

PUBLIC DEBT AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM NIGERIA

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Abstract

This study investigates the influence of public debt on economic growth in Nigeria, employing the autoregressive distributed lag (ARDL) model of cointegration and analysing annual time series data spanning from 1980 to 2022. The empirical findings reveal that in the long run, external debt exerts a positive and significant impact on economic growth. This suggests that external debt holds substantial economic potential to drive growth in Nigeria throughout the analysed period. However, debt service payments have a significant adverse effect on growth, both in the long run and the short run. Consequently, the study recommends that the government should ensure borrowed external funds are allocated to productive investments to achieve its desired objectives. Specifically, Projects financed through government borrowing should undergo thorough assessment, evaluating their technical feasibility, financial viability, and economic desirability before committing funds, borrowing should be allocated towards financing productive infrastructure projects and initiatives that enhance productivity, thereby potentially offsetting the costs associated with servicing the debt.

Keywords: External debt; Economic Growth; ARDL cointegration; Nigeria

1.0 Introduction

Debt, as a global phenomenon, is prevalent across virtually all countries worldwide as a means to stimulate economic growth. When a government's income does not cover its spending, it resorts to borrowing. Public debt becomes essential for financing government expenses, especially when raising taxes or cutting spending is challenging. This practice has resulted in substantial debts for many governments over time. Responsible borrowing for public and infrastructure projects is crucial for stimulating economic growth. However, excessive borrowing without proper investment planning can lead to a burdensome debt load and interest payments, potentially causing adverse effects on the economy (Joy & Panda, 2020). In nations with fragile economic frameworks, elevated public debt poses a significant challenge as it fosters uncertainty and hampers economic expansion. Investors are wary of high debt-to-GDP ratios, as they can detrimentally impact the stock market and diminish opportunities for productive investment and employment over the long term (Saungweme et al., 2019). Hence, while public debt can initially serve as an economic stimulant, its accumulation to a substantial level entails significant drawbacks. A considerable portion of government expenditure and foreign exchange earnings must be allocated to service and repay the debt, incurring heavy opportunity costs even for future generations. Additionally, the burden of debt servicing may surpass the economy's coping capacity, thereby impeding efforts to

achieve desired fiscal and monetary policy objectives. Furthermore, mounting debt burdens can limit the government's capacity to pursue more beneficial investment programs in areas such as infrastructure, education, and public health (Johnny & Johnnywalker, 2018). It's important to note that public debt can take the form of either domestic or external obligations.

Nigeria finds itself classified among the heavily indebted nations of Sub-Saharan Africa, characterized by a sluggish GDP growth rate, constrained export growth, declining income per capita, and a rising poverty level. Like many of its counterparts, Nigeria has become ensnared in a cycle of rapid and distress borrowing, often struggling to service its debts. Compounding this challenge is the necessity for further borrowing due to the deteriorating world prices of primary exports, exacerbating the economic predicament (Ogunjimi, 2019). Nigeria experienced a notable reduction in its debt burden in 2006 following the 2005 debt relief granted by the Paris Club of creditors. This relief was primarily aimed at freeing up resources for investment and fostering faster economic growth. Unfortunately, over the span of 14 years since then, the country has found itself grappling with a more significant debt crisis. Successive administrations have been accumulating debt at an alarming pace, leading to a considerable increase in debt servicing costs, which have become a significant strain on Nigeria's budgetary process over the past decade. As a result, the economy is now burdened with substantial government debt and debt service expenses that consume more than half of the government's limited revenue, thereby constricting the fiscal space available for critical infrastructure investment that supports private sector growth and sustains overall economic expansion.

The combination of rising global interest rates and Nigeria's escalating debt burden is signaling the potential onset of another debt crisis, which may not be far off. Unsustainable public debt levels are deterring investment and stifling growth in Nigeria, thereby diminishing the country's global competitiveness and heightening its vulnerability to international financial shocks (Ogbonna et al., 2019). While Nigeria's debt-to-GDP ratio stands at approximately 22%, one of the lowest globally and well below levels seen in many emerging markets, this metric alone does not adequately gauge debt sustainability. Given Nigeria's exceptionally low tax-to-GDP ratio (6.1%), the debt service-to-revenue ratio emerges as a more pertinent indicator of sustainability. This ratio assesses whether the government generates sufficient revenue to meet debt obligations as they come due. With Concern, Nigeria's debt service-to-revenue ratio has surged to alarming levels in recent years, prompting questions from analysts about the country's solvency and the possibility of bankruptcy looming on the horizon.

