THE DEBT-GROWTH NEXUS IN NIGERIA: AN ARDL APPROACH

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ABSTRACT

With rapidly changing business cycles in developing economies such as Nigeria, the need to re-evaluate the debt trajectory cannot be overemphasized especially facing the potential economic disequilibrium orchestrated by the emerging COVID-19. This paper employed economic data spanning 1980 to 2019 in an autoregressive distributed lagged model framework to examine the impact of debt variables on economic growth. Empirical results showed that debt does not significantly impact on economic growth. In addition, debt sustainability indicators negatively impact economic performance in the short-run and long-run periods with the debt-growth nexus exhibiting a U-shape trajectory. This prompted the proering of viable policy- mix to cushion the ravaging eects of debts and ensure macroeconomic stability.

Key words: debt, external, growth, domestic, government

JEL Classifications: E43, O47, H61, H63

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1.0   Introduction

Debt is a fundamental component of any nation. It is ultimately targeted at augmenting deficits or defraying shortfalls in government expenditure. The impact that debt exerts on economic growth has been a heated debate in any countries, especially developing countries (Deshappriya 2012). This is because there is hardly a consensus of the direction of such impact (Mhlaba and Phiri, 2017). Three distinct conclusions have emerged from the debt-growth debates. The debates show that the impact of debt on economic growth could either be positive (Wibowo, 2017), negative (Mhlaba & Phiri, 2017; Akram 2016; Atique & Malik, 2012) or nonlinear (Kobayashi 2015; Weerasinghe & Madhuwanthi, 2010). Ceteris paribus, governments often borrow to finance developmental programmes and projects or other financial obligations. When efficiently utilized, such financial resources can stimulate economic activities in the long run, resulting in a positive debt-growth nexus. Inefficiency in the acquisition and execution of debt resources can also be devastating economically to any country, climaxing in a negative impact of debt on economic growth. The inconclusiveness of the direction of impact of debt on growth has resulted in the nonlinear theory gaining renewed attention in recent times. Countries are justifying their borrowing spree under the assumption that debt stocks positively affect economic growth to a threshold level, and subsequently becomes negative (Mencinger, et al., 2014).

Nigeria is not immune to financial shortfalls. For instance, in 2019 expenditure of subnational governments increased to N4,503.3 billion, a 1.0 percent increase over 2018 expenditure (CBN, 2019a). In addition, between January and November of 2020, subnational governments received N3.43 trillion, while N91 billion was expended as derivation allocation among oil producing states (Adegbesan, 2020). Since there are shortfalls in income, this has necessitated the country resorting to debt to finance her financial obligations through the years. Debt issues transverse across all subnational governments in Nigeria. The efficiency or otherwise of fiscal and monetary policies in managing debt in Nigeria has been under scrutiny since debt stocks keep increasing. Through the years, several policies and programmes have been embarked by the government to check the menace. For instance, the Structural Adjustment Programme (SAP) contributed to the fall in growth rates of domestic and external debts in the mid-1980s. It can also be observed that there was a decline in the 2000s. Proactive economic policies during the Obasanjo civil administration was a major reason for the drop in debts in the economy between 2002 and 2014. During that era, the

economy witnessed a huge drop in debt obligations through debt cancelation, restructuring, outright forgiveness and other programmes. The primary concern has been the sustainability of such debts. Huge debts burdens coupled with unfavourable debt servicing schedules has plunged Nigeria into financial and economic crisis. The debt burden keeps increasing with severe consequences for economic growth.

The emerging COVID-19 pandemic has exerted more strain on the financial resources of economies including that of Nigeria. For instance, in curtailing the spread of COVID-19, the Nigerian government introduced an amendment to the 2020 budget in order to direct financial resources to areas where they are urgently needed to stimulate the economy (Budget Office of the Federation, 2020). A prominent part of the amended budget was the $500 billion ($1.3 billion) COVID-19 Intervention Fund. This was intended to strengthen health and other public projects to mitigate the adverse impacts of the pandemic. The Central Bank of Nigeria (CBN) also established a $50 billion credit facility and $100 billion credit intervention targeted at households/SMEs and indigenous pharmaceutical/health institutions, respectively (Central Bank of Nigeria, 2020).

These laudable economic responses have necessitated external borrowing. For instance, the Nigerian government borrowed $4.34 billion from the domestic stock market and $3.4 billion from the International Monetary Fund (Dixit, et al., 2020; IMF, 2020). The government is also proposing to borrow from the African Development Bank ($1 billion) and the World Bank ($2.5 billion) (Osae-Brown & Soto, 2020; Dixit & Onwujkwe., 2020). These recent spikes in external borrowings have been a disturbing issue as the country prepares for the post-COVID-19 era. This is not a misplaced issue because prior to the pandemic, total public debt was $80 billion (Debt Management Office, 2020). These issues have prompted the examination of debt overhanging, unfavourable debt servicing and other debt-related indicators to ensure solvency.

Scores of studies exist on the impact of the debt on economic growth in Nigeria (see Ekpo & Udo, 2013; Nwaeze, *et al*, 2015; Iliya & Tahir 2017; Obed, et al, 2017; Ewubara, et al, 2017; Udoh, 2020). However, the justification of re-investigating the debt-growth nexus in Nigeria emanates from the ravaging COVID-19 pandemic. The COVID-19 pandemic has thrown the world into financial tumor, with economies sliding towards economic recession. There is urgent need to re-examine the debt-growth trajectory in Nigeria in order

to proffer viable economic policies to cushion the effects of debt in the Post-COVID-19 era in Nigeria. Thus, the objective of this study is to re-examine the debt-growth trajectory in Nigeria.

Following this introductory section, section 2 provides an overview of Nigeria debt profile; section 3 examines some empirical studies on debts and economic growth; section 4 presents the methodology of the study, section 5 gives a discussion of the empirical results; while section 6 proffers policy recommendations to cushion the effects of debt spillovers.

2.   Nigeria Debt Profile and Economic Growth: Stylized Facts

The Nigerian economy was largely an agrarian one prior to the discovery of crude oil in commercial quantity. The agricultural sector provided revenue for economic activities. The country was not indebted immediately after the discovery of crude oil. However, following inappropriate macroeconomic policies which resulted in the appreciation of the naira, as well as rise in import of technological facilities necessary for the operations in the oil industry, external borrowing became inevitable since the foreign exchange reserves had been drastically depleted. This trend continued into the 1980s.

