an adjustment in the short-run distortions, error correction requires that the sign of the coefficient of the residual is negative and statistically significant. The greater the absolute value of the ECM coefficient, the more quickly the model fine-tunes to achieve long-run equilibrium. Based on Equation (3), the short-run connections may be stated as an ARDL ECM as follows:

$$\Delta \log GDP_t = \phi_0 + \sum_{i=1}^k \partial_1 \Delta \log GDP_{t-i} + \sum_{i=1}^k \pi'_i X'_{t-i} + \theta ECM_{t-1} + \varepsilon_t \quad (8)$$

Where  $X' = [\log LAB, \log GCF, \log DMD, \log EXD, \log BMS, INF, EXR, TRP, INT]$ ;

$\pi'_i = [\pi_1, \pi_2, \pi_3, \dots, \pi_9]$ ;  $\theta$  captures the speed of adjustment; ECM is the error correction mechanism; and  $\varepsilon_t$  is the error term assumed to be normally distributed -  $\varepsilon_t \sim N(0, \delta_\varepsilon^2)$ .

## EMPIRICAL FINDINGS

### Stylized Facts on Public Debt Profile in Nigeria (1981 – 2019)

#### *Federal Government Domestic Debt Outstanding*

The domestic debt profile in Nigeria is characterised by diversification of debt instruments over the years. These instruments consist of Treasury Bills, Treasury Certificates, Development Stocks, FGN Bonds, FGN Green Bonds, FGN Savings Bonds, etc. For the period

1981 to 1988, the key debt instruments that were utilized by the federal government were the Treasury Bills, Treasury Certificates, and the Development Stock. This is illustrated in Table 1.

Table 1: Categorization of Federal Government Domestic Debt Outstanding (1981 – 1988)

Year	Treasury Bills (N billions)	% of Total	Treasury Certificates (N billions)	% of Total	Development Stock (N billions)	% of Total	Domestic Debt (N billions)
1981	5.78	51.65	2.06	18.41	3.35	29.94	11.19
1982	9.78	65.16	1.67	11.13	3.56	23.72	15.01
1983	13.48	60.67	4.89	22.01	3.85	17.33	22.22
1984	15.48	60.30	6.41	24.97	3.78	14.73	25.67
1985	16.98	60.75	6.65	23.79	4.32	15.46	27.95
1986	16.98	59.70	6.65	23.38	4.81	16.91	28.44
1987	25.23	68.60	6.65	18.08	4.91	13.35	36.79
1988	35.48	75.44	6.79	14.44	4.76	10.12	47.03

Source: Compiled from Central Bank of Nigeria (2019).

From Table 1, the bulk of federal government domestic debts were raised from Treasury Bills. As at 1981, Treasury Bills accounted for 51.65% of the total domestic debt outstanding; while Treasury Certificates and Development Stock only accounted for 18.41% and 29.94% respectively. Though development stock recorded a high percentage in 1981, it keeps on declining up to 10.12% in 1988. Meanwhile, there have been some form of oscillations in the utilization of the Treasury Certificates in raising domestic debt. This is noticed from its ups and downs swings in its percentage contribution over the years. For Treasury Bills, a continuous rise has been the trend. Domestic debt raised from Treasury Bills was as high as N35.48 billion as at 1988 representing a 75.44% contribution to the total domestic debt of N47.03 billion for the same period.

For the period 1989 – 1995, there was an introduction of Treasury Bonds to augment the generation of public domestic debt in the country. This is portrayed in Table 2.

Table 2: Categorization of Federal Government Domestic Debt Outstanding (1986 – 1995)

Year	Treasury Bills (N billions)	% of Total	Treasury Certificates (N billions)	% of Total	Treasury Bonds (N billions)	% of Total	Development Stock (N billions)	% of Total	Domestic Debt (N billions)
1989	24.13	51.29	6.94	14.75	11.35	24.12	4.63	9.84	47.05
1990	25.48	30.30	34.21	40.68	20.00	23.78	4.40	5.23	84.09
1991	57.76	49.71	34.21	29.44	20.00	17.21	4.22	3.63	116.20
1992	119.75	67.29	35.24	19.80	19.01	10.68	3.96	2.23	177.96
1993	116.38	42.50	36.58	13.36	117.14	42.78	3.73	1.36	273.84
1994	170.93	41.94	37.34	9.16	195.96	48.08	3.35	0.82	407.58
1995	276.91	57.96	23.60	4.94	174.06	36.43	3.17	0.66	477.73

Source: Compiled from Central Bank of Nigeria (2019)

The introduction of Treasury Bonds led to the reduction of the contribution of Treasury Bills from 75.44% in 1988 to 51.29% as at 1989. In this horizon still, development stock exhibits the least contribution to the total domestic debt outstanding with as less as 0.66% as at 1995. Though Treasury Certificate contributed to as high as 37.34% as at 1994, it declined to as low as 23.60% in 1995 as Treasury Bond gains dominance by increasing from just 24.12% in 1989 to 36.43% in 1995. Thus, the period 1989 – 1995 was characterised by dominance of Treasury Bills and Treasury Bonds in the domestic debt outstanding of the country.

