FISCAL SUSTAINABILITY IN NIGERIA: When Should the Government Cut down Public Debt?

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ABSTRACT

The surge in Nigeria's public external debt in recent times has raised serious concern about whether it has reached a point where it would have adverse effect on economic growth. Does such a tilting point in external debt exist? What is the effect of public external debt on economic growth should it exceed this threshold? This study addressed these questions using the autoregressive distributed lag (ARDL) model and threshold regression on data spanning 1981-2020. The findings of the study show that public external debt had a positive and significant impact on economic growth in the short and long-run in Nigeria. The threshold regression estimate established an external debt-to-GDP ratio of 34.55 percent. This presupposes that the nation's external debt-to-GDP should not exceed this threshold. Should the country's external debt go beyond this threshold, public external debt would have adverse impact on the economy.

Keywords: Fiscal sustainability, Public external debt, ARDL, Threshold regression, Economic growth, Nigeria

JEL classification: F43, C24, H60, O23

1. Introduction

One of the major challenges bedeviling both advanced and developing nations in recent years is the increasing accumulation of public debt (Woo & Kumar, 2015; Akram & Rath, 2019; Ramos-Herrera & Prats, 2020). A large public debt can be detrimental to the growth of an economy, particularly when it surpasses a certain threshold (Baharumshah, Soon & Lau, 2017). It is

generally accepted that a moderate level of public debt will enhance economic growth while a high level of debt will induce tax increase and this will result in a fall in consumption and investment, reduce the rate of employment and lower the rate of economic growth (Baharumshah, Soon & Lau, 2017). Hence, fiscal policy can be considered sustainable when the current level of public debt is below a certain threshold level (Tran, 2018). Fiscal sustainability is critical to sustainable economic growth, however, maintaining fiscal sustainability has become a serious challenge to policymakers in developing countries. As a result, many countries are battling with the challenges of increased debt burden, high rate of debt servicing, higher and multiple taxations and greater uncertainty (Adeosun, Ayodele & Jongbo, 2021). Nigeria, like other developing nations, is currently faced with an enormous debt stock. For instance, public debt increased by 392.97 percent between 1999 and 2020 (Central Bank of Nigeria (CBN) Statistical Bulletin, 2020). The persistent rise in public debt, amidst fiscal consolidation and stabilization measures by policymakers (Adeosun & Adedokun, 2019), has indubitably raised serious concern about fiscal sustainability in Nigeria.

This study therefore seeks to address the following questions: What is the effect of public external debt on economic growth? Does a threshold level of public debt exist? What would be the effect of public external debt on economic growth should it exceed this threshold? Few studies have attempted to examine the optimum or threshold level of public debt in Nigeria. For instance, Eboreime and Sunday (2017) as well as Kur et al. (2021) estimated the public debt threshold but focused on the domestic debt threshold while ignoring the external debt threshold. This study contributes to the existing literature by shedding light on the areas unattended by previous studies.

The remaining parts of this study are organized as follows: Section 2 presents the current trends of public debts and GDP per capita. Section 3 features the review of theory and empirical literature. Section 4 presents the methodology and data employed in the study while Section 5 provides the empirical results and discussions. The conclusions and policy implications are presented in the section 6.

2. Current Situations of Public External Debt and GDP per capita in Nigeria

Figure 1 represents the trends of Nigeria's external debt in the last 40 decades, between 1981 and 2020. The diagram indicates that the debt-to-GDP ratio of the country's external debt was less than 10 percent between 1981 and 1983. However, the debt-to-GDP ratio rose sharply from 9 percent in 1983 to about 60 percent between 1986 and 1993. The reason for the sharp increase in the country's debt was the increase in capital projects embarked upon by the government coupled with the dwindling price of oil in the international market. Between 1994 and 1998, the country experienced a downward trend in debt but it rose sharply with the inception of the Fourth Republic. This was not sustained as the debt-to-GDP ratio dropped significantly hovering around 2% between 2005 and 2013, following the debt forgiveness received by the Nigerian government from the Paris Club in 2005-2006. In 2020, Nigeria's external debt as a percentage of GDP was about 9%.

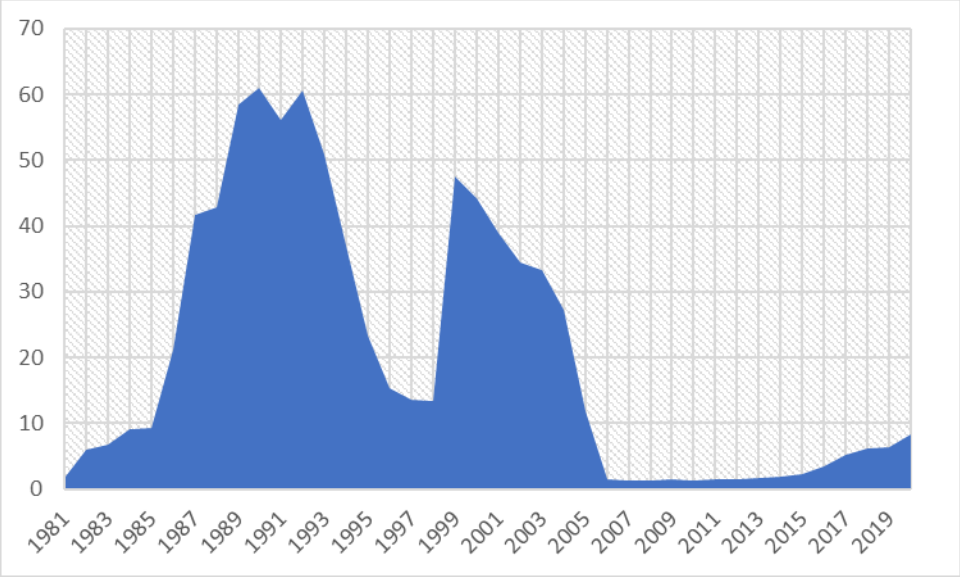

Figure 1: Trend in Nigeria's External Debt (% of GDP), 1981-2020

Source: Central Bank of Nigeria Statistical Bulletin 2021.

