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Exploring the intricate relationship between public debts and economic development in Nigeria

Christian Ugwueze Amu[1], Success Ikechi Kanu[2], Hilary Chinedu Akuwudike[2] and Kingsley Ikechukwu Okere[3*]

Abstract

This study was carried out to ascertain the relationships between public debts and economic development in Nigeria. The specific objectives were to assess the effects of public debt on economic growth rate, aggregate demands, sectoral compositions and to find out if there exists any threshold relationship between debt accumulation and economic development in Nigeria. An ex-post facto research design was adopted in the study. With the aid of E-view statistical package, varied econometric analyses were conducted. Outcome of the study indicates that there exists a significant threshold relationship of between 50 and 60 percent for external debt, while a 15–17 percent threshold was established for domestic debt and debt accumulation in Nigeria. The study also reveals that external and domestic debts both have significant and largely negative impact on economic growth and development in Nigeria. The study therefore recommends that there is need for government at various levels in Nigeria to strive to reduce debt accumulation, especially in the long run by expanding her tax drag nets where necessary for overall and effective public financial management. There is also the need for a strong support for fiscal operations. Debt dependence in Nigeria was identified as a problem of fiscal federalism and claims to resource control among the federating units. It is also recommended that government must provide support for fiscal discipline. This could pave way for effective debt management practice in Nigeria.

Keywords Public debt, Economic development, Economic growth, Regression, Threshold

Introduction

The debate surrounding the relationship between public debt policies and economic growth continues to be a contentious issue among academics, as evidenced by recent academic literature in finance [1, 2]. Scholars agree that the significant increase in public debt accumulated by developing countries over time is often associated with hindered economic growth, resulting in severe economic consequences for these nations. Efforts and studies have been made to identify how policymakers should address these emerging deficits in growing economies. One notable work by Rosen and Gayer [3] identifies three distinct avenues for financing such deficits: taxes, debts, and user fees.

On the one hand, the issue associated with the relationship between public debt and economic growth is connected to the emergence of debt overhang and crowding-out effects in many countries [4]. The significant accumulation of public debt in developing nations hinders economic and developmental growth initiatives aimed at stimulating their economies. Additionally, these substantial public debts discourage private investors and investments, resulting in macroeconomic instability and imbalance, as the burden of servicing the debt can disrupt

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consumption patterns and create economic disparities. On another hand, the role of public debt in modern economic management has become increasingly significant for governments worldwide, particularly in developing countries where public debt accumulation has been on the rise since the global financial crises of 2007/2008, primarily due to declining export earnings. This has led to extensive debt accumulation, resulting in overhang and servicing issues, with negative effects on investment and overall economic outlook. The debt problem has permeated various aspects of economic life in developing economies since the early 1980s debt crisis. Consequently, debates have emerged regarding the impact of high debt burdens and the channels through which they affect economic growth and development. This is a critical aspect of the debt–growth relationship that requires thorough investigation, particularly in developing economies.

Furthermore, there is a pressing need to establish an enabling external environment that ensures sustainable improvement in the quality of life for citizens in developing countries. However, a significant challenge in achieving external stability for sustainable growth in these countries is the absence of a framework that fosters clear macroeconomic environments due to high debt overhang. One major implication of debt patterns in developing countries is its sustainability. As developing countries consider debt sustainability in relation to growth and other macroeconomic indicators, examining the debt–growth nexus becomes crucial [5]. The viability of borrowing patterns has also become a challenging issue, particularly as governments in many developing countries have increased debts from private lenders through the expansion of domestic debt. This poses additional challenges such as crowding-out private investment, the underdevelopment of domestic financial markets, and low savings rates in the private sector. These aspects of the debt–growth (development) relationship necessitate the need for this study.

Indeed, the existing literature on the relationship between public debt and economic growth in Nigeria has primarily focused on investigating the effects of public debt on economic development [2, 6]. However, there is a significant research gap regarding the identification of the turning point at which public debt transitions from being beneficial to having negative effects on the Nigerian economy. This turning point is crucial for policymakers to determine sustainable levels of public debt that promote economic growth without leading to detrimental consequences. While studies have been conducted on the impact of public debt on economic growth in Nigeria, there is a lack of research that specifically examines the threshold or optimal level of public debt beyond which it becomes detrimental to economic development. Existing studies have provided insights into the positive and negative relationships between different components of public debt (such as domestic debt and external debt) and economic growth [2, 7], but they have not explicitly addressed the threshold level of debt accumulation. Understanding the turning point for public debt in Nigeria is essential for effective debt management and fiscal policy decision-making. It would provide policymakers with valuable guidance on the sustainable levels of public debt that can support economic growth without compromising fiscal stability. This research gap highlights the need for empirical investigations that analyze the nonlinear relationship between public debt and economic growth in Nigeria, focusing on identifying the threshold at which public debt becomes detrimental. By filling this research gap, policymakers and researchers can gain a comprehensive understanding of the optimal level of public debt that maximizes economic growth potential in Nigeria. This knowledge can inform the formulation of effective debt management strategies, fiscal policies, and investment decisions to ensure sustainable economic development in the country.