Following the recession of 2016, Nigeria has grappled with a heightened debt service to revenue ratio, as revenues declined in direct correlation with the drop in oil prices. In 2019, the Nigerian government allocated approximately 2.45 trillion Naira to debt service out of a total revenue of 4.1 trillion Naira, equating to a debt service to revenue ratio of 59.6%. The escalating cost of Nigeria's debt reached a significant milestone in 2020, with the debt service as a percentage of revenue soaring to 83%. This means that 83% of the revenue generated in 2020 was utilized to fulfill debt service obligations, a concerning development.

Regarding domestic debt, the government expended 1.76 trillion Naira in 2020, slightly lower than the budgeted 1.87 trillion Naira. In contrast, for foreign debts, 553 billion Naira was spent against a target budget of 805.47 billion Naira, possibly due to reduced interest rates on foreign borrowing and limited borrowing from the foreign debt market during the year. Notably, the government's contribution to its sinking fund was significantly below the budgeted amount, with only 4.58 billion Naira contributed instead of the allocated 272.9 billion Naira. The sinking fund is essential for setting aside funds to repay other loans, such as bonds, upon maturity in the future. The government's persistent borrowing from the domestic market has constrained private businesses' access to credit, hindering their ability to secure funding for business expansion and growth (Ogunjimi, 2019). When a country channels substantial portions of its revenue towards servicing large debts, it leaves minimal funds available to invest in critical infrastructure, consequently impeding growth. Additionally, the National Bureau of Statistics (NBS) 2019 Poverty and Inequality in Nigeria report revealed that 40.1% of the total population, equating to nearly 83 million Nigerians by national standards, live below the country's poverty line of ₦137,430 per year of its real per capita expenditures. Over the years, Nigeria's rising public debt has always been a source of concern. According to the Debt Management Office (DMO) as reported by the National Bureau of Statistics (NBS) (2023), Nigeria's debt stock profile (both domestic and foreign loan) stood at NG₦97.34 trillion in Q4 2023 from ₦87.91 trillion in Q3 2023, indicating a growth rate of 10.73% on a quarter-on-quarter basis. Total external debt stood at ₦38.22 trillion in Q4 2023, while total domestic debt was ₦59.12 trillion. The share of external debt (in Naira value) to total public debt was 39.26% in Q4 2023, while share of domestic debt (in Naira value) to total public debt was 60.74%. This underscores the pervasive wealth disparity in a nation that boasts Africa's largest economy.

Despite the recorded revenue shortfalls, the government's recurrent expenditure, including debt and non-debt obligations, remained high and aligned with budgetary projections. Meanwhile, essential capital expenditure has experienced a significant decline over the past two decades. The persistent erosion of Nigeria's revenue raises concerns about the country's economic solvency. With the economy potentially heading towards a recession induced by COVID-19 and escalating insecurity, government revenues, especially non-oil revenues, are likely to remain depressed for an extended period. Consequently, the government may continue to rely on borrowing to finance its operations, further exacerbating Nigeria's debt service to revenue ratio. Without substantial structural policy reforms and a fiscal consolidation strategy focused on revenue generation to stimulate private investment and foster growth, there will be insufficient resources to finance the budget and provide essential infrastructure that promotes investment and drives sustainable long-term economic growth.

Nigeria is grappling with a significant and escalating public debt burden, exacerbated by rapid and distress borrowing practices. This mounting debt burden has serious repercussions for the country's economic stability and growth prospects. Despite efforts to manage debt levels, successive administrations have struggled to effectively service

debts, leading to heightened debt servicing costs that consume a substantial portion of government revenue. As a result, critical infrastructure investment is constrained, hindering economic growth and exacerbating poverty levels. Additionally, Nigeria's vulnerability to global economic shocks, compounded by rising global interest rates, poses further risks to its financial stability. Moreover, the country's debt service-to-revenue ratio has reached alarming levels, prompting concerns about its fiscal sustainability and the possibility of bankruptcy. Furthermore, the pervasive wealth disparity highlighted in the National Bureau of Statistics (NBS) 2019 Poverty and Inequality in Nigeria report underscores the urgent need for effective debt management strategies to address the root causes of poverty and inequality in Africa's largest economy.