Figure 2 depicts the various sources of Nigeria's external debt between 1981 and 2020. The diagram shows that on average about 61 percent of the entire stock of external debt was sourced from the Paris Club while 14 percent was obtained from multilateral development institutions such as the World Bank and the IMF and 10 percent from the London Club of creditors. In addition, the government also raised funds through a promissory note, which accounted for an average of 10 percent of the entire external debt. Other sources of debt accounted for an average of 3 percent.

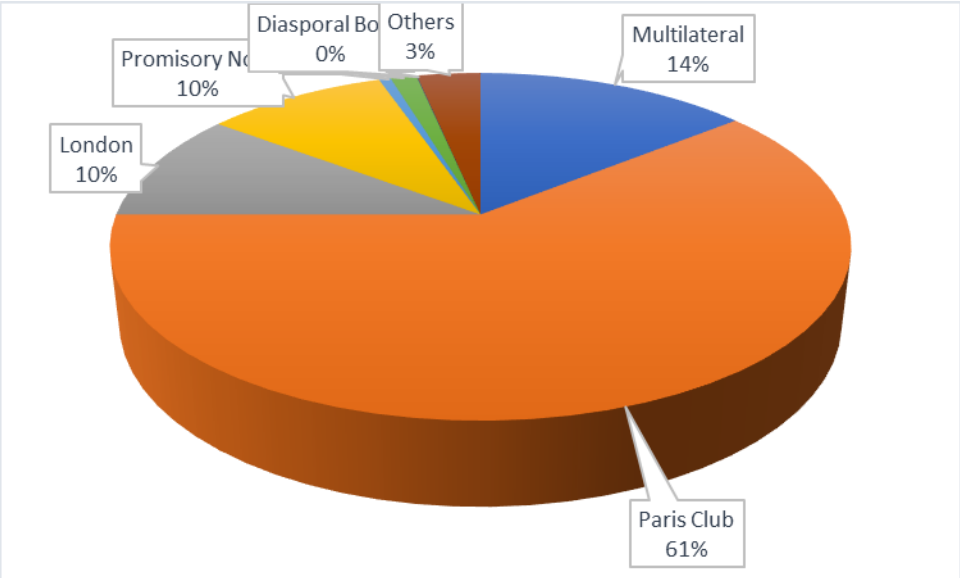

Figure 2: Composition of Nigeria's External Debt (% of GDP), 1981-2020
Source: Central Bank of Nigeria Statistical Bulletin, 2021.

Figure 3 represents the trend of the growth in GDP per capita of Nigerian citizens between 1981 and 2021. The diagram indicates that the growth GDP per capita in the early 80s before the Structural Adjustment Programme (SAP) was negative. In the period of the adoption of SAP, it recovered and rose as high as 9 percent in 1990. However, this was not sustained as growth in GDP per capita fell dramatically and became volatile. At the inception of the Fourth Republic, which marked the return to democratic governance, the growth in GDP per capita maintained positive and unprecedented growth

such that it rose as far as 12 percent in 2002. The positive growth was sustained until 2016 when the country experienced an economic recession following a fall in oil price and a shock in oil production. The growth in GDP per capita was still negative as of 2020. Some of the reasons that might have accounted for the negative growth in GDP per capita since 2015 include corruption, the rising level of insecurity, increasing rate of unemployment, epileptic power supply, which has hurt the manufacturing sector, and weak macroeconomic management.

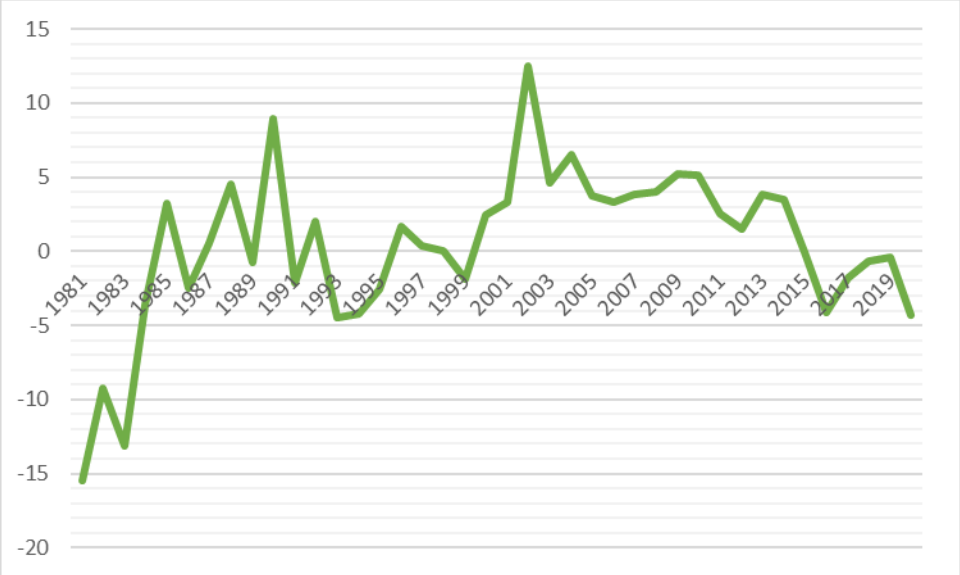

Figure 3: Trend in Growth in GDP Per Capita, 1981-2020.
Source: Central Bank of Nigeria Statistical Bulletin 2021.