Within 1996 to 2002, there was absence of Treasury Certificate as a domestic debt instrument in the country. Thus, Treasury Bills, Treasury Bonds, and Development Stock were the key domestic debt instruments in use. This is presented in Table 3.

Table 3: Categorization of Federal Government Domestic Debt Outstanding (1996 – 2002)

Year	Treasury Bills (N billions)	% of Total	Treasury Bonds (N billions)	% of Total	Development Stock (N billions)	% of Total	Domestic Debt (N billions)
1996	179.63	42.77	237.39	56.52	2.96	0.70	419.98
1997	364.52	72.65	134.39	26.78	2.84	0.57	501.75
1998	378.53	67.49	179.62	32.03	2.68	0.48	560.83
1999	361.76	45.52	430.61	54.18	2.44	0.31	794.81
2000	465.54	51.83	430.61	47.94	2.11	0.23	898.25
2001	584.54	57.48	430.61	42.34	1.83	0.18	1,016.97
2002	733.76	62.93	430.61	36.93	1.63	0.14	1,166.00

Source: Compiled from Central Bank of Nigeria (2019).

From Table 3, it is observed that over the period of 1996 to 2002 development stock still exhibited a downward trend, contributing only 0.70% to the total domestic debt outstanding as at 1996 with a further record low of 0.14% as at 2002. Meanwhile, Treasury Bills and Treasury Bonds still remains the dominant debt instruments that were in use. Treasury Bill contributed 42.77% to the total domestic debt outstanding as at 1996 while Treasury Bond contributed as high as 56.52% in the same period. A reverse of this was experienced in subsequent years where Treasury Bills however regained its dominance over the horizon. For instance, Treasury Bills contributed as much as 63.93% to total domestic debt outstanding in 2002 while Treasury Bonds contributed 36.93% in the same period.

Within 2003 and 2010, instruments of domestic debt outstanding were diversified to include FGN Bonds and Promissory Notes. Within this period, Promissory Notes were only introduced in 2009 and it amount to N63.03 billion of the total domestic debt outstanding of N3,228.03 billion. A breakdown of the various instruments and their percentages is presented in Table 4.

Table 4: Categorization of Federal Government Domestic Debt Outstanding (2003 – 2010)

Year	Treasury Bills (N billions)	% of Total	FGN Bonds	% of Total	Treasury Bonds (N billions)	% of Total	Development Stock (N billions)	% of Total	Domestic Debt (N billions)
2003	825.05	62.05%	72.56	5.46%	430.60	32.38%	1.47	0.11%	1,329.68
2004	871.58	63.60%	72.56	5.30%	424.94	31.01%	1.25	0.09%	1,370.33
2005	854.83	56.02%	250.83	16.44%	419.27	27.48%	0.98	0.06%	1,525.91
2006	695.00	39.64%	643.94	36.73%	413.60	23.59%	0.72	0.04%	1,753.26
2007	574.93	26.50%	1,186.16	54.67%	407.93	18.80%	0.62	0.03%	2,169.64
2008	471.93	20.34%	1,445.60	62.30%	402.26	17.34%	0.52	0.02%	2,320.31
2009	797.48	24.70%	1,974.93	61.18%	392.07	12.15%	0.52	0.02%	3,228.03
2010	1,277.10	28.06%	2,901.60	63.75%	372.90	8.19%	0.22	0.005%	4,551.82

Source: Compiled from Central Bank of Nigeria (2019).

With rising domestic debt profile in the country, Treasury Bills and Treasury Bonds still dominate in the domestic debt outstanding in the country. Debt outstanding in Treasury Bills was 62.05% in 2003, rose to 63.60% in 2004, but maintained a downward trend thereof up to 28.06% in 2010. Meanwhile, debt outstanding on Treasury Bonds was 32.38% in 2003 but thereafter declined significantly to 8.19% in 2010. Within the review period, there have been significant growth in domestic debt outstanding under the FGN Bonds. The FGN Bond recorded a meagre 5.46% and 5.30% contribution to total domestic debt stock for 2003 and 2004 respectively. Thereafter, there was significant increase in such percentages. It was 16.44% in 2005, rose to 54.67% in 2007, then to 63.75% in 2010. Thus as at 2010, majority of the federal government domestic debt outstanding was in FGN bonds.

There has been total disappearance of the Development Stock within the period 2011 to 2016 in the domestic debt outstanding. Therefore, Treasury Bills, FGN Bonds, and Treasury Bonds were the instruments that contributed to the domestic debt outstanding of the country. This is depicted in Table 5.

Table 5: Categorization of Federal Government Domestic Debt Outstanding (2011 – 2016)

Year	Treasury Bills (N billions)	% of Total	FGN Bonds	% of Total	Treasury Bonds (N billions)	% of Total	Domestic Debt (N billions)
2011	1,727.91	30.73%	3,541.20	62.98%	353.73	6.29%	5,622.84
2012	2,122.93	32.47%	4,080.05	62.41%	334.56	5.12%	6,537.54
2013	2,581.55	36.26%	4,222.04	59.31%	315.39	4.43%	7,118.98
2014	2,815.52	35.62%	4,792.28	60.63%	296.22	3.75%	7,904.03
2015	2,772.87	31.38%	5,808.14	65.73%	255.99	2.90%	8,837.00
2016	3,277.28	29.64%	7,564.94	68.41%	215.99	1.20%	11,058.20

Source: Compiled from Central Bank of Nigeria (2019).