The fiscal challenges facing Nigeria, including low revenue generation, escalating government recurrent expenditure, rapid accumulation of government debt, declining foreign reserves, and mounting arrears on external trade payments, have raised significant concerns among researchers and policy analysts. Of particular concern is the discord between the rapid expansion of government debt and debt service payments against a backdrop of sluggish economic growth and increasing poverty levels. This uncertainty has prompted the need to investigate the potential effects of Nigeria's escalating debt profile on economic growth, and to discern whether such effects, if any, are observed in the short run or the long run. This encapsulates the central problem addressed by the study, highlighting the need to understand the relationship between Nigeria's debt dynamics and its economic performance to inform effective policy interventions and decision-making.

2.0 Literature review

Fayose and Olayiwola (2024) examined the effect of public debt on economic growth in Nigeria with or without domestic investment for the period 1981 to 2020 using Dynamic Ordinary Least Square (DOLS) model technique. Using real gross domestic product, public debt, gross domestic investment, money supply, trade openness and labour force as key variables, the findings of the study revealed that public debt in Nigeria retards economic growth through reduction in the level of investment. Hence, excessive debt acquisition will automatically translate to negative growth and reduce investment. This indicates the possibility that the current levels of public debt in the Nigeria might not have been reducing the volume of growth but have the tendency to create a poorer macroeconomic and uncertain climate for investment and consequently, impact long term growth negatively.

Using ordinary least square technique, Richard et al., (2023) investigated the effect of public debt on the economic growth of Nigeria over the period span from 2004 to 2021. The macroeconomic variables used in the study include gross domestic product, public debt, interest rate, exchange rate and inflation rate. The study found that public debt has a negative effect on economic growth in Nigeria, exchange rate has positive relationship with economic growth, debt service payment have positive impacts on the same economy and interest rate does not have significant effect on the economic growth of Nigeria.

Akanbi and Olaoluwa (2022) investigated the relationship between sub national public debt and economic growth in Nigeria using time series data spanning 1981-2019. The study employed ordinary least square (OLS) multiple regression model. Using GDP, budget deficit, external debt, domestic debt, capital expenditure, population growth and exchange rate variables, the findings revealed that provided evidence of a positive relationship but not significant between sub national public debt and economic growth in Nigeria. Population growth and sub national capital expenditure also has a positive relationship but not significant relationships with economic growth. Sub national government budget deficit have a negative impact on economic growth although not significant. When the exchange rate was introduced a moderating variable in the model there was a negative relationship between sub national public debt and economic growths. This showed that foreign exchange rate is important in determining the direction of sub national public debt in Nigeria.

Aiyedogbon et al., (2022) examined the short and long run impact of state debt on economic growth in Nigeria. The study employed autoregressive distributed lag (ARDL) bounds testing method to co- integration for the period 1990 to 2020. The study employed autoregressive distributed lag (ARDL) bounds testing method to co-integration. The findings revealed the evidence of a long term link between the study variables. In addition, the study found that economic growth is significant and negatively responsive to changes in external debt and debt servicing over the sampled period. Contrary, domestic debt and exchange rate have a positive response to changes on economic growth.

Applying an OLS multiple regression model, Akanbi and Olaoluwa (2022) investigated the relationship between sub national public debt and economic growth in Nigeria from 1981-2019. The findings revealed a positive relationship but not significant between sub national public debt and economic growth in Nigeria. Population growth and sub national capital expenditure also has a positive relationship but not significant relationships with economic growth. Sub national government budget deficit have a negative impact on economic growth although not significant. However, when the exchange rate was introduced as a moderating variable, there was a negative relationship between sub national public debt and economic growth. This indicates that foreign exchange rate is important in determining the direction of sub national public debt in Nigeria.

Florence and Ann (2021) examined the resultant effect of government borrowings on economic development in Nigeria for the period 1990 to 2020. The study employed Johansen co-integration and Error Correction Mechanism (ECM). The variables used in the study include external debt, domestic debt, interest rate, inflation and human development index. The findings revealed a positive and statistically significant relationship between external debt and economic development the same as domestic debt and economic development in Nigeria, while interest rates have a negative and statistically significant relationship with economic development in Nigeria. However,

inflation was found to be negative and insignificant to economic development in Nigeria over the sampled period.

Ehikiyoa and Omankhanlen (2021) examined the impact of public debt on economic growth in Nigeria over the period 1981 to 2019. The study employed Johansen cointegration test, Ordinary Least Square technique and Vector Error Correction Models. The findings revealed the presence of a long run equilibrium relationship between public debt and economic growth in Nigeria. In addition, there exists evidence of an adverse impact of public debt on economic performance for the study period in Nigeria. The study demonstrates that inflation, interest rates, oil price and investment exert influence on economic growth in Nigeria.