3. Public Debt and Economic Growth: Theory and Empirics

A plethora of literature on the debt-growth relationship have concluded that an inverse relationship exists between debt and economic growth (e.g., Akhanolu et al., 2018; Ncanywa & Masoga, 2018; Asteriou, Pilbeam & Pratiwi, 2021). This confirms the classical theory of public debt, which posits that public debt is harmful to the growth of an economy. According to the classical school of thought, the financing of public spending through

borrowing is detrimental to the economy and it dampens the country's capacity to generate wealth. This is because borrowing reduces savings and investment thereby undermining the country's capacity for growth. The classical theory further affirms that public debt repayments, particularly external debt can crowd out private investment and discourage potential foreign investors. In the same vein, the debt overhang theory explains the adverse effect of public debt on economic growth stating that as a nation's debt increases, its ability to repay the debt declines; hence, increasing the burden of debt service and hindering economic growth (Bulow & Rogoff, 1990; Pattillo, Poirson & Ricci, 2002). Economic growth is hindered simply because a country spends a huge amount of its revenue on debt servicing and as a result, the potential of returning to growth paths is impeded (Levy-Livermore & Chowdhury, 1998). Several scholars (e.g., Krugman, 1988; Greene & Villanueva, 1991) have supported the theoretical proposition of the debt overhang theory.

Contrary to the classical theories of public debt, the Keynesian theory of public debt is of the view that debt-financed public spending has a multiplier effect on national income (Elmendorf & Mankiw, 1999). The Keynesian theory is supported by the law of increasing state activity hypothesis, which posits that increased government expenditure stimulates domestic economic activities and crowds in private investment (Wagner, 1911; Ncanywa & Masoga, 2018). The Ricardian Equivalence Hypothesis (REH) of public debt follows a different trajectory from the classical and Keynesian theories as the theory asserts that the impact of public debt on economic growth is neutral (Barro, 1990; Afzal, 2012). The REH emphasizes that potential tax will allow debt repayment, that is, by the purchase of bonds issued by the government, individuals will boost their earnings (Hilton, 2021).

The debate on whether public debt is useful or harmful to economic growth still persists with consensus yet to be reached. Empirical studies on the debt-growth relationship have had mixed findings. While a strand of the literature found the relationship to be positive (e.g., Burhanudin et al., 2017; Thao, 2018; Kur et al., 2021; Yusuf & Mohd, 2021) other studies observed a negative association (e.g., Lee & Ng, 2015; Asteriou, Pilbeam & Pratiwi, 2021; Ncanywa & Masoga, 2018; Akhanolu et al., 2018). Interestingly, yet other studies neither found no significant relationship (e.g., Panizza &

Presbitero, 2014; Shkolnyk & Koilo, 2018) nor nonlinear (i.e., inverted U-shape) association between public debt and economic growth (e.g., Mencinger, Aristovnik & Verbic, 2014; Omotosho, Bawa, & Doguwa, 2016).

Panizza and Presbitero's (2014) research aimed to ascertain whether there is an association between public debt and economic growth in OECD countries. The study was also motivated to establish the direction of causality by employing the instrumental variable approach. The study found that a negative correlation exists between the two. Also, the study noted the nonexistence of a causal relationship between the variables. Mencinger et al. (2014) investigated the EU countries in the period 1980-2010 using a panel estimation. The results show a significant and nonlinear effect of public debt on growth in GDP per capita. Lee and Ng (2015) carried out a study using a multiple regression approach on data over the period 1991to 2013 in Malaysia in a bid to determine the effect of public debt on the performance of the economy. The study found that public debt exerted a negative effect on GDP. The study also observed that external debt, government consumption expenditure as well as budget deficit were decreasing functions of GDP. Asteriou et al. (2021) utilized the pooled mean group, dynamic fixed effect, and asymmetric panel ARDL techniques to explore the debt-growth nexus in selected countries in Asia spanning 1980-2012. The results show that rising government expenditure was negatively related to GDP both in the short-run and long-run. Arčabić et al. (2018) investigated the debt-growth connection by applying the structural panel models and the reduced form VAR and found that economic growth exerted a strong effect on public debt; however, the effect of public debt on growth was found to be weak. Abubakar and Mamman's (2020) study aimed at ascertaining whether the effect of public debt on economic growth was permanent or transitory in 37 OECD countries. Applying the Mundlak decomposition technique in disaggregating the public debt effect on growth, the study found that public debt exerted a positive transitory impact on economic growth; however, the permanent effect of public debt exhibited a negative impact on growth. Thao (2018), used the generalized method moments estimation technique to investigate the linkage between public debt and economic growth for the period 1995-2015 in 6 ASEAN countries, namely Malaysia, Indonesia, Singapore, the Philippines,

Thailand, and Vietnam. The outcome of the study indicates that public debt is positively and statistically related to economic growth. Shkolnyk and Koilo (2018) applied correlation analysis and the ARDL model to examine the association between public debt and economic growth in emerging economies for the period 2006-2016 and found a nonsignificant effect of public debt on economic growth. For South Africa, Ncanywa and Masoga (2018) analysed the debt-growth relationship employing the ARDL model between the first quartile of 2002 and the fourth quartile of 2016. The study found a negative association between the two variables. Yusuf and Mohd (2021) also employed ARDL to examine the relationship between public debt and growth in Nigeria in both the long-run and short-run for the period 1980 and 2018 and noted that the effect of public debt on growth was positive in the long run; however, the association exhibited a negative relationship in the short-run. Akhanolu et al. (2018) conducted a similar study on Nigeria for the years 1982-2018 applying ARDL The findings of the study indicate that public debt was negatively related to economic growth both in the short-run and long-run. Burhanudin et al. (2017) used ARDL to explore the debt-growth linkage in Malaysia between the years 1970-2015. The study found that the public debt of Malaysia was positively related to sustainable growth in both the short-run and the long-run. The findings of the study also indicate that there is a unidirectional causality running from public debt to growth. Omotosho, Bawa and Doguwa (2016) studied the relationship between debt and economic growth in Nigeria and found a U-shape or inverted relationship.