Nigeria's debt profile showed a dismaying situation given the country's huge natural and human resources. There have been drastic increase in debt outstandings at the various levels of government through the years. For example, federal government domestic debt outstanding stood at N11.19 billion in 1981. As at 2000, this federal government domestic debt outstanding was N898.25 billion. In spite of government fiscal and monetary policies to curtail the rising tide in debt accumulation, domestic debt outstanding at the federal level as at 2019 was N14,272.64 billion (Central Bank of Nigeria, 2019). Even external debt outsta)nding did not fare any better during this period, with the figure standing at N2.33 billion, N3,097.28 billion and N9,022.42 billion in 1981, 2000 and 2019, respectively. Nigeria's total public debt portfolio stood at ? 31.01 trillion (N11.36 trillion external debt; N19.65 trillion domestic debt) in the second quarter of 2020 due to the increase in multilateral loans and FGN bonds (National Bureau of Statistics, 2020). At the sub-national level, growth in debts has been in the increase. Between 2011 and 2019, state domestic debt rose from N1.23 million to N4.11 million (CBN, 2019b). Available statistics indicated that at the local government level, debt outstandings stood at N220.20

million in 2017. As clearly depicted in Figure 1, external debt was on the ascent between 1980 and 2004. The Structural Adjustment Programme (SAP) did not significantly improve on the debt situation in 1986, as the country continued to borrow externally to finance her economic activities. In the post-2004 era, the domestic debt stock started growing at an increasing rate compared to the external debt stock. This is possibly caused by the external debt relief package extended to Nigeria.


Figure 1: Nigeria Debt Stock (1980-2019)
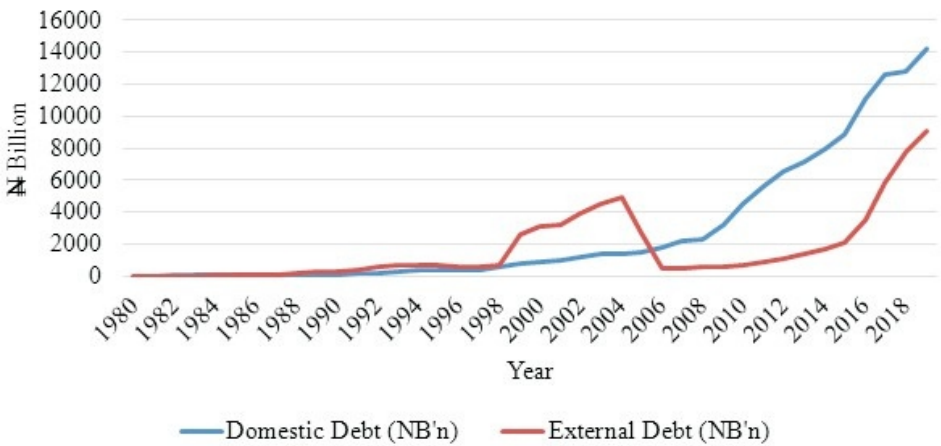
Source:
Central Bank of Nigeria *Annual Report* (various issues),
Central Bank of Nigeria *Statistical Bulletin* (various issues),
Debt Management Office Data Bank.

The deplorable debt situation has dire consequences for the economy. For instance, between 1980 and 2019, other than 1996, 1997, 2006 and 2007, growth in debt stock exceeds Gross Domestic Product (GDP) growth (See Figure 2). Debt stock has a peak growth in 1991 at a staggering 191.58%. Unfortunately, GDP recorded growth in several years, thus worsening the debt situation in Nigeria.

**Figure 2: Growth in Debt and GDP in Nigeria (1980-2019)**
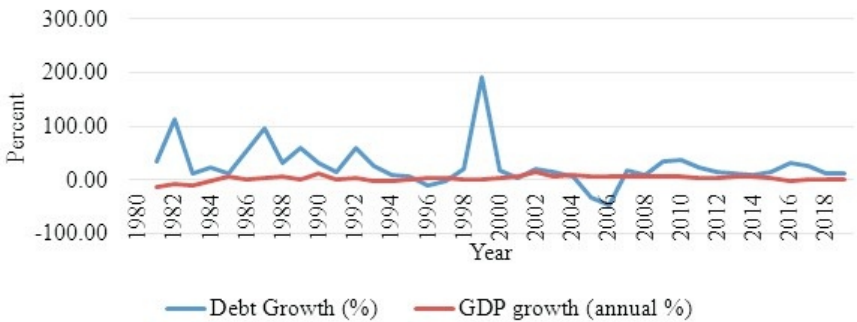
Source: Author's Compilation

In spite of the huge debt burden of the country, the economy has achieved internationally acceptable debt boundaries in recent times especially following the 2005 external debt forgiveness. The exit of the Paris Club in 2006 changed the debt trajectory in Nigeria. Debt indicators in recent times showed that Nigeria debt is sustainable, just as the following debt sustainability indicators show:

Total Debt/GDP (%)
This solvency ratio was below the internationally accepted threshold of 30% between 1980 and 1985. The adoption of the Structural Adjustment Programme and the appreciation of the local currency in 1986 increased this ratio above the threshold until 1996-1998 era (See Figure 3). Subsequently, this ratio increase sporadically until the debt forgiveness in 2005. Thereafter, the Total Debt/GDP ratio has remained sustainable.
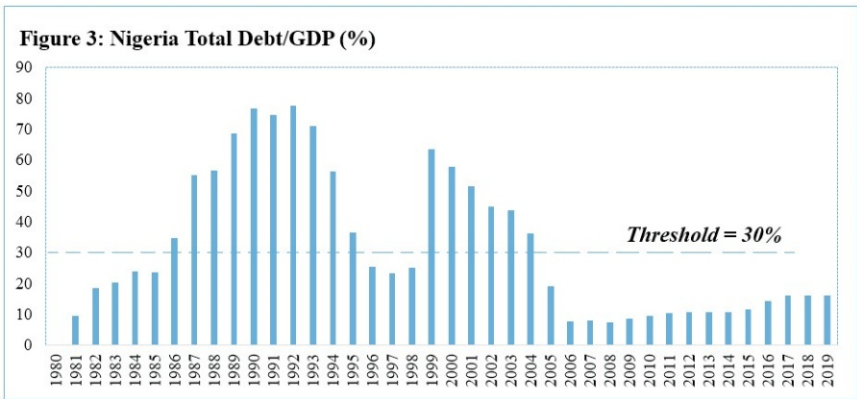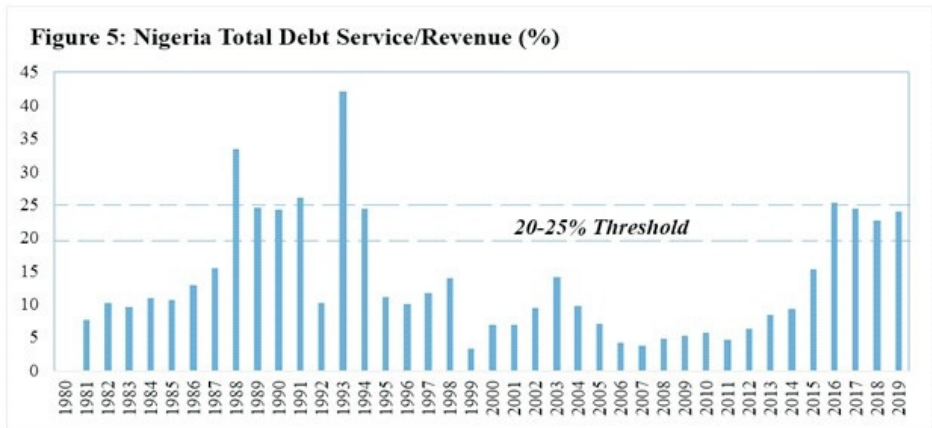