The dominance of the Treasury Bills in contributing to the domestic debt outstanding continuously got eroded by FGN Bonds within 2011 and 2016. While Treasury Bills contribution to total domestic debt outstanding oscillated between 30.73% and 29.64%, that of FGN Bonds maintained some degree of rising trend over the period. Its contribution to total domestic debt outstanding was 62.98% in 2011, declined to 59.31% in 2013, and thereafter increased to 68.41% of the total domestic debt outstanding. Within the same period, Treasury Bonds have been on the decline by contributing 6.29% to the total domestic debt outstanding in 2011; declined to 4.43% in 2013; and then to a record low of 1.20% as at 2016.

Within the period of 2017 – 2019, newer avenues for raising domestic debts new introduced. This include the reintroduction of the Promissory Notes; and introduction of FGN Sukuk, FGN Green Bonds, and FGN Savings Bonds.

Table 6: Categorization of Federal Government Domestic Debt Outstanding (2017 – 2019)

	2017	2018	2019
Treasury Bills (N billions)	3,579.80	2,735.96	2,651.51
% of Total	28.43%	21.42%	18.58%
FGN Bonds (N billions)	8,715.81	9,334.74	10,524.16
% of Total	69.23%	73.07%	73.74%
Promissory Notes (N billions)	-	331.27	732.62
% of Total	-	2.59%	5.13%
FGN Sukuk	100.00	200.00	200.00
% of Total	0.79%	1.57%	1.40%
Treasury Bonds	175.99	150.99	125.99
% of Total	1.40%	1.18%	0.88%
FGN Green Bonds	10.69	10.69	25.69
% of Total	0.08%	0.08%	0.18%
FGN Savings Bonds	7.20	10.75	12.67
% of Total	0.06%	0.08%	0.09%
Total Domestic Debt	12,589.49	12,774.40	14,272.64

Source: Compiled from Central Bank of Nigeria (2019).

These new domestic debt instruments have been insignificant in the overall domestic debt outstanding of the country. For example, FGN Sukuk only contributed 0.79%, 1.57% and 1.40% to the total domestic debt outstanding in the period 2017, 2018 and 2019 respectively. Similarly, FGN Green Bonds contributed 0.08%, 0.08%, and 0.18% for 2017, 2018, and 2019 respectively to the total domestic debt outstanding. Similar trend was experienced in the FGN Savings Bonds as it only contributed only 0.06%, 0.08% and 0.09% of the total domestic debt outstanding for 2017, 2018 and 2019 respectively. Within this period, the FGN Bond was the

dominant debt instrument that contributed to the total domestic debt outstanding of the country. It contributed 69.23% in 2017, 73.07% in 2018, and 73.74% in 2019 to the total domestic debt outstanding.

Given these debt instruments, their holdings have been in the hands of the Central Bank of Nigeria, Deposit Money Banks, Non-Bank Public, and the Sinking Fund. However, such holdings depended on time. For the period 1981 – 2008, the above stated stocks were held basically by the Central Bank of Nigeria (CBN), Deposit Money Banks (DMBs), and the Non-Bank Public (NBP). The breakdown is given in Table 7 as follows:

Table 7: Holdings of Federal Government's Domestic Debt outstanding (1981 – 2008)

Year	CBN (N billions)	% of Total Holdings	DMBs (N billions)	% of Total Holdings	NBP (N billions)	% of Total Holdings	Total Holdings (N billions)
1981	4.52	40.42%	1.84	16.47%	4.83	43.12%	11.19
1982	6.49	43.24%	2.99	19.95%	5.53	36.82%	15.01
1983	10.40	46.81%	5.53	24.87%	6.29	28.32%	22.22
1984	9.53	37.13%	9.62	37.47%	6.52	25.40%	25.67
1985	9.91	35.44%	11.39	40.75%	6.65	23.81%	27.95
1986	16.10	56.62%	4.57	16.07%	7.77	27.315	28.44
1987	17.65	47.97%	7.86	21.36%	11.28	30.67%	36.79
1988	26.64	56.64%	7.48	15.90%	12.92	27.46%	47.03
1989	15.65	33.26%	3.70	7.86%	27.70	58.88%	47.05
1990	27.38	32.56%	9.06	10.78%	47.65	56.66%	84.09
1991	62.29	53.61%	7.49	6.44%	46.42	39.95%	116.20
1992	138.77	77.98%	6.23	3.50%	32.96	18.52%	177.96
1993	202.43	73.93%	38.88	14.20%	32.52	11.88%	273.84
1994	308.44	75.68%	47.27	11.60%	51.87	12.73%	407.58
1995	414.29	86.72%	22.30	4.67%	41.15	8.61%	477.73
1996	312.80	74.48%	56.07	13.35%	51.11	12.17%	419.98
1997	403.30	80.38%	45.10	8.99%	53.35	10.63%	501.75
1998	454.91	81.11%	57.68	10.28%	48.24	8.60%	560.83
1999	530.42	66.74%	201.49	25.35%	62.89	7.91%	794.81
2000	498.92	55.54%	344.89	38.40%	54.44	6.06%	898.25
2001	569.51	56.00%	386.45	38.00%	61.02	6.00%	1,016.98
2002	519.77	44.58%	460.23	39.47%	186.00	15.95%	1,166.00
2003	613.79	46.16%	500.43	37.64%	215.46	16.20%	1,329.68
2004	403.46	29.44%	669.07	48.83%	297.79	21.73%	1,370.33
2005	408.42	26.77%	726.23	47.59%	391.26	25.64%	1,525.91
2006	335.53	19.14%	882.85	50.35%	534.87	30.51%	1,753.26
2007	293.58	13.53%	1,410.04	64.99%	466.00	21.48%	2,169.63
2008	289.37	12.47%	1,482.16	63.88%	548.78	23.65%	2,320.31

Source: Compiled from Central Bank of Nigeria (2019).