Chioma et al., (2021) investigated Public Debt and Sustainable Development in Nigeria utilizing Domestic Debt and External Debt as dimensions of Public Debt and Gross Domestic Product per Capita, Life Expectancy at Birth and Primary School Enrollment as the measures of Sustainable Development. The study employed Johansen cointegration Test and Vector Error Correction Model covering the period from 1970 to 2019. The study found that in Nigeria, domestic debt has a negative and insignificant effect on Gross Domestic Product per Capita; domestic debt has a negative and insignificant effect on Life Expectancy at Birth and domestic debt has a positive and significant effect on Primary School Enrollment. Furthermore, it found that in Nigeria, external debt has a positive but insignificantly effect on Gross Domestic Product per Capita; external debt has no significant effect on Life Expectancy at Birth and finally, external debt has a negative and insignificant effect on Primary School Enrollment. Hence, the study concludes that of the two dimensions of public debt only domestic debt is significant in boosting sustainable development in Nigeria.

Edeminam (2021) examined the impact of public debt on economic growth in Nigeria using annual time series data over the period 1990 to 2019. The study employed Johansen Co-integration model. The key variables used include Real GDP, public debt, Inflation, debt to GDP ratio, debt servicing to GDP ratio, and exchange rate. The findings of the study revealed that public debt has a negative and significant impact on economic growth in the long run but negative and insignificant in the short run. In addition, the impact of ratio of debt servicing to GDP was significant and negative in the short and long run. Evidently, there was no causality between public debt and economic growth.

Kur et al., (2021) using time series over the period spanning 1981 to 2019, investigated public debt and its potential consequence on economic growth through its impact on investment in Nigeria. The study employed Autoregressive distributed lag (ARDL) model. The findings of the study reported that external debt and investment have a strong positive link with economic growth, while domestic debt and external debt service are inversely related to growth. Further findings suggested that increased investment of domestic debt and external loans in Nigeria is a blessing and curse, respectively.

Yusuf and Mohd (2021) employed time series data covering the period 1980 to 2018 to investigate the effect of government debt on Nigeria's economic growth using the Autoregressive Distributed Lag (ARDL) technique. The study found that external debt constituted an impediment to long-term growth while its short term effect was growth enhancing. Domestic debt had a significant positive impact on long term growth while

its short term effect was negative. In the long term and short term, debt service payments led to growth retardation confirming debt overhang effect.

Oladipo et al., (2020) using a time series data over the period spanning from 1989 to 2019 examined the impact of external debt in stimulating economic growth in Nigeria: mediating on the role of public sector financial management. The study employed autoregressive distributed lag (ARDL) model and co-integration model. The variables employed involves Gross Domestic Product (GDP) as endogenous variable while Debt to GDP Ratio (DGR), Foreign Debt to Exports Ratio (FDER), Inflation Ratio (INFR), Interest Service Ratio (ISR) and Exchange Ratio (EXR) as exogenous variables. The findings of the study revealed that the presence of co-integration among the variables with clear indication that external debt has a significant and positive relationship with economic growth with strong emphasis on public sector financial management as mediating factor. Also, the study concluded that Nigeria debt crisis was attributed to both exogenous and endogenous factors due to dwindling economy.

Ohiomu (2020) analysed external debt and economic growth nexus for policy analysis on public finance and public debt management in Nigeria. The study utilized Autoregressive Distributed Lag (ARDL) model covering a period span from 1984 to 2018. The variables used in the study are per capita gross domestic investment (PCGDI), interest rate, marginal product of capital, growth rate of real output, external debt and debt servicing. The findings revealed that foreign debt service ratio has significant negative impact on PCGDI in both the long run and short run; debt overhand has significant negative relationship with PCGDI in the long run and also in the short run; there is causal relationship existing amid explanatory variables and PCGDI in Nigeria. In addition, there was deterioration in all the debt indicators during the period under review.

Gabriel (2020) empirically examined the effect of public debt on economic growth of Nigeria using annual data spanning 1982 to 2018. The study specifically determined the impact of domestic debt on the economic growth of Nigeria; assessed the effect of external debt on the economic growth of Nigeria and analyzed the relationship between public debt and the economic growth of Nigeria. The study employed Johansen co-integration test and vector error correction model. Using gross domestic product, external debt and domestic debt as key variables, the findings of the study reported that external debt exerts a negative long run and short run effect on economic growth of Nigeria and domestic debt was ascertained to exert positive long run and short run effect on economic growth of Nigeria over the sampled period.