The lack of consensus as to the effect of public debt on economic growth has made the subject still relevant in the literature despite the numerous studies done on the debt-growth nexus across the countries. It can be observed that while much attention has been paid to investigating the debt-growth relationship, little attention has been paid to exploring the optimum level of public debt for Nigeria to ensure fiscal sustainability. As a result, this study aims to go beyond examining the cause-effect relationship of the debt-growth nexus, to estimate the threshold level of public debt that is considered sustainable for a developing country such as Nigeria.

4. Methodology and Data

4.1 Model specification

The study explored the classical theory of public debt, the Keynesian theory of public debt and the debt overhang theory to establish the linkage between public debt and economic growth. As a result, the model for the study is specified as follows:

$$GDPGR = \beta_0 + \alpha PED + \delta GXE + \gamma BDF + \theta EXDS + \phi FDI + \sigma TOP + \rho POP + \mu \quad (1)$$

where:

$GDPGR$ = GDP annual growth rate
PED = public external debt as a percentage of GDP
GXE = government final expenditure as a percentage of GDP
BDF = budget deficit as a percentage of GDP
$EXDS$ = external debt services as a percentage of GDP
FDI = foreign direct investment net inflows as a percentage of GDP
TOP = trade openness
POP = population growth
μ = error term

4.2 Estimation technique

4.2.1 *Unit Root Tests*

The Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were used to ascertain the stationarity of the variables. The ADF test estimation procedure is expressed as:

$$\Delta y_t = \lambda + \delta y_{t-1} + \varphi_i \sum_{i=0}^{n} \Delta y_{t-1} + \mu_t \quad (2)$$

where:

Δy_t = first difference of y_t,

λ = intercept,

δ = coefficient of y_{t-1},

n = number of lags,

t = time trend,

μ_t = disturbance term.

The PP test was also applied to complement the ADF tests because the PP test is robust to general forms of heteroskedasticity in the error term (Fedorová, 2016). The PP test is expressed as:

$$\Delta y_t = \pi y_{t-1} + \beta_1 D_{t-1} + \mu_t \quad (3)$$

where: μ_t is a I(0) with zero mean and D_{t-1} is a deterministic trend component. The hypothesis is tested for $\pi = 0$.

4.2.2 *Autoregressive Distributed Lag Model*

This study applied the autoregressive distributed lag model (ARDL) proposed by Pesaran et al. (2001) to examine the long-run and short-run relationships between public debt and economic growth. ARDL is considered an appropriate technique when the variables are integrated of the order of I(0) and I(1) (Belloumi, 2014). Also, ARDL provides an unbiased estimate of the long-run model (Harris & Sollis, 2003). The study estimates the following ARDL models in order to determine the long-run and short-run impacts of public debt on economic growth in Nigeria:

$$\Delta GDPGR_t = \beta_0 + \beta_1 GDPGR_{t-i} + \beta_2 PED_{t-i} + \beta_3 GXE_{t-i} + \beta_4 BDF_{t-i}$$
$$+\beta_5 EXDS_{t-i} + \beta_6 FDI_{t-i} + \beta_7 TOP_{t-i} + \beta_8 POP_{t-i} \sum_{i=1}^{n} \alpha_i \, \Delta PED_{t-i}$$
$$+ \sum_{i=1}^{n} \delta_i \, \Delta GXE_{t-i} + \sum_{i=1}^{n} \gamma_i \, \Delta BDF_{t-i} + \sum_{i=1}^{n} \theta_i \, \Delta EXDS_{t-i} + \sum_{i=1}^{n} \phi_i \, \Delta FDI_{t-i}$$
$$+ \sum_{i=1}^{n} \sigma_i \, \Delta TOP + \sum_{i=1}^{n} \rho_i \, \Delta POP + \mu_t \quad (4)$$

where: β_1, β_2, β_3,… β_8, represent long-run parameters, α, δ, γ, θ, ϕ, σ, ρ connote the short-run parameters.

4.2.3 *Threshold Regression*

The study aims to determine the optimum public external debt for Nigeria. In order to achieve this objective, the study applied threshold regression model, which is expressed as follow:

$$y_t = x_t\beta + z_t\delta + \varepsilon_t \qquad if \ -\infty < w_t \leq \gamma \tag{5}$$

$$y_t = x_t\beta + z_t\varphi + \varepsilon_t \qquad if \quad \gamma < w_t < \infty \tag{6}$$

where:

y_t connotes the dependent variable,

x_t represents a vector of covariates,

β is a vector of regional-invariant parameters,

ε_t is the error term,

z_t is a vector of independent variables region-specific coefficient vectors δ and φ,

w_t is a threshold variable, which could be one of the variables in x_t or z_t.