The remaining sections of this study are structured as follows: Sect. "Literature review" provides a comprehensive review of the relevant literature, while Sect. "Methodology" outlines the methodology and analytical tools employed in this research. The penultimate section presents the findings of the data analysis and facilitates discussions, while the final section presents a summary of the study's key findings and offers policy recommendations.

Literature review

Theoretical underpinning

The theory of debt overhang, as proposed by Myers [8], suggests that excessively high debt levels can have negative consequences for an economy. This situation arises when the projected repayment plan for external debt falls short of the initially agreed-upon conditions and amounts [9]. In such cases, the burden of outstanding debt reduces incentives for investment and economic growth, as the government's financial resources are constrained by the need to prioritize debt repayment. Consequently, excessive debt can hinder a country's ability to attract new investment and lead to inefficient resource allocation [10]. In the context of Nigeria, the concept of debt overhang is relevant to the nation's public debt. Nigeria is at risk of debt overhang due to its entire public debt stock of N42.84 trillion (USD103.31 billion) as of June 30, 2022 (DMO, 2022).[1] In the event that the

[1] Debt Management Office, https://www.dmo.gov.ng.

anticipated repayment arrangements for this debt do not meet the agreed-upon terms and numbers, it has the potential to discourage investment and impede economic progress. The presence of outstanding debt may impede the government's capacity to attract fresh investment and efficiently manage resources.

The Liquidity Constraint Hypothesis, which is similar to the debt overhang concept, addresses the "crowding-out" effects of allocating resources to debt servicing [11]. This hypothesis posits that when governments face significant debt service obligations, the resources available for economic and development projects are diminished [12]. This reduction in resources can lead to decreased public investment, negatively impacting economic growth and development [13]. In Nigeria's case, the liquidity constraint hypothesis is particularly relevant. The necessity to service both domestic and external debts limits the resources available for economic and development projects. Consequently, this constraint can decrease public investments, adversely affecting economic growth and development in Nigeria. The crowding-out effect of debt service obligations reduces the resources available for the productive sectors of the economy.

Empirical review

Linear relationship between public debt and economic growth

Numerous empirical studies have explored the complex relationship between public debt and economic growth in Nigeria, revealing mixed outcomes. Some research indicates that public debt can positively influence economic growth [14]. In contrast, other studies suggest that while external debt negatively impacts economic growth, domestic debt has a positive effect [15]. Additionally, these studies emphasize the importance of prudent budgeting practices, such as reducing recurrent expenditure in favor of capital investment and diversifying the economy, to improve fiscal and debt sustainability and promote economic development [16]. Furthermore, concerns have been raised about the effective use of borrowed funds and the necessity for legislative oversight to ensure responsible borrowing practices for sustainable economic growth in Nigeria [17].

Yusuf and Mohd [18] examine the asymmetric impact of public debt on economic growth in Nigeria using the Nonlinear Autoregressive Distributed Lag (NARDL) method for the period from 1980 to 2022. Their findings indicate that external debt has a significant positive impact on economic growth, while debt service payments negatively affect economic growth. Kanu and Ozurumba [1] conducted a study on domestic debts and economic growth in Nigeria. The findings revealed that in the short run, Federal Government of Nigeria (FGN) Bond had a positive and significant relationship with economic growth, while development stock showed a significant negative relationship. In the long run, treasury bills and the lagged value of GDP (in the second year) were found to have a positive and significant impact. Kanu, Anyanwu, and Osuji [6] examined the impact of disaggregated components of external debt on the economic development of Nigeria from 1969 to 2011. The short-term results showed that while multilateral and miscellaneous sources of external debt had a positive and significant relationship with economic development, promissory notes exhibited a significant negative relationship. In the long run, only the lagged value of GDP (in the second year) was found to be positively significant. In other words, there was no significant long-term relationship between external debts and the level of economic development in Nigeria. Other sources of external debt that were previously significant in the short run turned out to be insignificant in the long run. A study by Nwannebuike, Ike, and Onuka [19] suggested that the Nigerian economy was positively influenced by the exchange rate but negatively affected by the debt stock and debt service payments during the study period. Onakoya and Ogunade [2] examined the effect of external debt on economic growth in Nigeria. The study revealed a negative relationship between economic growth and external debt in the country. Heimberger [20] investigates the relationship between public debt levels and economic growth using meta-regression techniques. By synthesizing findings from 47 primary studies encompassing 816 estimates, the study concludes that an increase in the public debt-to-GDP ratio is associated with a decline in annual growth rates; Ehikioya and Omankhanlen [21], utilizing data from 1981 to 2019, demonstrate that public debt negatively impacts Nigeria's economic performance, showing a significant relationship with lag variables. Similarly, Anderu et al. [22] in their study covering the period from 1980 to 2016 find a significant inverse relationship between external debt and economic growth in Nigeria, indicating that external debt does not contribute to economic growth as anticipated. [23] examine the impact of external debt on economic growth in South Asian countries from 1980 to 2020. Using the Cross-Sectional Dependence Autoregressive Distributed Lag (CS-ARDL) technique, the study finds a significant negative relationship, indicating that higher external debt leads to slower economic growth in both the short and long run. Opara, Nzotta, and Kanu [24] investigated the effects of Nigeria's domestic public debts on economic development. The first model showed that domestic debt servicing and state governments' domestic debts were significantly related

to economic development. Moreover, federal domestic debt and state domestic debt were significantly related to private sector investment.