Within 1981 to 1990, there have been dominance by the Central Bank of Nigeria and the Non-Bank Public in holding of the federal government domestic debt instruments. The two categories jointly held 83.54% of domestic debt instrument of the federal government as at 1981; 78.64% in 1987; and 84.04% as at 1990. Within the period, the Deposit Money Banks only held up to 40% of the total holdings as at 1985. The period 1991 to 1998 was characterised by significant dominance of the CBN in the holdings of the domestic debt instruments. The CBN held as much as 77.98% as at 1992; 86.72% as at 1985; and 81.11% in 1998. The holdings of the non-bank public declined significantly from 39.95% in 1991 to 8.60% in 1988. Meanwhile, holdings from the deposit money banks was still insignificant as they held only 3.50% in 1992 and a bit record high of 10.28% as at 1998.

The period 1999 to 2008 witnessed continuous decline in the holdings of the CBN and NBP while the deposit money banks gained dominance. The CBN held 66.74% as at 1999 but this declined to 29.44% in 2004 and thereafter to as little as 12.47% in 2008. Though in this period the non-bank public holdings started to regained some dominance by increasing from 6.00% in 2001 to 21.73% in 2004 and thereafter to 23.65% in 2008, such was still insignificant when compared to that of the deposit money banks. The deposit money banks held 25.35% as at 1999 but this increased to 39.47% in 2002. Further increase to 48.83% and 64.99% in 2004 and 2007 respectively was obtained, but declined a bit to 63.88% as at 2008.

Within 2009 and 2019, the Sinking Fund was introduced. The breakdown is further presented in Table 8 as follows:

Table 8: Holdings of Federal Government's Domestic Debt outstanding (2009 – 2019)

Year	CBN	% of Total Holdings	DMBs	% of Total Holdings	Sinking Fund	% of Total Holdings	NBP	% of Total Holdings	Total Holdings
2009	323.18	10.01%	1,274.58	39.48%	284.72	0.09%	1,345.55	41.68%	3,228.03
2010	343.14	7.54%	2,605.01	57.23%	144.37	0.03%	1,459.30	32.06%	4,551.82
2011	348.84	6.20%	3,790.90	67.42%	146.49	0.03%	1,336.61	23.77%	5,622.84
2012	398.27	6.09%	3,580.42	54.77%	160.32	0.02%	2,398.52	36.69%	6,537.53
2013	468.86	6.59%	3,293.83	46.27%	158.59	0.02%	3,197.69	44.92%	7,118.97
2014	180.21	2.28%	3,982.72	50.39%	176.77	0.02%	3,564.32	45.10%	7,904.02
2015	877.30	9.93%	3,284.01	37.16%	162.20	0.02%	4,513.49	51.07%	8,837.00
2016	1,688.20	15.27%	3,736.02	33.79%	140.45	0.01%	5,493.53	49.68%	11,058.20
2017	1,703.80	13.53%	5,351.80	42.51%	118.40	0.01%	5,415.50	43.02%	12,589.50
2018	2,032.28	15.91%	5,040.81	39.46%	108.44	0.01%	5,592.88	43.78%	12,774.40
2019	1,860.62	13.04%	4,205.24	29.46%	84.95	0.01%	8,121.82	56.90%	14,272.63

Source: Compiled from Central Bank of Nigeria (2019).



The Sinking Fund portray an insignificant holdings of the total domestic debt outstanding. It only constitutes 0.09% of the total holdings as at 2009; declined to 0.02% as at 2015; and then to just 0.01% as at 2019. The CBN still held an insignificant proportion of the total holdings within this period, though with some improvement within 2016 and 2019. CBN held only 2.28% as at 2014 and then 13.04% as at 2019. The DMBS and the NBP held significant proportion of the total holdings. Though the DMBS maintained greater dominance between 2009 – 2014, the NBP overtook from 2015 till 2019. As at 2011, DBMs held 67.42% while the NBP held 23.77%. Similarly, the DMBS held 50.39% as at 2014 while the NBP held 45.10%. In 2016, the proportion of holdings by the DMBS declined to 33.79% while that of the NBP rose to 49.68%. As at 2019, the proportion of holdings by the DMBS was 29.46% while that of the NBP was as high as 56.90%.