Following the general form of the threshold regression, the threshold equation for public external debt is specified as:

$$GDPGR_t = \delta_1 + \delta_2 PED + \delta_3 GXE + \delta_4 BDF + \delta_5 EXDS + \delta_6 FDI + \delta_7 TOP + \delta_8 POP + \varepsilon_t \ \ if \ -\infty < PED \leq \gamma \tag{7}$$

$$GDPGR_t = \varphi_1 + \varphi_2 PED + \varphi_3 GXE + \varphi_4 BDF + \varphi_5 EXDS + \varphi_6 FDI + \varphi_7 TOP + \varphi_8 POP + \varepsilon_t \ \ if \ \ \gamma < PED < \infty \tag{8}$$

4.3 Data source

The study employed annual time series data for the period 1981-2020. The data was obtained from the *Central Bank of Nigeria (CBN) Statistical Bulletin*

(2021) and the *World Bank Development Indicators* (2021). The study variables, their measurement, and the specific source of each variable are represented in Table 1.

Table 1: Data Sources

Variable	Description	Measurement	Source
GDPGR	Gross domestic product	GDP growth (annual %)	World Bank Development Indicators (WDI, 2021)
PED	Public external debt	Public external debt (% of GDP)	CBN Statistical Bulletin (2021)
GXE	Government expenditure	Government final expenditure (% of GDP)	WDI (2021)
BDF	Budget deficit	Budget deficit (% of GDP)	CBN (2021)
EXDS	External debt service	External debt services (% of GDP)	WDI (2021)
FDI	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WDI (2021)
TOP	Trade openness	Trade (% of GDP)	WDI (2021)
POP	Population	Population growth (annual %)	WDI (2021)

Source: Author's compilation.

5. Empirical Analysis and Discussion

Table 2 provides a summary of the statistics of the variables employed in the study. It shows that the average growth of GDP in Nigeria is 3.03 percent while public external debt as a percentage of GDP is 20.26 percent. The average government final expenditure in proportion to GDP is 58.14 percent, budget deficit as a percentage of GDP on the average is 0.82 percent while the proportion of GDP earmarked for debt servicing averaged 2.22 percent. The mean contribution of foreign direct investment net inflows to the GDP is 1.50 percent. Meanwhile the degree of the country's openness to trade stands at 31.90 percent. The annual average growth of Nigeria's population is 2.6 percent.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum	Obs.
GDPGR	3.026	5.453	-13.128	15.329	40
PED	20.262	20.295	1.263	60.969	40
GXE	58.144	19.207	11.611	86.920	40
BDF	0.820	1.987	-2.700	6.000	40
EXDS	2.216	2.022	0.048	6.080	40
FDI	1.496	1.246	0.184	5.791	40
TOP	31.902	12.501	9.136	53.278	40
POP	2.624	0.119	2.441	3.003	40

Source: Author's estimation using data from the CBN statistical Bulletin and WDI (2021).

Table 3 represents the correlation matrix indicating the degree of correlation between the variables employed in the study. The essence is to determine whether the explanatory variables are collinear. High correlation coefficients among the independent variables will indicate a tendency for issues of multicollinearity to emerge. The results in Table 3 indicate that there is no strong relationship among the independent variables as the coefficient of correlation is below 0.70; hence, the problem of multicollinearity is nonexistent.

Table 3: Correlation Matrix

	GDPGR	PED	GXE	BDF	EXDS	FDI	TOP	POP
GDPGR	1.000	0.159	0.495	0.074	0.025	0.167	0.513	0.040
PED		1.000	-0.425	-0.122	0.691	0.380	0.122	-0.244
GXE			1.000	-0.114	-0.529	0.007	0.345	-0.250
BDF				1.000	0.102	-0.101	0.372	0.111
EXDS					1.000	0.334	-0.085	-0.220
FDI						1.000	0.311	0.094
TOP							1.000	0.093
POP								1.000

Source: Author's estimation using data from the CBN statistical Bulletin and WDI (2021)

Table 4 presents the results of the unit root tests. The outcomes of the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests indicate that the variables are stationary at level and first difference. Since the variables are integrated at I(0) and I(1), the autoregressive distributed lag (ARDL) technique of estimation is considered the appropriate approach to investigate the long-run and short-run impacts of public external debt on economic growth.

Table 4: Unit Root Tests

Variable	Augmented Dickey-Fuller		Order of Integration	Phillips-Perron		Order of Integration
	With Constant	With Trend and Constant		With Constant	With Trend and Constant	
GDPGR	-10.07***	10.45***	I(1)	-4.08***	-3.78**	I(0)
PED	-4.43***	-4.42***	I(1)	-4.44***	-4.44***	I(1)
GXE	-7.50***	-7.70***	I(1)	-7.76***	-3.88**	I(0)
BDF	-6.45***	-6.47***	I(1)	-6.44***	-6.47***	I(1)
EXDS	-6.16***	-6.17***	I(1)	-7.95***	-9.59***	I(1)
FDI	-3.84***	-3.79**	I(0)	-3.77***	-3.70**	I(0)
TOP	-7.16***	-4.56***	I(1)	-7.69***	-13.33***	I(1)
POP	-4.81***	-5.12***	I(1)	-3.70***	-3.60**	I(0)

Source: Author's estimation using data from the CBN statistical Bulletin and WDI (2021).

The ARDL technique begins with the ARDL bounds test proposed by Pesaran, Shin and Smith (2001) to determine whether the variables are cointegrated. In estimating the ARDL, it is important to use the optimum lag for estimation. The optimum lag section test was thus carried out using for criteria, namely: the final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information (HQ). Table 5 shows the results of the optimum lag selection test. The suggested optimum lag length as indicated by FPE, SC, and HQ is 0.

Table 5: Optimum Lag Selection Test

Lag	Final prediction error (FPE)	Akaike Information criterion (AIC)	Schwarz information criterion (SC)	Hannan-Quinn information (HQ)
0	8.5348*	4.9751	5.3234*	5.0979*
1	8.8364	5.0068	5.3987	5.1449
2	8.8656	5.0063	5.4417	5.1598
3	8.5935	4.9704*	5.4493	5.1392

Source: Author's estimation using data from the CBN statistical bulletin and WDI (2021).