Nonlinear relationship between public and economic development.

The impact of public debt on economic growth is nonlinear and varies by income levels and countries. Research indicates that economic growth can, over the long term, help reduce public debt accumulation [25]. However, there is a threshold beyond which public debt begins to adversely affect growth, underscoring the need for effective debt management [26]. The relationship between national debt and GDP growth is critical, with an optimal threshold identified for promoting successful economic development [27]. Although public debt may not significantly impact overall economic growth, it influences investment and credit provision, particularly in public investment and credit, beyond certain threshold levels. In Kenya, both public and internal debts show a U-shaped relationship with economic growth, where specific threshold levels indicate when debt starts to positively impact growth [28]. Shah et al. [29] use a dynamic panel threshold model to explore the relationship between public debt and economic growth in developing countries, particularly in the context of the significant rise in global public debt ratios following the 2007–2009 financial crisis and the COVID-19 pandemic. Their study highlights two key aspects of the empirical literature: the threshold effects of public debt and the heterogeneity in threshold levels. The findings reveal that in developing countries, higher public debt ratios are associated with decreasing average growth rates over time.

Methodology

Data sourced and description

This research examines the relationship between public debt and economic growth in Nigeria using 41 annual observations from 1981 to 2022. The study utilizes secondary sources to obtain data, including annual public debt series (comprising external and domestic debts) and gross domestic product (GDP) series as a proxy for economic growth. The main variables analyzed in this study are the public debt series (divided into domestic debt and external debt) and the GDP series, with GDP serving as the dependent variable and public debt as the independent variables. All data were sourced from CBN statistical bulletin.

Specification of model

Following the previous research conducted by Kasidi and Said [30], and Ntshakala [31], who utilized comparable economic models, data, and variables, the following variables were selected to investigate the impact of domestic and external debt on aggregate demand:

$$Y_{i,t} = \beta_0 + \beta_1 lnED_{i,t} + \beta_2 DD_{i,t} + \beta_3 Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

where: $Y_{i,t}$ denotes a vector of economic development variables country i in time t: $Z_{i,t}$ is used to capture the control variables such Foreign direct Investment (FDI), Trade Openness (OPEN), urbanization (URBAN) Government Expenditure (GOVSTAB).

Economic variables and justifications

Investment Rate (INVR) represents the portion of a country's GDP that is invested in capital goods like machinery, infrastructure, and technology. A higher investment rate typically fosters economic growth and development. Consumption Rate (CONSR) indicates the share of GDP that households and individuals spend on goods and services. It is a measure of consumer confidence, economic stability, and overall demand in the economy. Savings Rate (SAVR) shows the percentage of income that households save instead of spending. Higher savings rates can lead to greater capital accumulation and investment opportunities. Agricultural GDP (AGDP) quantifies the value of goods and services produced within the agricultural sector. It is crucial for understanding rural economies and ensuring food security. Industry GDP (IGDP) measures the value of goods and services produced in the industrial sector, including manufacturing, mining, and construction. It plays a key role in economic diversification. Services Sector GDP (SGDP) assesses the value of services produced within an economy, such as finance, healthcare, and education. The services sector often dominates modern economies. Real Income per Capita (RGDPPC) adjusts GDP per capita for inflation, offering a more accurate measure of living standards and economic well-being. Human Development Index (HDI) combines indicators such as life expectancy, education, and per capita income to evaluate overall human development and quality of life. Unemployment Rate (UMR) reflects the percentage of the labor force that is unemployed, serving as a critical indicator of economic health and social stability. External Debt Stock (ED) represents the total amount a country owes to foreign creditors. Effective management of external debt is essential for maintaining economic stability. Z denotes a vector of other control variables; ε denotes the error term; and $\beta_0 \ldots..\beta_3$ are the parameters to be estimated. Theoretically, we expect all the estimated variables to exert a positive and statistical impact on economic development of Nigeria. All variables are converted into natural log.

Estimation approach

Johansen cointegration test

The study uses the Johansen cointegration test to examine whether there is a long-term equilibrium relationship among the variables. This test entails determining the rank of the *n* by *n* matrix Π in the provided model.