Alagba and Eferakeya (2019) empirically investigated the effect of public debts on economic growth of Nigeria using annual data for the period of thirty-eight (38) years, 1981 to 2018. Specifically, analyze the effect of domestic debts on the economic growth of Nigeria and evaluate the effect of foreign debts on the economic growth of Nigeria. The data were classified and analyzed using ordinary least square (OLS) technique. The variables used in the study include federal government total expenditure, federal government domestic debt, federal government foreign debt, cost of servicing debt and

federal government retained revenue. The findings showed that domestic debts of the Federal government of Nigeria is positive and statistically significant to economic growth of Nigeria while foreign debts contribute less to the economic growth of the country. Cost of debts servicing is significant and has a negative effect on economic growth.

Using ordinary least square (OLS) regression technique, Omodero and Alpheaus (2019) examined the effect of foreign debt on the economic growth of Nigeria for the period 1997 to 2017. The findings of the study reported that foreign debt exerts a significant negative influence on economic growth while foreign debt servicing has a strong and significant positive impact on economic growth.

Saungweme and Odhiambo (2019) reviewed the theoretical and empirical literature on the impact of public debt on economic growth in both developing and developed economies. The review showed that the impact of public debt on economic growth is not given and varies depending on a set of heterogeneous factors, including the level of development of the sampled countries, institutional quality, and the relative size of the public sector, the composition and structure of the government debt. The findings of the study showed that the impact of public debt on economic growth is not clear-cut, and that the notion that public debt is bad for economic growth is merely based on prima facie or superficial evidence and should be taken with a pinch of salt.

Using ordinary least square (OLS) model for the period 1997 to 2017, Omodero and Alpheaus (2019) examined the effect of foreign debt on the economic growth of Nigeria. The variables used in the study include nominal gross domestic product, foreign debt stock, foreign debt servicing, inflation rate, and exchange rate. The findings revealed that foreign debt exerts a significant negative influence on economic growth while foreign debt servicing has a strong and significant positive impact on economic growth. The other factors are insignificant in explaining economic growth over the sampled period.

Anidiobu et al., (2016) investigated the responsiveness of economic growth to foreign debt in Nigeria. The study employed ordinary least square (OLS) model using annual time series data from 1986 to 2013. The variables used in the study are real gross domestic product, foreign debt stock, foreign debt service payments and foreign exchange rate. The findings revealed that GDP negatively responded to external/foreign debt stock and had a non-significant response to external debt stock. This suggest that foreign debt did not influence economic growth with the implication that foreign debt could not be used to forecast improvement or slowdown in economic growth in Nigeria within the period studied.

Olasode and Babatunde (2016) examined the casual relationship between accumulated funds/loans from external sources (external debts) and economic growth with a more focus on Nigerian economy. The study utilizes the OLS, Autoregressive Distributed Lag (ADL) model and Johansen Co-integration model covering the period spanning from 1984 to 2012. The findings of the study confirmed the existence of long run relationship between the variables. Also, confirms the existence of a dual behaviour as the lag 1 of external debts has positive while external debts of present year posed a negative effect on the performance of the economy.

Muritala (2012) analyzed the relationship between the external debt and economic growth. The study utilized Ordinary Least Square technique over the period 1980 to 2010. The variables used in the study include GDP, external debt, and debt servicing. The findings revealed a negative relationship between external debt and economic growth while that of debt servicing conforms with the apriori expectation of positive relationship.

3.0 Methodology

The study employs an econometric approach, utilizing annual time series data spanning forty-three years from 1980 to 2022. The variables on which the data were collected include external debt, debt servicing, inflation, interest rate, exchange rate and GDP. Data for all the variables were sourced from the World Development Indicators (WDI) (2022). The study adopts the Autoregressive Distributed Lag (ARDL) Model approach to cointegration technique.