Source: Author's Compilation

External Debt/GDP (%)

This debt sustainability ratio has also improved in the wake of the debt forgiveness received by the country. Following the Paris Club exit in 2006, the External debt/GDP has greatly improved, although it has been rising in recent years. In spite of this, it is far below the 30% threshold (See Figure 4). This is an indication that the external debt component of GDP is steadily declining.

Figure 4: Nigeria External Debt/GDP (%)
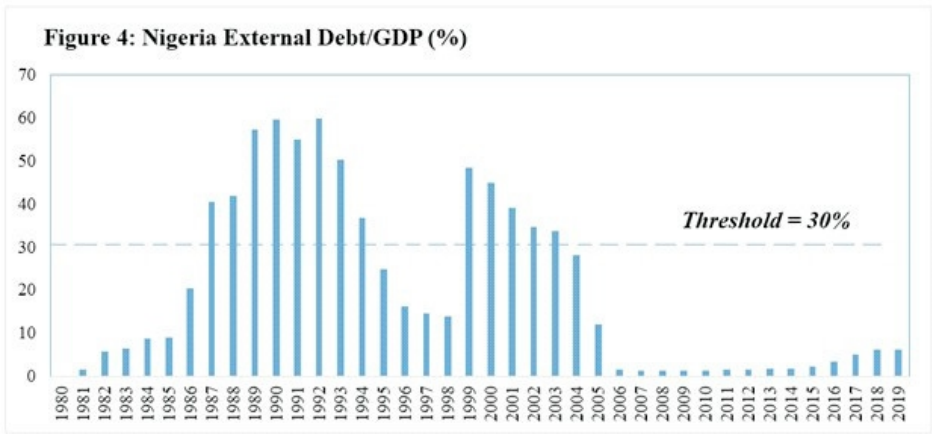
Source: Author's Compilation

Other debt sustainability indicators also showed that Nigeria's debt is still within the required thresholds. For instance, since 2005 Nigeria's Total Debt Service/ Revenue (20-25% threshold) and Total Domestic Debt/GDP (40-60% threshold) ratios are still within sustainable boundaries (See Figure 5 and Figure 6).

Figure 5: Nigeria Total Debt Service/Revenue (%)

Source: Author's Compilation

Figure 6: Nigeria Domestic Debt/GDP (%)
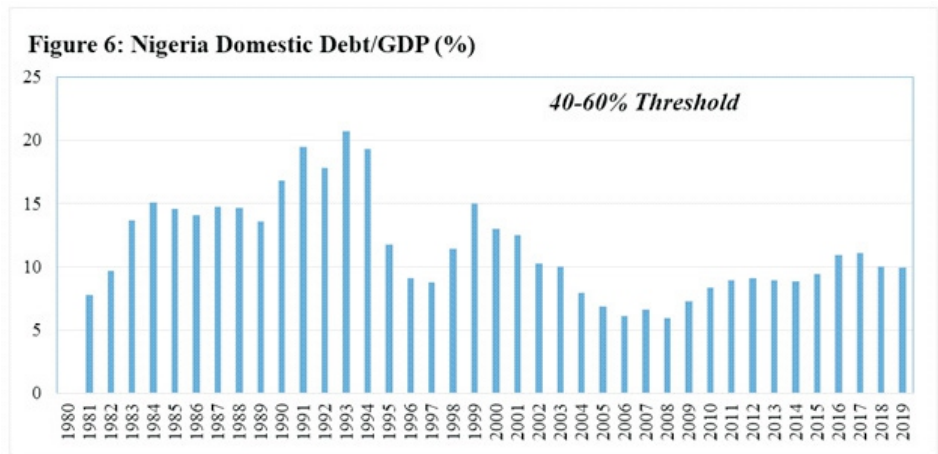
Source: Author's Compilation

However, there is need to trend with care in handling debt in Nigeria. Looking at the constraints in revenue generation in Nigeria, debt sustainability might be moving on a knife-edge. This can be observed in recent movements in the Total Debt/Revenue ratio (See Figure 7). The figure clearly showed that there have been a rise in this ratio since 2012 and has been oscillating around the 250% threshold. This has dire economic consequences for debt management in Nigeria.

Figure 7: Nigeria Total Debt/Revenue (%)
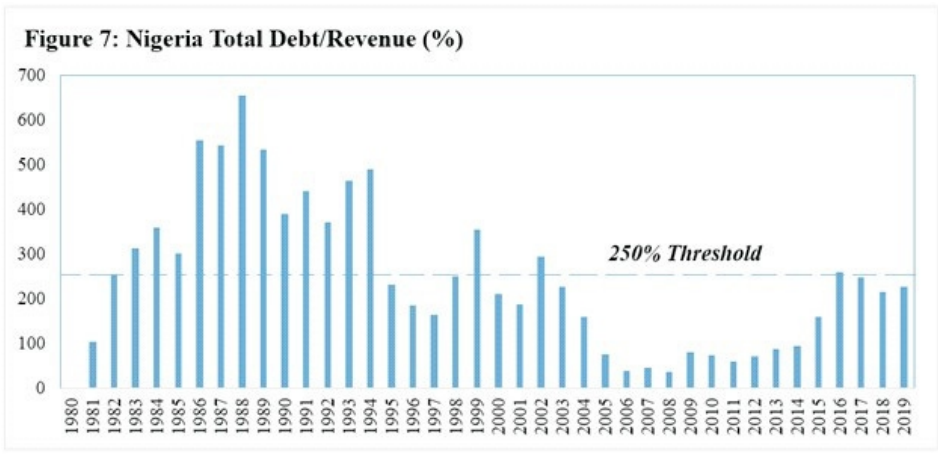
Source: Author's Compilation

The brief overview of Nigeria debt profile clearly shows that the economy is moving towards a debt overhang trap. This is especially true following the emergency of the COVID-19 pandemic, although economic projections look promising. For instance, following the recent revision of the 2020-2022 medium term fiscal framework, the key parameters as well as other macroeconomic projections are presented in the table below:

Table 1: Key Parameters and other Macroeconomic Projections

Description	2019 Actual	2020 Budget	2021	2022	2023
Oil Price Benchmark (US $/b)	67.2	28.0	40.0	40.0	40.0
Oil Production (mbpd)	1.96	1.80	1.86	2.09	2.38
Exchange rate (N/S)	305.0	360.0	360.0	360.0	360.0
Inflation (%)	11.98	14.15	11.95	10.94	11.02
Non-Oil GDP (N'bn)	131,810.1	131,155.5	132,592.2	134,154.5	139,304.9
Oil GDP (N'bn)	12,400.4	8,691.9	10,102.2	12,640.0	12,159.5
Nominal GDP (N'bn)	144,210.5	139,517.5	142,192.1	146,072.8	150,497.7
GDP Growth Rate (%)	2.27	(4.20)	3.00	4.68	3.86
Nominal Consumption (N'bn)	119,281.6	117,913.7	118,887.3	120,835.4	125,157.3

Source: Ministry of Finance, Budget & National Planning; NNPC; BOF; NBS

In the same vein, the federal government in collaboration with the states has established a ? 500 billion COVID-19 Crisis Intervention Fund to revamp the economy. These hallmark projections and projects are expected to be financed largely through external borrowings, since the economy has been operating on deficits through the years. This thus underscores the need to re-evaluate the impact of debt on economic growth in Nigeria in the light of the COVID-19 pandemic.

3.   Literature Review

There have been several debates on the trajectory of the debt-growth relationship. One popular school of thought is the threshold effect theory. According to the threshold effect theory (non-linear nexus), growth is expected to be positive at lower debt levels and negative at higher debt levels. There have been several studies on the linearity of the debt-growth nexus (Ahlborn & Schweickert, 2018; Checherita- Westphal & Rother, 2012; Pattillo, *et al*. 2011; Reinhart & Rogoff, 2010; and others). While some studies supported a U-shaped relationship, others supported an inverted U-shaped debt-growth relationship. For instance, Mindaugas and Seputiene (2018) examined a panel of 152 countries over the period of 1996–2016. Employing a SYS- GMM estimation technique as well as OLS and LSDV techniques to check for robustness, the study confirmed an inverted U-shaped debt-growth relationship. The reverse was the case in the

study of Checcherita-Westphal and Rother (2012). Using the data of 12 countries in the euro-zone between 2008 and 1970, Checcherita- Westphal and Rother (2012) found a non-linear relationship between the two variables (growth and debt). The study found that the hump-shaped relationship was at its maximum point when the debt-to-GDP ratio ranged from 90 to 100 percent.

For their part, the study of Cecchetti, *et al.* (2011) supported the nonlinear theory using a sample 18 Organization for Economic Cooperation and Development (OECD) countries between 1980 and 2008. Specifically, the study showed that any threshold below 85 percent of GDP, debt positively affect growth, while for any threshold beyond 85 percent, growth is adversely affected. Using a sample of 20 developed economies, Reinhart and Rogoff (2010) found a U-shaped debt-growth relationship. The study placed the debt-GDP ratio threshold at 90 percent. Pattillo, *et al.* (2011) also found a U-shaped relationship but with a 30-40 percent threshold.

Conversely, Herndon, *et al*. (2014) employed economic data of 20 advanced economies between 1946 and 2009 in evaluating the nature of the debt-growth relationship. The study found that nonlinearity does not exist between debt and economic growth, stating that debt/GDP ratio lies between 0 and 30 percent threshold.

On the nature of impart of debt on economic growth, several studies have shown a negative impact of debt on economic growth. For instance, the study of Mindaugas and Seputiene (2018) examined a panel of 152 countries over the period of 1996–2016 using a SYS-GMM estimation technique and found a negative relationship between debt and economic growth. The focus of Ahlborn and Schweickert (2018) was on 111 OECD and developing countries between 1970 and 2010. The study employed the pooled OLS, random and fixed effects models and found that public debt exerted a negative impact on economic growth. The study of Panizza and Presbitero (2013) also got similar findings among OECD countries. The study employed an instrumental variable (IV) approach.

For their part, Gómez-Puig and Sosvilla-Rivero (2017) investigated the long-run relationship between public debt and GDP growth rates in selected countries in the Eurozone between 1961 and 2013 using the autoregressive distributed lag (ARDL) bounds testing approach. The study found a negative relationship

between the variables. A critical look at the OECD countries did not provide a different conclusion because Dar and AmirKhalkhali (2012) examined the debt-growth nexus among 23 OECD countries over the 1996-2007 period and found a negative relationship.

In the same vein, Szabo (2013) concentrated on countries in the European Union (EU). Employing data of public debt-to-GDP ratio and GDP growth rate among 27 countries in the EU between 2008 and 2014, the study found that there are negative effects of debt on economic growth in the shortrun, while the relationship is weak in the longrun. The findings of Égert (2012) was a confirmation of this using the data of 20 advanced countries between 1946 and 2009.

In an attempt to be more specific in terms of determining thresholds, in the sample of 20 developed countries, Reinhart and Rogoff (2010) found a negative relationship between debt and economic growth, when public debt to GDP ratio exceeds 90 percent. Pattillo, *et al*. (2011) estimated much lower threshold for the panel of 93 developing countries. The debt levels above 30–40% of the GDP was found to hinder per capita growth.

In spite of the numerous studies that showed that debt has an adverse impact on economic growth, several studies hold the conclusion that debt positively impact economic growth. For instance, Owusu-Nantwi and Erickson (2016) investigated the impact of debt on economic growth (proxied by real GDP growth rate) in Ghana between 1970 and 2012 using the Johansen cointegration and the vector error correction models. The study found a positive relationship. Specifically, the study showed that a percent increase in debt result in about 2.8 percent increase in economic growth. This was the same conclusion in the study of Uzun, *et al*. (2012) which employed the panel ARDL model on the economic data of 19 transitional economies between 1991 and 2009.

For their part, Abbas and Christensen (2007) which employed a sample of 93 low- income countries and emerging economies between 1975 and 2004 using modified system of generalized method of moments (GMM) technique found a positive linear relationship between debt and economic growth (per capita GDP growth).

The impact of debt on economic growth in Nigeria has also received much attention in the past and has yielded differing outcomes. For instance, Umaru, et. al. (2013) examined the impact of debt on economic growth in Nigeria between 1970 and 2010. The study disaggregated debt into external and domestic growth. The study found that while external debt impact economic growth negatively, the reverse was the case for domestic debt.