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \Pi Y_{t-k} + \varepsilon_t \quad (2)$$

In the given model, *Yt* represents a column vector of *n* variables, Δ is the difference operator, Γ and Π are matrices of coefficients, k indicates the lag length, and β is a constant. In the absence of a cointegrating vector, the matrix Π becomes singular, indicating that the rank of the cointegrating vector is zero. The Johansen cointegration test employs two likelihood ratio tests: the trace test (λtrace) and the maximum eigenvalue test (λmax), as represented by the equations below:

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln\left(1 - \hat{\lambda}_1\right) \quad (3)$$

$$J_{max} = -Tln(\ln(1 - \widehat{\lambda}_{r+1}) \quad (4)$$

In the given analysis, *r* denotes the quantity of individual series, *T* is the quantity of sample observations, and λ denotes the predicted eigenvalues. The trace test assesses the null hypothesis of *r* cointegrating vectors in comparison to the alternative hypothesis of *n* cointegrating vectors. Conversely, the maximum eigenvalue test (λmax) assesses the null hypothesis of *r* cointegrating vectors compared to the alternative hypothesis of $r+1$ cointegrating vectors. If it is determined that the two series are cointegrated, then a granger causality will be implemented. Accordingly, the Granger causality test is utilized to ascertain the causal direction among the three variables. By implementing a sudden change to the explanatory variable at time $t=0$, indicated by a rise of ε_t by one standard deviation, we may examine the immediate and subsequent impacts of this stimulus on the dependent variables. To determine the extent of Granger causality among the variables outside the observed time period, one might assess the relative importance of a variable in causing its own oscillations.

Results and discussions

According to the data presented in Table 1, the average ratio of debt to GDP in Nigeria during the examined period was 34.90%. Additionally, it is observed that debt servicing accounts for approximately 12.07% of Nigeria's total export earnings.

Table 1 Descriptive statistics of variables. *Source*: Researchers' computation

Variable	Mean	Max	Min	Std-dev
DYR	34.90	120.84	4.08	30.94
DSEX	12.07	38.04	0.49	10.21
ED_SH	47.09	83.63	13.16	25.82
DD_SH	52.91	86.84	16.37	25.82
ED_M	14.73	29.55	5.02	7.95
ED_OFF	85.27	94.98	70.45	7.95
DD_TB	43.30	75.43	20.34	15.43
DD_OTH	56.70	79.66	24.57	15.43
RGDPG	2.44	6.05	−1.62	1.73
INVR	13.41	20.07	5.04	3.60
SAVR	18.00	37.11	8.00	6.30
CONR	75.23	94.65	50.12	9.42
AYR	24.34	38.22	16.25	4.19
IYR	22.75	29.98	16.76	3.70
SYR	52.88	60.42	45.02	4.30
GDPPC	1766.3	2563.9	1324.3	436.7
HDI	0.46	0.53	0.36	0.05
UMR	8.83	19.70	1.80	4.93
CPI	64.04	111.72	35.20	20.16
FDIR	1.69	4.86	0.10	1.15
URBAN	35.44	50.34	21.97	8.30
SER	31.20	56.18	13.67	9.63
OPEN	29.71	58.92	7.36	12.76

Preliminary test

Table 1 reveals that Nigeria experienced an average GDP growth rate of 2.44 percent, indicating a relatively sluggish pace of economic expansion since the 1980s. The maximum growth rate observed during this period was 6.05 percent, highlighting the limited success of the economy over an extended timeframe. On the other hand, the minimum GDP growth rate recorded was 1.62 percent, signifying substantial fluctuations between positive and negative growth rates. Such significant swings are further confirmed by the high standard deviation, which surpasses the mean value. This suggests a considerable level of variability in growth rates throughout the period, with certain periods witnessing significant declines while others showing relatively robust growth. The pronounced variability in the economy's growth rate poses challenges for effective economic management and the implementation of tools to stimulate sustained growth over time. It is likely that the debt dynamics examined in the study have contributed to the unstable growth trajectory experienced by the Nigerian economy. Furthermore, the average investment and savings rates in Nigeria are relatively low, particularly when considering the

substantial investment required to foster economic development and the limited availability of domestic resources to finance such investments. This highlights the pressing need for increased investment and the exploration of alternative financing mechanisms to propel economic growth in Nigeria.

Pair-wise correlation matrix for Nigeria

Table 2 indicates that a positive correlation exists between real GDP growth rate and all the other variables in the study, apart from savings rate and employment, as to be expected. The correlation between savings rate and the other variables is also positive, suggesting that savings rate also moves together with the other variables that show the performance of the economy at any particular period. HDI is negatively correlated with unemployment rate, suggesting that lack of jobs hinders human development in a country. On the other hand, school enrollment has a very strong positive correlation with HDI, indicating that education moves together with human development in the country.

Unit root and cointegration analysis

The variables attained stationarity at first differences. In other words, they are all integrated of order one.

Cointegration test

Empirical analysis

In the preliminary analysis, the stationarity test results presented in Table 3 indicate that all variables are stationary at the first difference, making the data series suitable candidates for cointegration analysis. Subsequently, the cointegration test results in Table 4 confirm the existence of a long-run relationship among the variables, thereby validating the earlier stationarity test and providing a strong rationale for further empirical investigation.