To investigate the impact of public debt on economic growth in Nigeria, the empirical model is a function of possible determinants of growth which includes external debt or foreign debt. The functional and econometric representations of the relationship among the variables of the study are given in equation (1) and (2).

$$GDP = f(EXTD, DS, INFL, INTR, EXR) \dots \dots \dots (1)$$

$$GDP_t = \beta_0 + \beta_1 EXTD_t + \beta_2 DS_t + \beta_3 INFL_t + \beta_4 INTR_t + \beta_5 EXR_t + \varepsilon_t \dots \dots \dots (2)$$

Where GDP represents real GDP per capita, EXTD indicates external debt, DS indicated debt servicing, INFL represents inflation rate, INTR represents interest rate, INFL represent inflation rate, EXR represents exchange rate, t represent time, ε_t is the stochastic error term, β_0 is the constant, the intercept of the regression function and β_1 to β_5 indicates the parameters to be estimated.

Pesaran and Pesaran (1997) introduced the autoregressive distributed lag (ARDL) model, which was expanded by Pesaran et al., (2001); in addition, Pesaran and Smith (1998), Pesaran et al., (2001) and Narayan (2005) proposed the bounds-testing approach of the empirical linear autoregressive distributed lag (ARDL) model and any long run relationship may be given by the equation as follows:

$$GDP_t = \beta_0 + \sum_{i=1}^n \beta_1 GDP_{t-1} + \sum_{i=1}^n \beta_2 EXTD_{t-1} + \sum_{i=1}^n \beta_3 DS_{t-1} + \sum_{i=1}^n \beta_4 INFL_{t-1} + \sum_{i=1}^n \beta_5 INTR_{t-1} + \sum_{i=1}^n \beta_6 EXR_{t-1} + \beta_{7i} \ln GDP_{t-1} + \beta_{8i} \ln EXTD_{t-1} + \beta_{9i} \ln DS_{t-1} + \beta_{10i} \ln INFL_{t-1} + \beta_{11i} \ln INTR_{t-1} + \beta_{12i} \ln EXR_{t-1} + \varepsilon_t \dots \dots (3)$$

Where n represents the optimal lag length, t is time.

The test for a long run relationship is conducted to determine if such a relationship exists among the variables. If a long run relationship exists, indicating cointegration among the variables, it suggests the presence of a long run equilibrium relationship, thereby implying short-run dis-equilibrium. These short-run dynamics are captured by estimating the coefficient of the error correction mechanism (ECM). This will explain

how much time the system will take to return to the long term equilibrium following a random shock, with an expected negative sign to ensure convergence. The error correction model (ECM) is specified in equation (4) as follows:

$$\Delta \ln GDP_t = \pi_0 + \sum_{i=1}^n \pi_{1i} \Delta \ln GDP_{t-1} + \sum_{i=1}^n \pi_{2i} \Delta \ln EXT D_{t-1} + \sum_{i=1}^n \pi_{3i} \Delta \ln DS_{t-1} + \sum_{i=1}^n \pi_{4i} \Delta \ln INFL_{t-1} + \sum_{i=1}^n \pi_{5i} \Delta \ln INTR_{t-1} + \sum_{i=1}^n \pi_{6i} \Delta \ln EXR_{t-1} + \gamma ECM + \varepsilon_t \dots \dots \dots (4)$$

From the equation (4), represents γ the speed of adjustment for the convergence of the coefficients of short run equation and ECM is the residuals obtained through the application of the cointegration model. In addition, the coefficient would give the information about the long run relationship among the variables and the expected sign is negative.

1.0 Results and discussion

Utilizing time series variables necessitates conducting a test for stationarity to ascertain the order of integration for each variable. This test is presented in Table 1, and the results follow the assumption of constancy.

Table 1: Results of Unit Root Test of Stationarity

Variables	ADF at Level	ADF at First difference	PP at Level	PP at First difference	Order of Integration
GDP	-0.724 ⁿ	-4.719***	-0.870 ⁿ	-4.832***	I(1)
EXTD	1.533 ⁿ	-4.749***	1.285 ⁿ	-4.739***	I(1)
DS	-2.443 ⁿ	-6.621***	-2.402 ⁿ	-10.563***	I(1)
INFL	-3.135*	-6.063***	-2.910*	-12.589***	I(0)
INTR	-2.933 ⁿ	-6.858***	-2.217 ⁿ	-10.770***	I(1)
EXR	-2.006 ⁿ	-4.474***	-2.126 ⁿ	-4.410***	I(1)

Notes: ***, ** and * correspond to 1%, 5% and 10% significance level, respectively.