### ***Nigeria's Public External Debt Outstanding***

The external debt profile of Nigeria includes debt secured from multilateral and bilateral means. Other creditors in this category include the Paris Club, London, Promissory Notes, Euro Bond and Diaspora Bond. The categorization is presented in Table 9 as follows:

Table 9: Federal Government's External Debt outstanding (1981 – 2019)

Years	Multilateral	Paris Club	London	Promissory Notes	Bilateral	Euro Bond	Diaspora Bond	Others	Total
1981	0.18	1.98	0.00	0.00	0.00	-	-	0.18	2.33
1982	0.53	5.47	1.98	0.00	0.00	-	-	0.83	8.82
1983	0.57	6.00	2.76	0.55	0.55	-	-	0.70	10.58
1984	1.27	6.36	5.44	1.16	1.16	-	-	0.58	14.81
1985	1.29	7.73	6.16	1.27	1.27	-	-	0.84	17.30
1986	4.67	21.73	8.44	4.15	4.15	-	-	2.46	41.45
1987	8.78	63.21	6.77	20.63	20.63	-	-	1.40	100.79
1988	9.99	75.45	14.99	25.74	25.74	-	-	7.79	133.96
1989	21.47	121.23	42.84	35.07	35.07	-	-	19.78	240.39
1990	34.61	154.55	53.43	40.95	40.95	-	-	15.08	298.61
1991	39.46	173.05	58.24	43.56	43.56	-	-	14.14	328.45
1992	89.27	324.73	41.89	64.14	64.14	-	-	24.23	544.26
1993	81.46	400.38	45.32	69.67	69.67	-	-	36.32	633.14
1994	97.06	404.21	45.37	70.07	70.07	-	-	32.11	648.81
1995	97.04	476.73	44.99	69.26	69.26	-	-	28.85	716.87



1996	102.63	420.00	44.95	47.08	47.08	-	-	2.66	617.32
1997	96.20	417.57	44.95	35.48	35.48	-	-	1.74	595.93
1998	93.21	458.26	44.95	35.15	35.15	-	-	1.45	633.02
1999	361.19	1,885.66	187.63	136.52	136.52	-	-	6.36	2,577.37
2000	379.04	2,320.27	223.83	158.49	158.49	-	-	15.75	3,097.38
2001	313.50	2,475.51	228.95	144.75	144.75	-	-	13.58	3,176.29
2002	375.70	3,220.82	182.96	146.34	146.34	-	-	7.06	3,932.88
2003	413.88	3,737.28	196.16	123.99	123.99	-	-	7.02	4,478.33
2004	384.25	4,196.84	196.16	106.56	106.56	-	-	6.46	4,890.27
2005	330.65	2,028.58	189.77	85.53	85.53	-	-	60.54	2,695.07
2006	332.22	-	-	64.83	64.83	-	-	54.41	451.46
2007	374.30	-	-	-	-	-	-	64.59	438.89
2008	464.56	-	-	-	-	-	-	58.70	523.25
2009	524.20	-	-	-	-	-	-	66.23	590.44
2010	635.45	-	-	-	24.60	-	-	29.79	689.84
2011	723.12	-	-	-	71.80	79.10	-	22.83	896.85
2012	828.72	-	-	-	110.60	78.70	-	8.88	1,026.90
2013	986.84	-	-	-	161.30	235.90	-	3.29	1,387.33
2014	1,142.30	-	-	-	237.20	252.00	-	-	1,631.50
2015	1,489.41	-	-	-	326.60	295.50	-	-	2,111.51
2016	2,436.41	-	-	-	585.00	457.50	-	-	3,478.91
2017	3,133.88	-	-	-	725.83	1,836.00	91.80	-	5,787.51
2018	3,381.40	-	-	-	949.10	3,336.60	92.10	-	7,759.20
2019	4,127.28	-	-	-	1,254.26	3,543.08	97.80	-	9,022.42

Source: Compiled from Central Bank of Nigeria (2019).

Within 1981 – 2005, Nigeria sourced her debt from outlets that excludes the Euro Bond and Diaspora Bond. In this period, the dominant creditor was the Paris Club. Loans sourced from the Paris Club accounted for about 84.76% of the total external debt outstanding as at 1981. Meanwhile, such proportion keeps on oscillating over the years. For instance, the proportion was 52.41% in 1986; and 50.43% in 1989. Thereafter, it increased to 59.66% in 1992; 70.07% in 1997; and 81.89% in 2002. In 2004, the proportion of external debt outstanding in regards to Paris Club was 85.82% but declined to 75.27% in 2005.

For the period 2006 – 2019, the outstanding debt from Paris Club and London Club ceases to exist while there was introduction of the Euro Bond in 2011 and Diaspora Bond in 2017. Within the period, Multilateral debt and the debt from Euro Bond were the major sources

of the external debt outstanding. As at 2019, the multilateral source constituted 45.74% of the total external debt outstanding while the Euro Bond constituted 39.27% of the total external debt outstanding.

### Unit Root Test

The result of the augmented Dickey-Fuller (ADF) and Philip-Peron (PP) unit root test is presented in Table 10. The estimation follows the constant assumption and the maximum lag was selected based on the Schwarz Information Criterion.