Using ARDL technique, the studies of Udoh, *et al* (2020), Ohiomu (2020), Charles and Abimbola (2019), Onakoya and Ogunade (2017), Olasode and Babatunde (2016), and Mbah, *et al* (2016) examined the impact of debt on economic growth and found that debt negatively affect economic performance. Olugbenga and Oluwole (2019) employed the structural vector auto-regression generalized on Nigerian data spanning from 1970 to 2014 using external public debt-to-GDP ratio, per capita, GDP growth, investment, trade openness, exchange ratio, and inflation. The study found that external debt negatively impact economic growth and investment.

Obiesesan, *et al*. (2019) employed the ordinary least squares on economic data (economic growth (GDP), external debt, external debt service payment, exchange rate) for the period 1981-2017 and found that external debt and external debt payment negatively impact economic growth. In the same vein, Alagba and Eferakeya (2019) found that while domestic debt positively impact on economic growth; external debt and debt servicing negatively affect economic growth. Similar conclusion was reached by Isibor, *et al* (2018) which employed the 2-stage least squares on debt and growth data spanning from 1982 to 2017.

An earlier study by Onyeiwu (2012) which covered the period 1994-2008 using the ordinary least squares (OLS) has concluded that domestic debt holding has negative effect on economic growth by crowding out private investments, although this was refuted in the study of Dal and Ayokunle (2020) which employed the Vector Error Correction Model (VECM) and found the domestic debt positively impact economic growth.

Other studies employed several methods to evaluate the impact of debt on economic growth. For instance, Essien, *et al* (2016) employed the Vector Auto-regression (VAR) technique; Omotosho, *et al* , (2016) utilized the threshold regression; Ekperiware, *et al,* (2012) employed the Chow test; while Tokunbo, *et al* (2010) adopted the ordinary least squares and Johansen Cointegration Test.

These studies all found a negative relationship between debt and economic growth.

Taking a close look at the empirical studies carried out thus far in Nigeria, we observed several research gaps. None of these studies has approached the subject matter considering debt sustainability variables such as Total debt/GDP, Total debt/Revenue, and other indicators as these. A consideration of the impact of institutional quality on the debt-growth model has also been lacking in existing empirical studies in Nigeria. The linearity theory has also not been considered in the several studies in Nigeria to the best of our knowledge. This study will thus attempt to contribute to existing knowledge in these perspectives.

4.   Methodology

4.1.   Theoretical Framework
The study is based on the theoretical framework of the Solow-Swan model. This crux of this model is the neoclassical production function given as
$$Q(t) = F(K(t), A(t) L (t)\}   \quad (1)$$

Where
Q = output K = capital L = labour
A = technological knowledge t = time

The time variable enters the production function via the four basic components *Q, K, L* and *A*. The implication of this is that output will change overtime if the production inputs change. *AL* in Equation (1) is referred to as *effective labour*. Labour- augmenting technical change is assumed to be exogenous. The model assumed that aggregate investment is financed by domestic savings. The production function is Equation (1) is combined with constant savings rate to predict long-term growth.

Explicitly, this model assumes a diminishing marginal returns for the production inputs in explaining their effects on economic growth, while laying much emphasis on capital accumulation. The Solow-Swan (1956) model can be applied to the debt- growth debate. This emanated from the fact that aggregate capital stock employed in the production process is either the current account deficit or the sum of domestic saving and net external borrowing (Villaneuva & Mariano, 2007). Debt stock is thus incorporated into the Solow-Swan

model through augmentation of domestic savings or investment in the capital component. The impact of this debt stock on economic growth (negative of positive) can be captured through it effect on investment. It can either crowd-out private investment, making the economy vulnerable to external forces (Dombi & Dedak, 2019) or it can expand the economy through expansionary fiscal policies (DeLong & Summers, 2012).

4.2 Estimation Techniques, Empirical Model Specification and Data
The debt-economic growth nexus is tested utilizing the ARDL technique (see Pesaran, et al., 2001; Pesaran & Shin, 1999). The choice of this technique is essentially due to its advantages over other conventional cointegration techniques. It yields more robust estimates and can be utilized for analysis with small sample size, unlike techniques such as the Engle-Granger and Johansen and Joselius methods which are highly unreliable for small samples (Pesaran, et al., 2001). Thus, the ARDL technique is not associated with pre-testing problems and it yields asymptomatically normal and consistent estimates regardless of their level of integration. However, prior to the estimation of the ARDL model, the variables are tested for unit roots using the Augmented Dickey Fuller (ADF) unit root test to ensure that they are stationary. The study utilizes data covering the period 1980–2019.

4.3 Econometric model
The study specified the ARDL growth equation is given as:

$$
\begin{aligned}
\Delta GDPG_t = {} & \varphi_0 + \sum_{i=1}^{n} \varphi_1 \Delta GDPG_{t-1} + \sum_{i=1}^{n} \varphi_2 \Delta TOD_{t-1} + \sum_{i=1}^{n} \varphi_3 \Delta DOD_{t-1} + \sum_{i=1}^{n} \varphi_4 \Delta EXD_{t-1} \\
& + \sum_{i=1}^{n} \varphi_5 \Delta TODGDP_{t-1} + \sum_{i=1}^{n} \varphi_6 \Delta TODREV_{t-1} + \sum_{i=1}^{n} \varphi_7 \Delta TODSREV_{t-1} \\
& + \sum_{i=1}^{n} \varphi_8 \Delta EXDGDP_{t-1} + \sum_{i=1}^{n} \varphi_9 \Delta DODGDP_{t-1} + \sum_{i=1}^{n} \varphi_{10} \Delta CAPEXG_{t-1} \\
& + \sum_{i=1}^{n} \varphi_{11} \Delta TOD^2_{t-1} + \sum_{i=1}^{n} \varphi_G \Delta INST_{t-1} + \beta_1 GDPG_{t-1} + \beta_2 TOD_{t-1} \\
& + \beta_3 DOD_{t-1} + \beta_4 EXD_{t-1} + \beta_5 TODGDP_{t-1} + \beta_6 TODREV_{t-1} \\
& + \beta_7 TODSREV_{t-1} + \beta_8 EXDGDP_{t-1} + \beta_9 DODGDP_{t-1} + \beta_{10} CAPEXG_{t-1} \\
& + \beta_{11} TOD^2_{t-1} + \beta_{12} INST_{t-1} + \varepsilon_{1t}
\end{aligned} \tag{2}
$$

Where $ö_0$ is the constant term; $ö_0 – ö_0$ are the short-run regression coefficients; $â1–â2$ are the long-run regression coefficients; ? is the difference operator; n is the lag length; $å_{1t}$ is the white-noise error term; t is the time period. In addition, the variables in Equation (2) are defined in Table 2:

Table 2: Operationalization of Variables

Code	Variable	Definition of Variable	Source
GDPG	Growth in Gross Domestic Product	Annual percentage growth rate of GDP at market prices based on constant local currency	World Development Indicators (WDI)
TOD	Total Debt	The summation of domestic and external debt stocks	Debt Management Office (DMO)
DOD	Domestic Debt	Government accumulated local debt scheduled to be paid in local currency	Central Bank of Nigeria *Statistical Bulletin* Debt Management Office (DMO)
EXD	External Debt	Outstanding amount owed to foreign creditors, often used to complement domestic debt	Statistical Bulletin Debt Management Office (DMO)
TODGDP	Total Debt-GDP ratio	It measures the share of total debt stock in the GDP of a country	Debt Management Office (DMO)
TODREV	Total Debt-revenue ratio	Share of total debt stock in total revenue	Debt Management Office (DMO)
TODSREV	Total Debt service-revenue ratio	Share of total debt service in revenue	Debt Management Office (DMO)
EXDGDP	External Debt-GDP ratio	Share of external debt in GDP	Debt Management Office (DMO)
DODGDP	Domestic Debt-GDP ratio	Share of domestic debt in GDP	Debt Management Office (DMO)
CAPEXG	Capital expenditure growth	Captures the capital stock of an economy. It is the growth in capital expenditure	Central Bank of Nigeria *Statistical Bulletin*
TOD^2	Total Debt squared	It captures the linearity or otherwise of the model	Debt Management Office (DMO)
INST	Institutional quality	It is proxied by control of corruption. It captures the level of institutional quality	World Governance indicators

Source: Authors' Compilation.

When a long-run association exists between debt and economic growth, the error correction model (ECM) in an ARDL framework is expressed as follows:

$$\Delta GDPG_t = \varphi_0 + \sum_{i=1}^{n} \varphi_1 \Delta GDPG_{t-i} + \sum_{i=1}^{n} \varphi_2 \Delta TOD_{t-1} + \sum_{i=1}^{n} \varphi_3 \Delta DOD_{t-1} + \sum_{i=1}^{n} \varphi_4 \Delta EXD_{t-1}$$

$$+ \sum_{i=1}^{n} \varphi_5 \Delta TODGDP_{t-1} + \sum_{i=1}^{n} \varphi_6 \Delta TODREV_{t-1} + \sum_{i=1}^{n} \varphi_7 \Delta TODSREV_{t-1}$$

$$+ \sum_{i=1}^{n} \varphi_8 \Delta EXDGDP_{t-1} + \sum_{i=1}^{n} \varphi_9 \Delta DODGDP_{t-1} + \sum_{i=1}^{n} \varphi_{10} \Delta CAPEXG_{t-1}$$

$$+ \sum_{i=1}^{n} \varphi_{11} \Delta TOD^2_{t-1} + \sum_{i=1}^{n} \varphi_6 \Delta INST_{t-1} + \delta_1 ECM_{t-1} + \varepsilon_{2t} \qquad (3)$$

Where ECMt-1 is the one period lagged error correction term.

5.   Results and Discussion of Findings

5.1   Preliminary Results

5.1.1   Descriptive Statistics

Table 3 represents the descriptive statistics of the variables employed. These include growth in GDP (GDPG), total debt (TOD), domestic debt (DOD), external debt (EXD), total debt/GDP ratio (TODGDP), total debt/revenue ratio (TODREV), total debt service/revenue ratio (TODSREV), external debt/ GDP ratio, domestic debt/GDP ratio (DODGDP), capital expenditure growth (CAPEXG), and institutional quality (INST).

Table 3: Descriptive Statistics

stats	inst	gdpg	exd	dod	tod	todgdp	exdgdp	dodgdp	todrev	todsrev	capexg
mean	-1.13	3.15	1698.22	2874.91	4573.13	32.07	20.52	11.53	250.99	13.63	22.36
max	-.81	15.33	9022.42	14272.63	23295.05	77.62	59.82	20.74	655.84	42.06	90.07
min	-1.33	-13.13	2.33	11.19	13.52	7.26	1.26	5.93	36.15	3.25	-51.92
Std. dev.	.14	5.47	2195.77	4124.13	5876.22	23.13	20.24	3.87	164.73	9.06	36.19
skewness	.40	-.87	1.76	1.52	1.77	.67	.67	.67	.64	1.21	-.04
kurtosis	2.88	4.63	5.59	4.05	5.48	2.03	1.96	2.64	2.56	3.95	2.19

Source: Authors' compilation

The values in the table showed that the average values of GDP growth (GDPG), external debt (EXD), domestic debt (DOD), total debt (TOD), total debt/GDP ratio, external debt/GDP ratio, domestic debt/GDP ratio, total debt/revenue ratio, total debt service/revenue ratio, and capital expenditure growth in Nigeria between 1980 and 2019 are 3.15 percent, N1698.22 billion, 2874.91 billion, N4573.13 billion, 32.07 percent, 20.52 percent, 11.53 percent, 250.99 percent, 13.63 percent and 22.36 percent, respectively. The symmetrical normal distribution showed that GDPG and CAPEXG are negatively skewed, while all other variables are positively skewed. The table also reported the maximum, minimum, standard deviation as well as the Kurtosis values of all the variables.

5.1.2   Correlation Analysis

Table 4 shows the correlation among the variables. It can be observed that other than EXD, TODGDP, EXDGDP and CAPEXG, all other variables has negative correlation with GDPG (economic growth variable). The relatively low correlation values among the variables showed that model will not suffer from multicollinearity heteroskedastic and autocorrelation.

Table 4: Correlation Analysis

	inst	gdpg	exd	dod	tod	todgdp	exdgdp	dodgdp	todrev	todsrev	capexg
inst	1.0000										
gdpg	-0.0004	1.0000									
exd	-0.0105	0.0130	1.0000								
dod	-0.0024	-0.0038	-0.0003	1.0000							
tod	-0.0034	-0.0094	0.0011	0.0086	1.0000						
todgdp	-0.0007	0.2090	0.1012	-0.1002	-0.0375	1.0000					
exdgdp	-0.0109	0.0120	0.0019	-0.0061	-0.0869	0.0059	1.0000				
dodgdp	-0.1014	-0.1014	0.1028	-0.0291	0.0430	0.0054	0.1086	1.0000			
todrev	-0.0019	0.0070	0.0006	-0.0037	-0.0294	0.1262	0.1986	0.0029	1.0000		
todsrev	-0.0006	-0.1081	0.2046	0.0085	0.1070	0.0035	0.0691	0.0039	0.0275	1.0000	
capexg	0.0042	-0.0004	-0.0072	-0.1238	-0.0048	-0.1502	-0.0117	-0.1029	-0.1609	-0.0155	1.0000

Source: Authors' compilation

5.1.3   Unit Root Analysis

In order to ascertain the nature of the dataset and to avoid spurious regression estimates, the root of the variables was carried using the Augmented Dickey Fuller unit root test. The results are presented in Table 5. The unit root test showed that the variables are of order 0 [I(0)] and order [I(1)], thus validating the use of ARDL bounds approach. This is highly required since the ARDL model is appropriate when the variables in the model are stationary at level and first differences.