Table 2 Correlation matrix

Variable	RGDPG	INVR	SVR	CONR	AGDP	IGDP	SGDP	GDPPC	HDI	UMR	CPI	FDIR	UBN
INVR	0.07												
	0.71												
SVR	−0.20	0.79											
	0.29	0.00											
CONPC	0.43	0.03	−0.26										
	0.02	0.89	0.17										
AGDP	0.46	0.51	0.21	0.67									
	0.01	0.00	0.28	0.00									
IGDP	0.24	0.03	−0.13	0.92	0.59								
	0.22	0.86	0.52	0.00	0.00								
SGDP	0.38	0.03	−0.19	0.93	0.67	0.93							
	0.04	0.88	0.33	0.00	0.00	0.00							
GDPPC	0.44	0.03	−0.23	0.99	0.66	0.94	0.96						
	0.02	0.86	0.23	0.00	0.00	0.00	0.00						
HDI	0.48	0.15	−0.18	0.97	0.74	0.91	0.94	0.98					
	0.01	0.44	0.35	0.00	0.00	0.00	0.00	0.00					
UMR	−0.23	−0.38	−0.18	−0.07	−.02	0.03	0.12	−0.08	−0.16				
	0.22	0.04	0.35	0.70	0.91	0.89	0.55	0.68	0.41				
CPI	0.36	0.05	−0.14	0.95	0.63	0.96	0.94	0.98	0.95	−0.09			
	0.05	0.80	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.64			
FDIR	0.41	0.12	−0.20	0.83	0.70	0.73	0.79	0.84	0.90	−0.21	0.79		
	0.03	0.54	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00		
UBN	0.46	0.22	−0.08	0.93	0.80	0.91	0.96	0.95	0.97	−0.02	0.92	0.83	
	0.01	0.26	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00	
SER	0.38	0.01	−0.26	0.98	0.60	0.92	0.91	0.98	0.96	−0.18	0.96	0.85	0.89
	0.04	0.96	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00

Table 3 Stationarity test. Source: Author's computation

Variable	ADF	P-P	Remark
ΔDYR	−5.78**	−7.378**	Stationary
ΔDSEX	−6.87**	−6.087**	Stationary
ΔDD_TB	−6.05**	−4.106**	Stationary
ΔDD_OTHER	−5.83**	−4.479**	Stationary
ΔED_MULT	−9.99**	−4.249**	Stationary
ΔED_OFF	−7.67**	−6.087**	Stationary
ΔRGDPG	−6.89**	−4.364**	Stationary
ΔINVR	−5.89**	−4.364**	Stationary
ΔSVR	−7.06**	−3.216**	Stationary
ΔCONR	−3.43**	−4.106**	Stationary
ΔAGDP	−4.97**	−6.173**	Stationary
ΔIGDP	−5.01**	−3.187**	Stationary
ΔSGDP	−5.65**	−4.536**	Stationary
ΔGDPPC	−5.38**	−3.827**	Stationary
ΔHDI	−5.69**	−3.905**	Stationary
ΔUMR	−3.65**	−7.723**	Stationary
ΔCPI	−3.20**	−3.61**	Stationary
ΔFDIR	3.91**	4.28**	Stationary
ΔURBAN	−−4.11**	−4.39**	Stationary
ΔSER	−5.06**	−5.53**	Stationary
ΔCRE	−8.93**	−8.03**	Stationary
ΔOPEN	−6.38**	−6.98**	Stationary
ΔCOR	−3.01**	−3.26**	Stationary
ΔGOVSTAB	−2.99**	−3.18**	Stationary

Public debt on growth and development in Nigeria

In Table 5, the result of the goodness of fit statistics is high for each of the equations, with the lowest value being 0.655, which shows that a very large proportion of the systematic variations in different aggregate demand factors are captured by the explanatory variables. The model for consumption rate has the highest adjusted *R*-squared value, indicating that debt and its components more closely explain consumption rates in Nigeria. In particular, we focus on the coefficient of the variable in the estimates. The coefficients of each of the debt variables (external debt ratio—DYR, debt service ratio—DSEX, and domestic debt ratio—DDEBT) are all negative and significant in the real GDP growth equation (note prob < 0.01 for each of the coefficients) indicating that each coefficient passed the significance test at the 1 percent level. The result therefore shows that both external debt and domestic debt have significant negative impacts on real GDP growth in Nigeria. The coefficient is larger (in absolute terms) for the domestic debt variable, suggesting that domestic debt has the biggest negative impact on economic growth in Nigeria.

The results of the analysis indicate that in the investment rate equation, only the coefficient of domestic debt demonstrated significant results at the 1 percent level. On the other hand, all other debt variables did not pass the significance test at the 5 percent level. This suggests that only domestic debt has a significant negative impact on investment rates in Nigeria. Specifically, a one percent increase in domestic debt leads to a 0.16 percent decrease in the investment rate in the country. This finding can be rationalized by the fact that a significant portion of domestic debts in Nigeria are owed to government contractors, which discourages private sector investment.