Table 10: Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) Unit Test Result

Variables	ADF Statistic at Level	ADF Statistic at First Difference	PP Test at Level	PP Test at First Difference	Order of Integration
logGDP	<b>-0.0968</b> (0.9424) [-2.9434]	<b>-3.4341</b> (0.0160) ** [-2.9434]	<b>0.5610</b> (0.9867) [-2.9411]	<b>-3.3127</b> (0.0214) ** [-2.9434]	I(1)
logLAB	<b>3.0072</b> (1.0000) [-2.9571]	<b>-2.2369</b> (0.1979) [-2.9571]	<b>1.5217</b> (0.9991) [-2.9411]	<b>-3.8992</b> (0.0121) ** [-2.9434]	I(1)
logGCF	<b>-2.3463</b> (0.1637) [-2.9458]	<b>-5.0027</b> (0.0002) *** [-2.9458]	<b>-3.4792</b> (0.0141) ** [-2.9411]	<b>-5.6791</b> (0.0000) *** [-2.9434]	I(0)
logDMD	<b>-1.9989</b> (0.2861) [-2.9411]	<b>-4.5665</b> (0.0008) *** [-2.9434]	<b>-1.8600</b> (0.3469) [-2.9411]	<b>-4.5665</b> (0.0008) *** [-2.9434]	I(1)
logEXD	<b>-1.6661</b> (0.4397) [-2.9434]	<b>-4.7260</b> (0.0005) *** [-2.9434]	<b>-2.7195</b> (0.0801) * [-2.9411]	<b>-4.7260</b> (0.0005) *** [-2.9434]	I(1)
logBMS	-0.6484 (0.8475) [-2.9411]	-4.1089 (0.0028) *** [-2.9434]	-0.5762 (0.8642) [-2.9411]	-4.1089 (0.0028) *** (-2.9434)	I(1)
INF	<b>-2.9254</b> (0.0518) * [-2.9411]	<b>-5.6848</b> (0.0000) *** [-2.9434]	<b>-2.7963</b> (0.0683) * [-2.9411]	<b>-9.8044</b> (0.0000) *** [-2.9434]	I(1)
EXR	<b>0.7459</b> (0.9916) [-2.9411]	<b>-5.4427</b> (0.0001) ** [-2.9434]	<b>1.2284</b> (0.9978) [-2.9411]	<b>-5.4177</b> (0.0001) *** [-2.9434]	I(1)
TRP	<b>-2.4360</b> (0.1390) [-2.9411]	<b>-8.0769</b> (0.0000) *** [-2.9434]	<b>-2.2617</b> (0.1891) [-2.9411]	<b>-9.1057</b> (0.0000) *** [-2.9434]	I(1)
INT	<b>-2.4318</b> (0.1405) [-2.9458]	<b>-2.8712</b> (0.0603) * [-2.9604]	<b>-3.5002</b> (0.0134) ** [-2.9411]	<b>-9.7311</b> (0.0000) *** [-2.9434]	I(0)

Note: \*, \*\*, and \*\*\* denotes significance at 10%, 5% and 1% respectively; probabilities are enclosed in (); the PP and ADF statistics are in bold fonts; while the 5% critical values are enclosed in [].

From the unit root test conducted, the Philip-Peron test is taken as a more powerful test to confirm the report of the ADF test. From the test result, it is observed that the log of capital and interest rate are stationary at level  $I(0)$ . All other variables are stationary at first difference,  $I(1)$ , and confirmed by their significance after first differencing. The mixed order of integration of the variables presupposes the need to test for the existence of a long-run relationship among the variables. As such, the autoregressive distributed lag (ARDL) Bounds test for cointegration becomes pertinent to be used.

### ARDL Bounds Test for Cointegration

Table 11: ARDL Bounds Test for Cointegration Result

Test Statistic	Value	Significance	$I(0)$	$I(1)$
F-statistic	23.3603	10%	1.8	2.8
		5%	2.04	2.08
Number of Parameters (k)	9	1%	2.5	3.68

Source: Authors' Computation using Eviews 10.

The Bounds test is carried out using the F-statistic (Table 11). The F-statistic is statistically significant at the 5% level. The significance of the F-statistic presents strong evidence that there is a long run relationship between public debt and economic growth in Nigeria. the need to estimate the short-run and the long-run estimates becomes paramount.

### Long Run ARDL Error Correction Estimates

Table 12: Long-Run Result

Variable	Coefficient	Standard Error	t-statistic	Probability
logLAB	2.5468	0.5456	4.6677	0.0007***
logGCF	-0.1728	0.0672	-2.5696	0.0261**
logDMD	-0.0560	0.0360	-1.5572	0.1477
logEXD	-0.0973	0.0121	-8.0418	0.0000***
logBMS	0.0780	0.0611	1.2758	0.2283
INF	-5.93E-05	0.0007	-0.0858	0.9332
EXR	-0.0011	0.0002	-4.7872	0.0006***
TRP	-0.0048	0.0011	-4.2436	0.0014***
INT	0.0338	0.0039	8.6894	0.0000***
C	-30.6700	9.8433	-3.1158	0.0098**
R-squared	0.977253	Adjusted R-squared		0.961005
Akaike Info Criterion	-6.482162	Durbin-Watson stat		2.116466

Note: \*\* and \*\*\* denotes significance at 5% and 1% respectively.

Source: Authors' Computation using Eviews 10.