Source: Authors’ Computation (2024)

Prior to conducting the ARDL co-integration analysis, the study first checked the integration order of the variables to ensure none of them were stationary at the second difference level. This precaution was necessary because the ARDL bounds test lacks robustness in the presence of I(2) variables. To ascertain the stationarity properties of the study variables and prevent spurious regression, the study utilized unit root tests by Augmented Dickey and Fuller (ADF) (1979) and Phillips and Perron (PP) (1988), both conducted at levels and first difference.

Evidence from the results presented in Table 1 indicate that the variables exhibit a mixed order of stationarity, implying that all series are integrated at order I(0) at the level and first difference I(1). It can be accurately concluded that none of the variables are integrated of order two. This mixed order of integration underscores the importance of employing the ARDL Bounds test for cointegration and validates the use of the

Autoregressive Distributed Lag (ARDL) Model. Meeting the necessary conditions for ARDL estimation provides strong evidence that the co-integration analysis using this method will produce reliable and valid regression results.

Table 2: ARDL Bounds Test of Co-integration Results

Model	F-statistic	K	Critical Values			Decision
			%	Lower Bound I(0)	Upper Bound I(1)	
$\ln GDP = f(\ln EXTD, \ln DS, \ln INFL, \ln INTR, \ln EXR)$	8.216	5	1%	3.41	4.68	Reject H_0 and accept H_A . Co-integration exists
			2.5%	2.96	4.18	
			5%	2.62	3.79	
			10%	2.26	3.35	

Note: Based on Narayan Table Case III (Narayan, 2005).

Source: Authors' Computation (2024)

The bounds test procedure relies on the F-test to explore the presence of long-term connections between the analyzed variables, examining the joint significance of lagged level variables in the model. In Table 2, 'k' represents the number of parameters. The ARDL bounds test for cointegration indicates that the F-statistic value (8.216), based on the selected optimal lags, exceeds the critical bounds values at the 10%, 5%, and even the 1% significance levels for both the upper I(1) and lower I(0) bounds, as specified in the critical bounds table developed by Narayan (2005) respectively. This conclusion is drawn from the strong rejection of the null hypothesis of no co-integrating equation. Therefore, the significance level of the F-statistic suggests the presence of a long-run (equilibrium) and indicates the existence of a long-run co-integrating relationship among the variables in the model. This allows for the estimation of both short-run dynamics (error correction model) and long-run coefficients.

Table 3: The estimated Long Run and Short Run Coefficients Based on Akaike Info Criterion (AIC) for Linear-ARDL

Regressors	Coefficients	T-Ratio [Prob. Value]
<i>The long-run results</i>		
$\ln EXTD$	1.309	3.862 [0.002]***
$\ln DS$	-0.730	-3.080 [0.009]***
$\ln INFL$	-1.036	-5.734 [0.000]***
$\ln INTR$	-0.960	-3.984 [0.002]***
$\ln EXR$	-0.990	-3.424 [0.004]***
Constant	0.857	0.369 [0.718]

The short-run results

dLEXTD	0.063	1.787 [0.099]*
dLDS	-0.001	-0.111 [0.913]
dLINFL	-0.075	0.194 [0.848]
dLINTR	-0.045	-3.221 [0.007]***
dLEXR	0.056	3.075 [0.009]***
ECM (-1)	-0.169	-4.947 [0.000]***

Note: LGDP = Dependent Variable: Lag lengths are 4, 4, 3, 2, 3, 4 selected based on AIC

Note: *Significant at 10% level. ** Significant at 5% level. ***Significant at 1% level.

Source: Authors’ Computation (2024)

The long-run coefficients from Table 3, shows that external debt has a positive and significant impact on economic growth in Nigeria over the long term. This effect is particularly robust, being statistically significant at the 1% level. Specifically, a percentage increase in foreign loans (external debt), while holding other variables constant, is associated with a considerable 1.309% long-term effect on economic growth. This underscores the substantial influence of foreign loans as a determinant of economic growth in Nigeria. These findings are consistent with previous research by Abiodun et al., (2020), Inyang and Effiong (2020), as well as Ogbebor and Aigheyisi (2019) on the same subject matter within the Nigerian context. Moreover, the direct effect of external debt on economic growth in Nigeria is positive and significant even in the short run, also at the 10% level. However, the long-run growth effects of other explanatory variables, including debt servicing, real effective exchange rate, interest rate, and inflation rate, exhibit a negative and statistically significant relationship with growth.