In the analysis of the savings rate, both the coefficient of external debt ratio and domestic debt passed the significance test and showed negative effects. This indicates that both domestic and external debts have significant negative impacts on the savings rate in Nigeria. However, in the consumption equation, the coefficient of domestic debt failed the significance test at the 5 percent level, suggesting that domestic debt only has a slight impact on the consumption rate in the country. Conversely, the

Table 4 Test below rejects the null hypothesis of no co-integration. *Source: Authors computations*

Model	Relationship between variables	Hypothesized No. of Co- integrating equations		Nature of equilibrium
		Trace statistics	Max-Eigen value	
1	Real GDP	At most 4	None	Long run
2	Investment rate	At most 4	At most 1	Long run
3	Savings rate	At most 2	None	Long run
4	Consumption rate	At most 3	At most 1	Long run
5	Agric GDP	At most 3	None	Long run
6	Industry GDP	At most 4	At most 1	Long run
7	Services GDP	At most 3	At most 3	Long run
8	Human development index.(HDI)	At most 3	At most 2	Long run
9	Unemployment rate	At most 2	At most 1	Long run
10	Consumer price index	At most 3	None	Long run

Table 5 Public debt ratios and aggregate demand in Nigeria. Source: Author's computations

Variable	Real GDP growth			Investment rate			Savings rate			Consumption rate		
	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob
EXDR	−0.03	−2.68	0.01	0.03	1.57	0.13	−0.10	−2.47	0.02	−0.07	−1.96	0.03
DSEX	−0.04	−3.60	0.00	−0.01	−0.43	0.67	0.01	1.45	0.16	−0.01	−2.40	0.03
DDEBT	−0.09	−2.81	0.01	−0.16	−3.63	0.00	−0.95	−9.26	0.00	0.14	1.75	0.09
RGDP	–	–	–	0.47	2.47	0.02	−0.55	−1.21	0.24	−0.51	−1.42	0.17
FDIR	0.05	2.63	0.01	−0.04	−1.52	0.14	0.02	0.33	0.74	−0.05	−0.95	0.35
OPEN	0.05	1.87	0.07	−0.13	−3.52	0.00	0.22	2.49	0.02	−0.13	−1.92	0.07
SER	0.04	0.72	0.48	0.09	1.12	0.27	0.19	0.97	0.34	−0.11	−0.74	0.47
COR	0.02	0.74	0.46	−0.04	−1.18	0.25	−0.35	−4.26	0.00	0.04	0.59	0.56
GOVSTAB	−0.02	−2.98	0.01	0.03	2.68	0.01	−0.01	−0.62	0.54	0.00	−0.07	0.95
C	9.43	33.15	0.00	−2.19			9.26	2.31	0.03	9.84	3.12	0.00
Adj. R-sq	0.991			0.809			0.655			0.976		
S.E. of reg	0.054			0.287			0.437			0.050		
L-R var	0.001			0.041			0.124			0.001		

coefficients of the external debt ratio and debt servicing were both significant and negative, highlighting the strong detrimental effects of external debt and its servicing on consumption rates. This finding also implies that external debt may contribute to increasing levels of poverty in the country. The results concerning aggregate demand reveal that both domestic and external debts have adverse effects on domestic aggregate demand in Nigeria. The other variables included in the model also yielded notable outcomes. The coefficient of foreign direct investment (FDI) was significant and positive in the real GDP growth equation, indicating that FDI has a favorable impact on economic growth. Additionally, the coefficient of openness was negative in the investment equation but positive in the savings equation, implying that greater openness to trade is associated with reduced investment but increased savings. As for the institutional quality variables, the coefficient of government stability in the real GDP growth model demonstrated that the less stable the Nigerian government is, the lower the economic growth achieved. The coefficient of corruption control was only significant in the savings equation, with a positive coefficient suggesting that reducing corruption can boost the savings rate in Nigeria.

Table 6 Public debt ratios and sectoral performance in Nigeria. Source: Author's computations

Variable	Agric GDP			Industry GDP			Services GDP		
	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob
EXDR	−0.01	−0.57	0.57	0.05	4.77	0.00	−0.06	−5.18	0.00
DSEX	0.00	0.09	0.93	−0.01	−0.99	0.33	−0.01	−0.83	0.41
DDEBT	−0.17	−3.95	0.00	−0.03	−1.48	0.15	0.10	4.88	0.00
RGDP	0.84	4.27	0.00	1.15	11.18	0.00	0.59	5.77	0.00
URBAN	–	–	–	–	–	–	1.53	2.34	0.03
FDIR	0.00	−0.01	0.99	−0.04	−2.84	0.01	0.01	0.57	0.57
OPEN	−0.05	−1.21	0.24	0.07	3.43	0.00	−0.03	−2.09	0.05
SER	−0.04	−0.45	0.66	−0.09	−1.99	0.06	0.11	2.84	0.01
COR	−0.06	−1.61	0.12	−0.02	−0.83	0.42	−0.02	−0.89	0.38
GOVSTAB	−0.03	−2.73	0.01	0.00	0.11	0.91	0.00	0.99	0.33
C	0.46	0.27	0.79	−1.99	−2.19	0.04	−2.57	−1.60	0.12
Adj. R-sq	0.99			0.98			0.99		
S.E. of reg	0.06			0.04			0.03		
L-R var	0.00			0.00			0.00		

In Table 6, results of the equations for the three sectors of the Nigerian economy are presented. It can be noted that the goodness of fit statistics for the estimates are very high and have improved over the initial aggregate demand estimate. The adjusted *R*-squared value for the results is very high, with up to 98 percent of the systematic variations in sectoral shares of GDP explained by each of the results. The long-run variance coefficients for each of the equations are also low, implying that the model was well specified.