The long-run effect of public debt and economic growth is presented in Table 12. From the result, labour and capital exerts significant effect on the growth of the Nigerian economy over the study period. The log of labour (measuring the percentage change in labour) exerts a positive effect which aligns with the a priori expectation. It follows from the coefficient that a unit percentage increase in labour will culminate to a 254.68% increase in economic growth. Thus, labour is of great importance in the economy as it drives the functioning of all other inputs in the production process. Though capital exerted a significant effect, such effect is negatively related to growth of the Nigerian economy. This can be linked to greater negligence of key infrastructures in the economy along with key project abandonment over the years.

Both domestic and external debt components are also observed to generate a negative and significant effect on the growth of the Nigerian economy. This therefore presupposes the debt crowding-out effect in the Nigerian economy over the study period. The elasticities imply that a unit percentage increase in domestic debt will reduce the growth of the Nigerian economy by 5.6%; while a unit percentage increase in external debt will reduce Nigeria's growth by 9.73%. Based on the elasticities, we can therefore say that external debt had the greatest crowding out effect on economic growth over the study period.

Both broad money supply and the rate of inflation generated an insignificant effect on the growth of the Nigerian economy over the study period. However, broad money supply generated the expected positive effect while the rate of inflation as well generated the desired negative effect on the growth of the economy.

Exchange rate and trade openness generated negative and significant effect on economic growth within the study period. A unit percentage increase in exchange rate will lead to a 0.11% decrease in economic growth; while a unit percentage increase in trade openness will lead to a 0.48% decrease in economic growth. Nigeria is importing more than what the value of her export is, especially when it comes to manufactures. As such, excessive opening up of the economy propelled the dominance of foreign goods that are produced with low cost due to advanced technologies. The resultant effect declines in domestic production due to excessive competition from advanced countries hence, a decline in growth. Interest rate generated a positive and significant effect on economic growth. This does not meet the a priori expectation. Thus, a unit percentage increase in interest rate will lead to a 3.38% increase in economic growth in Nigeria.

The R-squared of 0.9773 indicates a good fit of the regression model. It implies that 97.73% of the total variations in economic growth is explained by variations in the explanatory variables in the model. The remaining 2.27% is accounted for by other variables excluded in the model. The goodness of fit is still high (96.10%) after being adjusted for the degree of freedom.

The Durbin-Watson statistic (2.12) is an indication that the model does not suffer from any form of autocorrelation.

### Short Run ARDL Estimates

The short-run error correction estimate is presented in Table 13. The dynamic nature of the variables in the short run reveals some key issues.

Table 13: Short-Run Result

Variable	Coefficient	Standard Error	t-statistic	Probability
D(logLAB)	-2.6294	1.1928	-2.2043	0.0497**
D(logLAB(-1))	-3.6659	1.2084	-3.0338	0.0114**
D(logGCF)	-0.0959	0.0131	-7.3023	0.0000***
D(logGCF(-1))	-0.0441	0.0114	-3.8785	0.0026***
D(logDMD)	-0.0714	0.0116	-6.1415	0.0001***
D(logDMD(-1))	-0.0670	0.0122	-5.5034	0.0002***
D(logEXD)	-0.0576	0.0044	-13.170	0.0000***
D(logEXD(-1))	0.0151	0.0042	3.5848	0.0043***
D(logBMS)	-0.1423	0.0174	-8.1951	0.0000***
D(logBMS(-1))	-0.0719	0.0162	-4.4429	0.0010***
D(INF)	0.0008	0.0001	5.8102	0.0001***
D(TRP)	-0.0009	0.0002	-5.0089	0.0004***
D(TRP(-1))	0.0006	0.0002	3.0850	0.0104**
D(INT)	0.0061	0.0005	11.768	0.0000***
D(INT(-1))	-0.0041	0.0006	-6.4758	0.0000***
CointEq(-1)*	-0.6080	0.0275	-22.1487	0.0000***
R-squared	0.977253	Akaike Info Criterion		-6.482162
Adjusted R-squared	0.961005	Durbin-Watson stat		2.116466

Source: Authors' Computation using Eviews 10.

In the short-run, it is observed that the error correction coefficient (-0.6080) is negative and statistically significant at the 1% level of significance. It follows that 60.80% of the short-run disequilibrium is corrected annually so that equilibrium is restored in the long run. In other words, 60.80% of the short-run distortions are corrected annually so as to achieve long-run equilibrium.

The short-run result indicates that both labour and capital, along with their lagged values, exert a negative and significant effect on economic growth. Similarly, both domestic and external debt, along with their lagged values, exerted a negative and significant effect on economic growth. In the short-run, a unit percentage increase in domestic debt will cause economic growth to decrease by 7.14% while a unit percentage increase in external debt will reduce economic growth by 5.76%. The lag value of domestic debt reduces GDP by 6.7% while

that of external debt increase the variable by 1.15%. It can be adduced from this that the crowding-out effect of external debt in the long run is greater than in the short run. In the short run, the crowding out effect of is less than the crowding out effect of domestic debt. This is because as domestic debts are redeemed, the proceeds go to the citizens which could spur up their aggregate demand and also stimulate output. In the case of external debt, such debt redemption does not have a benefiting effect on the domestic economy.