Table 5: Unit Root Test

Variable	@ Level	@ 1st Differences	Status
GDPG	-0.57	-3.97*	I(1)
TOD	-3.97**	-7.02***	I(0)
DOD	-0.89	-4.41**	I(1)
EXD	-1.17	-3.05**	I(1)
TODGDP	-0.94	-5.20***	I(1)
TODREV	-4.83**	-7.94***	I(0)
TODSREV	-0.46	-3.51**	I(1)
EXDGDP	-1.19	-7.03***	I(1)
DODGDP	-5.49***	-9.37***	I(0)
CAPEXG	-1.20	-4.07**	I(1)
INST	-0.87	-6.33***	I(1)

*Note: ρ values of coefficients: *** ρ ? 0.01; **ρ ? 0.05; ρ ? 0.1*
Source: Authors' compilation

5.2   Bound Testing Procedure

Given the implications of the results in Table 5, the study carried out the bound test. A joint significance of lagged variables' coefficients is captured in the bounds test through a computed F-test (Pesaran, et al. 2001). The bound test was conducted under three scenarios; restricted deterministic trend (Fë), unrestricted deterministic trend (Fè), and without deterministic trend (Fð). These scenarios all have unrestricted intercepts. The Akaike Information Criterion (AIC) was adopted in selection a lag length of 1 as most appropriate. The Bound F tests results are presented in Table 6. A comparison between the F-statistic and the bound critical values for the basis of establishing the nature of relationship among the variables. If the computed F- statistic is exceeds the upper critical bound value that suggests co-integration. On the other hand, if the computed F-statistic is less than the lower critical bound value, it implies that there is no co-integration (Pesaran et al., 2001).

Table 6: Bound F Test

Lag = 1	With Deterministic Trend			With Deterministic Trend	
	$F_{ĕ}$	$F_{è}$	$t_{è}$	$F_{ð}$	$t_{ð}$
	11.319	16.023	-6.519	9.817	-6.031
Critical values	10%		5%		1%	
K = 5	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
$F_{ð}$	2.61	3.11	3.27	4.38	4.19	5.92
$F_{ĕ}$	2.95	3.57	3.52	4.61	4.63	6.81
$F_{è}$	4.03	5.29	4.22	6.01	5.62	6.99
$t_{ð}$	-1.74	-2.81	-1.91	-3.13	-2.07	-4.07
$t_{è}$	-2.37	-3.72	-2.69	-4.82	-3.11	-5.09

Source: Authors' compilation

A critical look at F-statistic value in Table 6 shows that there is cointegration among series in Fë, Fè, Fð at the 1 percent level of significance. By implication, a cointegrating relation exists among the variables. In other words, the F-statistic suggests the existence of a long-run relationship between the variables in the debt-economic model.

5.3   Long-run equilibrium model

The long-run results [equation (2)] between debt and economic growth are presented in Table 7. The long-run empirical revealed that the coefficients of total debt/GDP(TODGDP) ratio and capital expenditure growth (CAPEXG), a

proxy for capital stock, are statistically insignificant, implying that TODGDP and CAPEXG have a neutral impact on economic growth in Nigeria in the long-run. A possible reason for this is that the debt stock and capital stock, all things being equal, can be adequately utilized without adversely affecting economic growth in the long-run.

It is important to note that all the debt sustainability indicators (TODGDP, TODREV, TODSREV, EXDGDP, and DODGDP) negatively impact economic growth in the long-run. Of these variables, TODGDP was statistically significant. This implies that these indicators will depress economic growth in the long-run. This is complemented by the negative and significant impacts of domestic debt (DOD) and external debt (EXD) on economic growth in the long-run. These findings are consistent with those obtained by Udoh, *et al*, (2020), Mbah, *et al*, (2020), Ohiomu (2020) and partly Onakoya and Ogunade (2017), Onafowora and Owoye (2017), Yeasmin, et.al. (2015), Ramzan and Ahmed (2014). It is important to note that total debt (TOD) has a positive but highly insignificant impact on economic growth in the long-run. This implies that there is a possibility that the total debt stock can be invested into productive sector of the economy, thereby offsetting the negative effects on economic growth in the long-run.

Regressor	Coefficient	t-statistic
TOD	0.831	1.294
DOD	-0.915***	-3.017
EXD	-0.182*	-1.886
TODGDP	-0.421	-0.725
TODREV	-0.929**	-2.636
TODSREV	-0.235*	-1.820
EXDGDP	-0.471***	-3.315
DODGDP	-0.225*	-1.948
CAPEXG	0.013	1.371
TOD ^{2}	-0.172**	-2.029
INST	-0.701*	-1.811
_Con	7.628***	6.119

Source: Authors' compilation
Note: *, **, *** denotes statistical significance at 1%, 5% and 10% levels, respectively

The coefficients of total debt (positive) and total debt squared (negative) showed that the debt-growth relationship in the long-run is non-linear. This trend also shows that the debt-growth nexus is an inverted U-shape in Nigeria. This is in line with the findings of Ahlborn and Schweickert, (2018), Matemilola, *et al.* (2016), Marchionne and Parekh (2015), and others. The findings thus validate the threshold theory. The institutional quality coefficient which is proxied by control of corruption has a negative and statistically significant coefficient. This implies that institutional quality has not contributed positively to economic growth. This can be perceived in the relative high rate of corruption in Nigeria. For instance, Transparency International (TI) ranked Nigeria as the fourth most corrupt country in West Africa and 146 out of 180 countries in the world in 2020. (Transparency International, 2020).

5.4.   Short-run equilibrium model

The short-run results [equation (3)] are presented in Table 8. The short-run regression results presented in Table 8 showed that total debt (TOD) positively impacted economic growth in the current year, although the impact is statistically insignificant. In the previous year, the impact was negative but statistically insignificant. Domestic debt (DOD) negatively impact economic growth in the current year. The impact of domestic debt (DOD) on economic growth in the previous two periods was positive but statistically insignificant. In all periods, external debt negatively impact economic growth significantly.