A close examination of the individual contribution of each of the explanatory variables reveals that the coefficients of the debt components are only significant for domestic debt in the agricultural sector equation. This indicates that the effects of the debts on the agricultural sector performance in Nigeria only come through rising domestic debt. In this direction, domestic debt tends to lead to lesser performance of the agricultural sector in Nigeria.

External debt and its servicing conditions do not play significant roles in explaining agricultural sector performance. For the industry equation, only the coefficient of external debt passed the significance test at the 1 percent level and it is positive. This shows that external debt accumulation is good for industrial sector growth in Nigeria. Every one percent rise in external debt is shown to lead a 0.05 percent increase in industrial sector growth. There is a mixed effect for the services sector. While external debt has significant negative impact, domestic debt has significant positive impact. This implies that while external debt burden leads to decline in services sector performance in Nigeria, domestic debt accumulation actually boosts the sector.

The results also show the impact of other variables on sectoral performance. It can be seen that real GDP had significant positive impacts on each of the sectors, suggesting that economic growth leads to general improvements in all the sectors in the country; industrial sector is shown to realize the biggest impact. Urban population rate has significant positive impact on services sector growth, while FDI only tends to reduce industrial sector performance in Nigeria. Secondary school enrollment appears to be only relevant for the services sector equation where it is positive and significant. This shows that human capital development is needed for boosting services sector performance in Nigeria.

In Table 7, the results for debt effects on development outcomes and indicators for Nigeria are presented. The *R*-squared values for each of the equations are high, suggesting efficiency in the estimation of the equations. The coefficient of external debt ratio passed the significance test at the one percent level for the GDP per capita and HDI equations. The coefficient is, however, positive in the GDP per capita equation, but negative in the HDI equation. This indicates that foreign debt tends to promote per capita income but is also tends to reduce the quality of life (through falling HDI) in Nigeria. The coefficient of domestic debt passed the significance test for the HDI, unemployment, and CPI equations. Given the signs of the coefficients, the result shows that domestic debt leads to a fall in HDI and unemployment in the country, while it also leads to rise in price level. Essentially therefore, both external and domestic debts are shown

Table 7 Public debt ratios and development indicators in Nigeria. Source: Author's computations

Variable	GDP per capita			HDI			Unemployment rate			CPI		
	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob
EXDR	0.02	4.06	0.00	−0.01	−3.21	0.01	0.03	0.48	0.64	−0.03	−0.64	0.53
DSEX	0.00	2.29	0.03	−0.01	−2.48	0.02	0.02	3.82	0.00	−0.01	−2.21	0.04
DDEBT	0.01	0.59	0.56	−0.02	−2.26	0.04	−1.27	−11.2	0.00	0.77	8.74	0.00
RGDP	1.30	30.37	0.00	−0.10	−1.66	0.12	−1.84	−3.10	0.00	−1.06	−2.30	0.03
URBAN	−0.95	−3.48	0.00	−0.05	−0.07	0.95	−1.19	−4.54	0.00	1.08	3.09	0.00
FDIR	−0.01	−1.62	0.12	0.00	−0.40	0.70	0.24	3.23	0.00	0.01	0.23	0.82
OPEN	0.01	1.33	0.19	−0.01	−2.40	0.03	−0.18	−1.91	0.07	0.18	2.36	0.03
SER	−0.12	−7.37	0.00	0.03	1.67	0.11	0.17	0.76	0.45	−0.06	−0.36	0.72
COR	−0.01	−1.53	0.14	0.00	0.68	0.51	−0.68	−6.31	0.00	0.12	1.45	0.16
GOVSTAB	0.00	0.07	0.94	−0.01	−6.83	0.00	0.04	1.71	0.10	0.05	2.76	0.01
C	−1.72	−2.55	0.02	−0.04	−0.02	0.98	74.66	8.03	0.00	−16.08	−2.22	0.04
Adj. R-sq	0.99			0.99			0.88			0.79		
S.E. of reg	0.02			0.01			0.22			0.14		
L-R var	0.00			0.00			0.01			0.01		

to lead to lower quality of life and worsening economic conditions in Nigeria. In the same vein, debt service coefficients are significant in the HDI, unemployment and CPI equations. The result shows that debt servicing significantly reduces HDI and stimulates unemployment in Nigeria, although the aggregate price level appears to fall with rising debt servicing obligations.