Broad money supply is observed to have a negative and significant short-run effect on economic growth. A unit percentage increase in broad money supply will lead to a 14.23% decrease in economic growth. This is because increase in money supply will lead to inflation in the short-term since such increase is not immediately matched by an increase in output. The one-period lag of broad money supply is also seen to reduce the growth of the economy by 7.19%. Inflation is observed to have a positive and significant short-term effect on economic growth. A unit percentage increase in inflation is followed by a 0.08% increase in the growth of the economy. For an economy to grow, a certain level of inflation is therefore desirable.

Trade openness still exerts a negative influence on growth but its lag value generates a positive effect. Thus, a unit percentage increase in trade openness will on the average lead to a 0.09% decrease in economic growth, while its lag value increases economic growth by 0.06% in the short run. Interest rate generates a positive and significant effect on economic growth but its lag value generates a negative effect. Thus, a unit percentage increase in interest rate will culminates to a 0.61% increase in economic progress. However, the one-period lagged value of interest rate reduces economic prosperity by 0.41%.

## Threshold Regression

Table 14: Debt Threshold Regression Result

Parameter	Total Public Debt (tpd)	Parameter	External Debt (exd)	Parameter	Domestic Debt (dmd)
$\alpha_1$	0.1151 (0.0000)***	$\beta_1$	0.6474 (0.0001)***	$\gamma_1$	0.1621 (0.0000)***
$\alpha_2$	0.0596 (0.0001)***	$\beta_2$	0.0290 (0.0000)***	$\gamma_2$	0.0337 (0.0000)***
$\pi_{tpd}$	9.570	$\pi_{exd}$	9.5550	$\pi_{dmd}$	9.629
tpd threshold	15.021	exd threshold	2.735	dmd threshold	4.384
$R^2$	0.811	$R^2$	0.396	$R^2$	0.969
SSR	2.358	SSR	7.517	SSR	0.390
F-statistic	49.959	F-statistic	7.662	F-statistic	360.421
P-value	0.0000	P-value	0.0005	P-value	0.0000

Source: Authors' Computation using Eviews 10.

From the threshold result in Table 14, the non-linear relationship of debt on economic growth is not valid since both the coefficients at the high debt regime and low debt regime are positive. Meanwhile, the optimal threshold level for public debt is set to be 15.021%. Above this level, debt accumulation could be detrimental to growth. At the upper total public debt regime, a growth rate of 5.96% can be achieved; while at the lower total public debt regime, a growth rate of 11.51% can be achieved. Also, the optimal threshold level of external debt is estimated to be 2.735%. This implies that external debt- GDP ratio above this level could be detrimental to growth. At the lower debt regime, public external debt propels growth by 64.74% while at the upper domestic debt regime, a 2.90% in growth can be achieved. Finally, the threshold of domestic debt is estimated to be 4.384%. At the upper domestic debt regime, the economy can only grow by 3.337% while at the lower domestic debt regime, a growth rate of 16.21% can be achieved.

## CONCLUSION AND RECOMMENDATIONS

The notion on whether debt can generate negative effect on the growth of an economy have been captured in the debt overhang hypothesis. Arguments on this strand had it that large debt, through the its effect on investment, lower growth in the economy since it will reduce domestic investments. In this regards, the burden of debt is in the aspect of liquidity scarcity, which can hamper capital formation and hence, the growth of the economy. The scarcity in liquidity arises because servicing debts entails transfer of resources. Also, “large debt increase expectation that debt services tend to be financed by distortionary measures” (Forgha, *et al.*, 2014). With such uncertainty, private investors prefer to exercise their option of waiting and may choose to invest less or resort to transfer their money abroad” (Serven, 1997). It therefore follows from the arguments that debt can negatively affect economic growth.

With this strands of thought, we examined the debt-overhang hypothesis in the Nigerian situation and we realize that debt negatively influences the growth of the Nigerian economy over the study period of 1981 to 2019. As such, there is a crowding-out effect of public debt in the Nigerian context. Our study also reveals that there is a long-run effect of public debt on the growth of the Nigerian economy. Public debt is split into domestic borrowing and foreign borrowing. Irrespective of whether debt is obtained from domestic or foreign sources, the finding of the negative effect of debt in the Nigerian context still holds.

Further, a threshold for public debt was also examined. It was realized that the optimal threshold level of total public debt is 15.021% while that of external debt is 2.735%. Meanwhile, the optimal threshold level of domestic debt was estimated to be 4.384%.



Though borrowing should be expected to generate a positive influence on the growth of the Nigerian economy, this can only be achieved through the investment of such loans on in the real sector of the economy. Our findings contradict this and is not surprising coupled with the fact that the cost of governance in Nigeria is quite high and loans which could be channelled to the real sector could have been used to run the machinery of the state or to finance consumption. As such, the desired growth effect of debt cannot be attained. As such, sustainable management of the public debt to achieve the desired policy objectives is recommended. In this regards, the debt threshold of 15.021%, 2.735% and 4.384% respectively for total public debt, external debt and domestic debt should be maintained. Debts should be channelled to finance production and in this way, domestic investments will be stimulated and the resultant effect will be accelerated economic growth.

For further studies, it is suggested that a disaggregated analysis should be conducted to ascertain the effect of various public debt instruments on the real sector of the economy. In that way, such study will be able to unveil the appropriate debt instruments that the country can utilized in order to avoid any form of crowding out effect on private investment.

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