Table 8. Debt-Growth Nexus: Short-run Regression

Regressor	Coefficient	t-statistic
Constant	3.841**	2.773
ΔTOD	0.661	1.095
ΔTOD(-1)	-1.352	-1.041
ΔDOD	-0.894**	-2.169
ΔDOD(-1)	0.431	0.972
ΔDOD(-2)	1.667	1.143
ΔEXD	-0.141***	-4.008
ΔEXD(-1)	-1.789**	-2.821
ΔTODGDP	-0.603**	-2.659
ΔTODGDP(-1)	-0.718***	-3.915
ΔTODREV	-0.040*	-1.859
ΔTODREV(-1)	-0.246**	-2.563
ΔTODSREV	-0.058***	-4.015
ΔEXDGDP	-0.012***	-1.901
ΔEXDGDP(-1)	0.517	0.628
ΔEXDGDP(-2)	0.209	1.091
ΔDODGDP	-0.007***	-3.475
ΔDODGDP(-1)	-0.110*	-1.899

|		
ΔCAPEXG	0.061	0.021
ΔCAPEXG(-1)	-0.514	-1.466
ΔCAPEXG(2)	1.972	1.097
ΔTOD^2	-0.268	-2.819
ΔINST	-0.001	-1.934
ECM(-1)	-0.812***	-4.269
R-squared	0.725	
Adj. R-squared	0.610	
F-statistic	22.971 (0.000)	
DW statistic	2.147	

Source: Authors' compilation

Of importance is the impact of debt sustainability indicators on economic growth in the short-run. Empirical results showed that other than 2-lagged periods of external debt/GDP [EXDGDP (-1) and EXDGDP (-2)] ratio, all other debt sustainability indicators negatively and significantly impact economic growth in the short-run. The capital stock variable (capital expenditure growth) positively impacts economic growth, though the impact is not statistically significant. The institutional quality (proxied by control of corruption) coefficient shows that the level of institutional quality has not positively impacted economic growth in Nigeria in the short-run. The coefficient and significance of total debt squared (TOD2) showed that the threshold theory is also validated in the short-run debt-growth nexus.

The one-period lagged ECM coefficient is negative and statistically significant at 1 percent level of significance. The ECM(-1) coefficient of -0.812 implied that over 81 percent deviation from economic growth path will be reversed within a year. In other words, economic growth adjusts to equilibrium at a rate of 81.2 percent per annum. The value of the R-squared showed that the variables in the model explain over 72 period variation in economic growth in Nigeria. The significant F-statistic clearly showed that the model is correctly specified. The Durbin Watson statistic of 2.15 implied that the model is void of autocorrelation. By implication, the findings can be relied on for policymaking and inferences.

5.5.   Post-Estimation Tests

5.5.1   Stability
In order to check the stability of the model, the CUSUM squared tests was adopted. A close look at the figure below shows that the residual plot falls within the 5 percent significant boundaries. Thus, based on the centric of Bahmani-Oskooee and Nasir (2004) the model is stable.
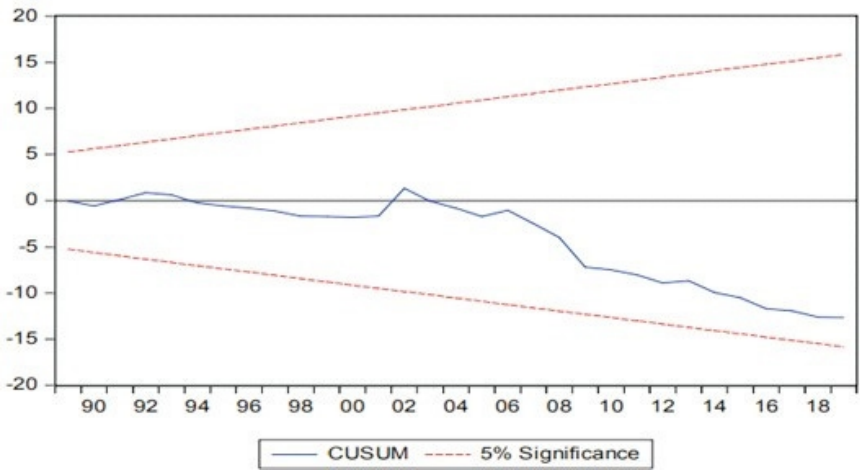
Source: Authors' compilation

5.5.2   Diagnostic Test

Diagnostic tests were carried out to affirm the viability of the empirical results. The tests results in Table 6 [Jarque Bera test = 1.5319; Breusch-Pagan-Godfrey (F statistics = 0.6014); and R-square = 0.725] imply that the specified model's residuals were normal distributed, devoid of heteroskedasticity, as well as have a highly explanatory power. Thus, our model can be highly relied on for economic analysis and decision making.

Table 6: ARDL Diagnostic Tests

Test	Diagnostic Test	P value	Status
Heteroscedasticity	Breusch-Pagan-Godfrey Test	0.6014	No Heteroskedastic
Goodness of Fit	R-Square	0.7253	Model adequately fitted
Normality	Jarque-Bera Test	1.5319	Normal residuals

Source: Authors' compilation

6.   CONCLUSION

This paper has critically evaluated the impact of debt on economic growth in Nigeria given the emerging COVID-19 pandemic. Given Nigeria's fragile financial system, the COVID-19 has exposed the flaws and strains in government economic policies. The empirical results have implications for post-COVID-19 Nigeria. With the emerging pandemic affecting economic indicators in economies around the globe, its effects will be highly felt in an economy such as Nigeria

which depends on external variables for its operations. Nigeria has continued to depend on external financing, thereby accumulating huge debt burdens. Highly enmeshed in debt stocks and servicing obligations, the economy has performed dismally through the years. A huge proportion of revenue is either expended on offsetting the debt stock or restructuring the debt profile. The COVID-19 pandemic has further exposed the flaws of the efficiency and effective of fiscal and monetary policies in Nigeria.

With the pandemic currently limiting financial resources of potential donors, Nigeria is faced with an economic dilemma. The empirical results portray a state of debt unsustainability that can threaten even the sovereignty of the country if not properly curtailed. Unless other sectors are revamped to stabilize the current economic realities, the Nigerian economy is potentially insolvent. This calls for prompt action on the part of policy-makers and institutions to create a viable economic framework which is Nigerian-centric to curtail the financial implications of COVID-19 as respect debts. This study has shown that the negative impact of debt variables on economic growth through the years has detrimental effect on the recovery and stabilization process from COVID-19 financial-related crisis. Due to lower revenues in the face of exponential public spending, fiscal deficits are expected in the short run. The need to build a resilient economic policy framework based on current realities cannot be overemphasized. There is need for the government to cut down on its external borrowings to ease financial strains on the economy. *There is also need for government to adopt sound debt management and transparency to ensure the debt sustainability is stabilized and fiscal risks minimized.* Policies targeted at the debt sustainability indicators should be initiated and implemented by monetary authorities. This calls for proactive financial sector regulation and supervision. Robust macroeconomic policies should be vigorously pursued to enhance the country's resilience. The institutional quality of the country should also be strengthened. This can be achieved through a concerted efforts aimed at minimizing corrupt practices and eradicating excessive bureaucratic bottlenecks in the process of governance in Nigeria.

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