Table 6 shows the ARDL bounds test result. The result indicates that the F-statistic value of 3.24 is significant at 10 percent level. Hence, the null hypothesis of no cointegration is rejected. This implies that there exists cointegration among the variables. It is, therefore, pertinent to estimate the long-run and short-run coefficients.

Table 6: ARDL Bounds Test

F-statistic	Lag length	Significance level	Bounds critical values	
			I(0)	I(1)
3.24	0	10%	2.03	3.13
		5%	2.32	3.84
		1%	2.96	4.26

Source: Author's estimation using data from the CBN Statistical Bulletin and WDI (2021).

Table 7 presents the regression estimates of the long-run and short-run impacts of public external debt on economic growth in Nigeria. The results show that the coefficient of public debt is positive and statistically significant both in the long run and the short run, suggesting that public external debt drives the growth of the Nigerian economy. This result is not consistent with some existing studies (e.g., Lee & Ng, 2015; Akhanolu et al., 2018; Ncanywa & Masoga, 2018; Asteriou, Pilbeam & Pratiwi, 2021) which found that public external debt exerts an adverse effect on economic growth. However, the finding is underpinned by the Keynesian theory of public debt, which affirms

that debt-financed public expenditure has a multiplier effect on national income. Empirical findings from previous studies (see Burhanudin et al., 2017; Thao, 2018; Yusuf & Mohd, 2021; Kur et al., 2021) also lend credence to this outcome, concluding that public debt stimulates economic growth. A plausible explanation for this finding lies in the fact that most of Nigeria's public external debt is tied to developmental projects. In some cases, the creditors, mostly the Paris Club, which is Nigeria's major creditor (see Figure 2), often request a feasibility report on the loan before deployment. Also, they monitor and provide advisory services to the government to ensure that the loan is judiciously utilized. Intuitively, does it imply that the country should continue to source or accumulate external debt? The answer is no as there is an optimum level beyond which public debt can turn out to have an adverse effect on economic growth. What then is the optimum level? This question is addressed in the next analysis, which deals with threshold regression.

Government final expenditure exhibits a positive coefficient and is statistically significant in the long and short run suggesting that government expenditure stimulates economic growth in both the short and the long run. This finding also supports the Keynesian theory, which affirms that the more the government spends the higher the economic growth (Romer, 1986). The economic rationale is that increased government expenditure stimulates aggregate demand which in turn would spur production and increase the level of GDP. Budget deficits exert a neutral effect on economic growth as the coefficient is positive but not statistically significant in the long run and the short run. In the same vein, the coefficient of external debt service is positive but statistically insignificant in both the long and short runs suggesting that external debt service does not promote economic growth. The coefficient of foreign direct investment net inflows, contrary to economic expectation, is negative and statistically significant suggesting that the FDI has an adverse effect on the growth of the Nigerian economy, A plausible explanation for this is that the average magnitude of FDI inflow (see Table 2) into the country is too small to engender the desired level of growth. Also, the nature of FDI flows is mostly resource-seeking, that is, motivated by the natural resource endowments of the country (Anetor & Vincent, 2022). The coefficient of trade openness is positive and not statistically significant in both the long run and the short run. Population growth, however, facilitates the growth of the

country as the coefficient of population exhibits a positive coefficient and is statistically significant.

The coefficient of determination, R-square, indicates that the explanatory or independent variable accounts for about 60 percent variation in the dependent variable, economic growth. The *F*-statistic, which explains whether all the explanatory variables are jointly significant, has a probability of less than 5 percent suggesting that all the independent variables are jointly significant. The error correction term (ECM), which shows the speed of adjustment, is negative and significant at 1 percent confirming a long-run relationship between the variables.

Table 7: Long-run and Short-run Estimation Results

Long-run estimates Dependent variable: GDPGR ARDL lag selection (3, 0, 0, 0, 0, 0, 0, 0, 0)			Short-run estimates Dependent variable: GDPGR ARDL lag selection (3, 0, 0, 0, 0, 0, 0, 0, 0)		
Variable	Coefficient	t-statistic	Variable	Coefficient	t-statistic
PED	0.100***	2.747	D(GDPGR(-1))	-0.017	-0.117
GXE	0.157**	2.654	D(GDPGR(-2))	0.198	1.564
BDF	0.091	0.339	D(PED)	0.109**	2.546
EXDS	0.584	1.398	D(GXE)	0.172**	2.432
FDI	-1.236**	-2.627	D(BDF)	0.099	0.344
TOP	0.044	0.900	D(EXDS)	0.637	1.433
POP	35.386***	6.161	D(FDI)	-1.349***	-3.057
C	-101.065***	-6.397	D(TOP)	0.048	0.862
D.W. stat	2.38		D(POP)	38.628***	5.831
F-stat	3.95		ECM (-1)	-1.092***	-6.166
			R^2	0.60	

Source: Author's estimation using data from the CBN statistical bulletin and WDI (2021).

Table 8 depicts the diagnostic test of the ARDL estimates to determine whether the estimates are reliable and can be used as a basis for policy formulation and decision making. The Breusch-Godfrey test, which signals the presence or absence of serial correlation, reveals that the ARDL

estimations do not suffer from autocorrelation. The Heteroskedasticity test also shows that there is no heteroskedasticity. The Ramsey RESET test, which is generally employed to ascertain if there is an error in the specification of the regression models, shows that the models are well specified.