The negative and statistically significant coefficient of the error correction term, observed at the 1% significance level, reaffirms the anticipated pattern. This underscores the likelihood of the variables converging over the long run. Specifically, the coefficient's value for the error correction model (ECM) (-0.169) indicates an oscillatory convergence toward long-run equilibrium following short-run deviations. This implies that approximately 16.9% of the short-run disequilibrium is rectified annually, facilitating the model's movement towards long-run equilibrium. Furthermore, to assess the model's robustness, various diagnostic tests were conducted, including the heteroscedasticity ARCH LM test, serial or auto-correlation LM test, and stability test, all aimed at ensuring the stability and reliability of the model.

Table 4: Diagnostic Tests for ARDL Model

Test	F-Statistic	Prob. Value
Serial Correlation	2.099	0.169
Functional Form	2.880	0.116
Normality	0.190	0.909

Heteroskedasticity	0.660	0.820
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Source: Authors' Computation (2024)

Several diagnostic and robustness tests were conducted to validate the reliability and stability of the econometric estimates and ensure that the errors adhere to the necessary assumptions. The outcomes of these tests, as presented in Table 4, demonstrate that the model successfully meets the required post-estimation criteria, thereby indicating its adequacy. Specifically, there is no evidence suggesting non-normality, serial correlation, heteroscedasticity, or model misspecification error. Consequently, the test results support the alternative hypothesis, indicating that public debt does not exert a significant effect on economic growth.

Stability Tests: CUSUM and CUSUMSQ

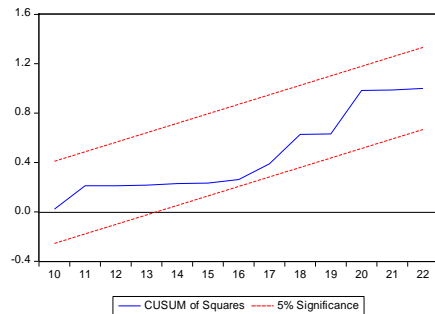
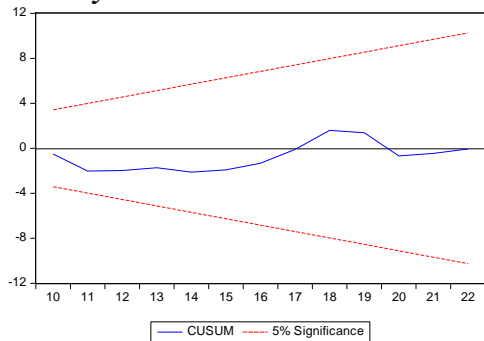


Figure 1: Cumulative Sum of Recursive Residuals

Figure 2: Cumulative Sum of Squares of Recursive Residuals

Source: Authors' Computation (2024)

Likewise, stability tests were performed on the parameters of the ARDL model using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests (Figures 1 and 2). The results indicated that the parameters of the estimated model fall within the critical bounds at a significance level of 5%. This suggests that the estimated model exhibits dynamic stability, affirming the reliability and adequacy of the estimated results throughout the sampled period.

2.0 Conclusion

This study empirically examined the relationship between external debt and economic growth in Nigeria using annual time series data spanning from 1980 to 2022. The ARDL cointegration approach was utilized for data analysis after ensuring data stationarity. The findings indicated a direct positive effect of external debt on the growth of the Nigerian economy throughout the sampled period. Specifically, the long-run estimations demonstrated a robust, positive, and statistically significant effect of external debt on

economic growth in Nigeria. This suggests that external debt possesses substantial economic potential to stimulate growth not only in the long run but also in the short run. Essentially, the empirical results indicated that external debt contributed to growth enhancement both in the long term and the short term. However, it was observed that debt service payments had a significant adverse effect on growth, both in the long run and the short run. Additionally, other explanatory variables such as inflation rate, exchange rate, and interest rate were found to exert significant negative effects on economic growth in the long run. The coefficient of co-integrating equation indicated a gradual adjustment speed parameter of 16.9% convergence to long-run equilibrium after a shock. Furthermore, stability and robustness checks confirmed the structural and dynamic stability of the estimated parameters of the model. Therefore, based on these findings, it is recommended that the government ensures that borrowed external funds are allocated to productive investments to fulfill intended objectives. Projects financed through government borrowing ought to undergo thorough assessment, evaluating their technical feasibility, financial viability, and economic desirability before committing funds. Borrowing should primarily support productive infrastructure initiatives that enhance productivity, potentially mitigating the burden of debt service. Moreover, investments should target productive sectors of the economy, particularly the real sector, aiming to generate employment opportunities and alleviate poverty levels within the regions.

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