Table 8: Diagnostic Tests

	F-stat	Probability
Breusch-Godfrey Serial Correlation LM Test	0.875	0.430
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.707	0.710
Ramsey RESET Test	0.296	0.591

Source: Author's estimation using data from the CBN statistical bulletin and WDI (2021).

Figure 4 represents the cumulative sum of recursive residuals, CUSUM and CUSUM of squares tests respectively. The aim of the test is to determine whether the ARDL estimates are stable. The tests suggest that the estimates are stable as the plots of the CUSUM and CUSUMSQ statistics fall inside the critical bands of the 5 percent confidence interval of parameter stability.

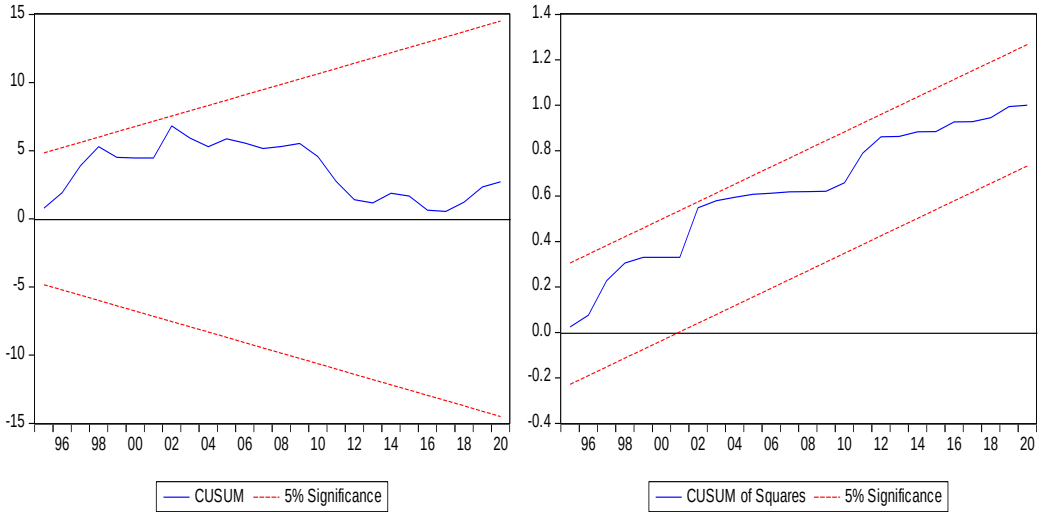

Figure 4: Plots of Cumulative Sum of Recursive Residuals

Table 9 depicts the threshold regression estimates. The aim is to determine the level of public external debt that is considered optimal for Nigeria. The result shows an estimated external debt-to-GDP threshold of 34.55 percent; however, the average external debt-to-GDP stands at 20.26 percent (see Table 2). The estimated threshold of 34.55 percent suggests that even though public external debt influences economic growth positively both in the short and the long run, the country should not exceed the threshold. Should the country's external debt go beyond this threshold, public external debt would have adverse effects on the economy.

Table 9: Threshold Regression Estimates of Public External Debt

Variables	*Estimated External Debt-to-GDP Threshold* γ *34.55%*		
	Coeff.	Standard error	Prob.
PED	0.213	0.074	0.004
GXE	0.291	0.051	0.000
BDF	0.247	0.376	0.512
EXDS	0.989	0.478	0.038
FDI	-0.917	0.599	0.126
TOP	0.042	0.069	0.543
POP	23.520	6.295	0.000

Source: Author's estimation using data from the CBN statistical Bulletin and WDI (2021).

6. Conclusion and Policy Implications

The increasing rate of debt accumulation by developing countries in a bid to meet both their recurrent and capital expenditure is alarming and has raised a serious question as to whether it has reached a point where it will negatively affect economic growth. This study was therefore embarked upon to determine the optimum level of public external debt in a developing country such as Nigeria. Nigeria was chosen as the focus of attention for this study based on the fact that the country is the largest in Africa in terms of population. The study was carried out to address the following germane questions: What is the effect of public external debt on economic growth? What is the threshold of public external debt? What is the effect of public

external debt on economic growth should it exceed the threshold? The study applied the ARDL and threshold regression model to data ranging from 1981 to 2020. The findings of the study indicate that public external debt stimulates economic growth in the short and long run in Nigeria. While this study appears not to corroborate the outcome of most existing studies on the debt-growth nexus, its findings however underpin the Keynesian theory of public debt, which affirms that debt-financed public expenditure has a multiplier effect on national income or output. The threshold regression estimate established an external debt-to-GDP ratio of 34.55 percent for Nigeria. By implication, even though public external debt influences economic growth positively, the government of Nigeria should not exceed the threshold. Should the country's external debt go beyond this threshold, it would have adverse impact on the economy. The study concludes that if the country maintains an external debt-to-GDP ratio of not more than 34.55 percent, public external debt would be beneficial to the economy.

References

Abubakar, A.B., & Mamman, S.O. (2020). Permanent and transitory effect of public debt on economic growth. *Journal of Economic Studies*, *48*(5), 1064-1083.

Adeosun, O.A., & Adedokun, S.A. (2019). Fiscal reaction functions and public debt sustainability in Nigeria: An error correction mechanism approach. *International Journal of Public Policy and Administration Research*, *6*(2), 116-132.

Adeosun, O.A., Ayodele, O.S., & Jongbo, O.C. (2021). Policy asymmetries and fiscal sustainability: evidence from Nigeria. *African Journal of Economic and Management Studies*, *12*(2), 302-320.

Afzal, M. (2012). Ricardian equivalence hypothesis: Evidence from Pakistan. *E3 Journal of Business Management and Economics*, *3*(6), 258-265.

Akhanolu, I.A., Babajide, A.A., Akinjare, V., Oladeji, T., & Osuma, G. (2018). The effect of public debt on economic growth in Nigeria: An empirical investigation. *International Business Management*, *12*(6), 436-441.

Akram, V., & Rath, B.N. (2019). Fiscal sustainability in India: Evidence from Markov switching and threshold regression models. *Studies in Economics and Finance*, *38*(2), 227-245.

Anetor, F.O., & Vincent, O. (2022). Do human capital and institutional environment constrain the impact of foreign direct investment inflows on economic growth in Africa? *Transnational Corporations Journal*, *29*(3), 79-106.

Arčabić, V., Tica, J., Lee, J., & Sonora, R.J. (2018). Public debt and economic growth conundrum: Nonlinearity and inter-temporal relationship. *Studies in Nonlinear Dynamics & Econometrics*, *22*(1).

Asteriou, D., Pilbeam, K., & Pratiwi, C.E. (2021). Public debt and economic growth: panel data evidence for Asian countries. *Journal of Economics and Finance*, *45*(2), 270-287.

Baharumshah, A.Z., Soon, S.V., & Lau, E. (2017). Fiscal sustainability in an emerging market economy: When does public debt turn bad? *Journal of Policy Modeling*, *39*(1), 99-113.

Barro, R.J. (1990). Government spending in a simple model of endogeneous growth. *Journal of Political Economy*, *98*(5, Part 2), S103-S125.

Belloumi, M. (2014). The relationship between trade, FDI and economic growth in Tunisia: An application of the autoregressive distributed lag model. *Economic Systems*, *38*(2), 269-287.

Bulow, J., & Rogoff, K. (1990), Cleaning up Third-World debt without getting taken to the cleaners. *Journal of Economic Perspectives*, *4*, 31-42

Burhanudin, M.D.A., Muda, R., Nathan, S.B.S., & Arshad, R. (2017). Real effects of government debt on sustainable economic growth in Malaysia. *Journal of International Studies*, *10*(3), 161-172.

Eboreime, M.I., & Sunday, B. (2017). Analysis of public debt: Threshold effect on output growth in Nigeria. *Central Bank of Nigeria*, *55*(3), 25.

Elmendorf, D.W., & Mankiw, N.G. (1999). Government debt. *Handbook of Macroeconomics*, *1*, 1615-1669.

Greene, J., & Villanueva, D. (1991). Private investment in developing countries: An empirical analysis. *Staff Papers*, *38*(1), 33-58.

Harris, R., & Sollis, R. (2003). Applied time series modelling and forecasting. Wiley.

Hilton, S.K. (2021). Public debt and economic growth: Contemporary evidence from a developing economy. *Asian Journal of Economics and Banking*, *5*(2), 173-193.

Krugman, P. (1988), Financing vs. forgiving a debt overhang: Some analytical notes. *Journal of Development Economics*, *29*, 253-268.

Kur, K.K., Abugwu, C.O.B., Abbah, C.S., & Anyanwu, O. (2021). Public debt and economic growth: What we know today about the Nigerian economy tomorrow. *African Social Science and Humanities Journal*, *2*(4), 192-206.

Lee, S.P., & Ng, Y.L. (2015). Public debt and economic growth in Malaysia. *Asian Economic and Financial Review*, *5*(1), 119-126.

Levy-Livermore, A., Chowdhury, K. (1998), Handbook on Globalization of the World Economy. Cheltenham, UK: Edward Elgar Publishing Limited

Mencinger, J., Aristovnik, A., & Verbic, M. (2014). The impact of growing public debt on economic growth in the European Union. *Amfiteatru Economic Journal*, *16*(35), 403-414.

Ncanywa, T., & Masoga, M.M. (2018). Can public debt stimulate public investment and economic growth in South Africa? *Cogent Economics & Finance*, *6*(1), 1516483.

Omotosho, B.S., Bawa, S., & Doguwa, S.I. (2016). Determining the optimal public debt threshold for Nigeria. *CBN Journal of Applied Statistics*, *7*(2), 1-25.

Panizza, U., & Presbitero, A.F. (2014). Public debt and economic growth: Is there a causal effect? *Journal of Macroeconomics*, *41*, 21-41.

Pattillo, C., Poirson, H., Ricci, L. (2002), External Debt and Growth. Working Paper, 02(69). Washington, DC: International Monetary Fund

Pesaran, M.H., Shin, Y. & Smith, R. (2001). Bounds testing approaches to the analysis of level relationship, *Journal of Applied Econometrics, 16*(3), 289-326.

Ramos-Herrera, M.D.C., & Prats, M.A. (2020). Fiscal sustainability in the European countries: A panel ARDL approach and a dynamic panel threshold model. *Sustainability*, *12*(20), 8505.

Romer, P.M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, *94*(5), 1002-1037.

Shkolnyk, I., & Koilo, V. (2018). The relationship between external debt and economic growth: Empirical evidence from Ukraine and other emerging economies. *Investment Management and Financial Innovations*, *15*(1).

Thao, P.T.P. (2018). Impacts of public debt on economic growth in six ASEAN countries. *Ritsumeikan Annual Review of International Studies*, *17*(3), 63-88.

Tran, N. (2018). Debt threshold for fiscal sustainability assessment in emerging economies. *Journal of Policy Modeling*, *40*(2), 375-394.

Wagner, A. (1911). *The state in economic perspective*, 3rd ed., Hinsicht.

Woo, J., & Kumar, M.S. (2015). Public debt and growth. *Economica*, *82*(328), 705-739.

Yusuf, A., & Mohd, S. (2021). The impact of government debt on economic growth in Nigeria. *Cogent Economics & Finance*, *9*(1), 1946249.