In the result in Table 7, it is also seen that real GDP growth does not have significant impact on HDI for Nigeria, even though growth leads to rise in income per capita and fall in both unemployment and price levels. This result suggests that the pattern of growth in Nigeria's economy (as well as the strength of the growth rates) has not been able to lead to better quality of life in the country. Both secondary school enrollment and urban rate, however, lead to drop in income per capita, while they also both lead to fall in unemployment rates in Nigeria. The institutional quality variables have rather weak effects on development indicators in Nigeria in the long run. For the other variables in the model, the result shows that economic growth had significant positive impacts on per capita income and on HDI, suggesting that, unlike in Nigeria, economic growth in Ghana actually boosts quality of life for citizens in the country. Urban rates also tend to boost only HDI and reduce unemployment, but it weakens per capita income and stimulates the price level in the country.

Robustness checks for estimates

Disaggregated debt analysis

In order to provide a robust analysis in this study, the results for the disaggregated debt estimates are also reported and analyzed. In Table 7, the result indicates that the adjusted R-squared values are high except for the consumption equation. In the result, the coefficients of the debt components are not quite significant in the real GDP growth equation, except the coefficients of official external debt (with a negative coefficient) and debt service (with surprising positive sign). This shows that it is the official debt component of the external debt that brings down economic growth in Nigeria.

Both multilateral external debt and debt servicing are significant in the investment model. Surprisingly, the coefficient of debt service is positive, suggesting that the more the debt servicing is paid, the higher will be the investment rate in Nigeria. Perhaps, more debt service tends to spur more foreign investment into Nigeria. It is clear in the savings equation that it is the external debt components that exert significant negative impact on savings rate. However, there is a mixed outcome for the savings equation. Multilateral debt has significant negative impact on savings, while official external debt tends to boost savings rate. This outcome can be linked to the pattern of the debt structure where official debt accumulation is more related to more citizens-based activities in the country. Debt servicing has significant negative impacts on both GDP per capita and consumption rate, but positive impacts on investment and savings rate. This shows that the effects of debt servicing appear to be mixed for the aggregate demand variables in Nigeria.

The results for the other variables show that urban rate has significant positive impacts on real GDP growth, investment rate, and savings rate, but not consumption rate. FDI also has significant positive impacts on both investment and savings rate for Nigeria. The effects of trade openness, however, show that trade openness has significant negative impact on consumption rate in Nigeria. The institutional quality variables indicate that corruption has significant negative impacts on real GDP and both investment and savings rates. On the other hand, government stability is seen to be debilitating to real GDP growth, but it tends to improve investment rate in the country.

In Table 8, the result for the disaggregated debt effects on sectoral shares of GDP indicates that treasury bill sources of domestic debt have significant negative impact on both agricultural and industrial sectors, but a positive impact on services sector. Apart from domestic debt from treasury bills, none of the debt components had any negative effect on the industrial sector. The two external debt components have significant negative impacts on agricultural sector in Nigeria, with that of official sources having the greatest negative impact.

More importantly, the debt from official sources has significant negative impact on GDP per capita and HDI, suggesting that debt from official sources has more deleterious effects on economic development in Nigeria than debt from multilateral sources. Domestic debt from treasury bills have significant positive impact on GDP per capita and unemployment rate, which shows that this dimension of domestic debt tends to improve economic development in Nigeria. Apart from HDI, debt service does not appear to significantly affect any of the development indicators for Nigeria.

Analysis of the threshold estimation

In Table 9, the coefficients of the included lagged real GDP growth variables are highly significant in each of the threshold estimates, with increasing values as the threshold value increases. The coefficient has the expected positive sign which suggests a very high level of persistence in disequilibrium in the system. Apparently, with external debt, long-term growth prospects are difficult to achieve, given any initial level of disequilibrium. The coefficient of trade openness did not perform too well. This means that

Table 8 Disaggregated public debt and aggregate demand in Nigeria. Source: Author's computations

	Real GDP growth			Investment rate			Savings rate			Consumption rate		
Variable	**Coeff**	***t*-stat**	**Prob**	**Coeff**	***t*-stat**	**Prob**	**Coeff**	***t*-stat**	**Prob**	**Coeff**	***t*-stat**	**Prob**
ED_M	0.01	0.71	0.48	−0.07	−2.71	0.01	−0.41	−8.28	0.00	−0.06	−1.95	0.06
ED_OFF	−0.10	−4.57	0.00	0.06	1.78	0.09	0.34	5.62	0.00	0.01	0.38	0.71
DD_TB	0.08	1.12	0.28	0.12	1.23	0.23	−0.11	−0.62	0.54	−0.33	−2.95	0.01
DD_O	0.04	0.46	0.65	0.15	1.30	0.21	−0.04	−0.20	0.84	−0.61	−4.42	0.00
DSEX	−0.01	−3.08	0.01	0.01	2.62	0.02	0.01	2.10	0.05	−0.01	−2.08	0.05
RGDP	–	–	–	−0.95	−4.86	0.00	−0.56	−1.60	0.12	−0.23	−1.02	0.32
URBAN	4.13	14.50	0.00	3.26	3.91	0.00	7.93	5.27	0.00	−0.91	−0.92	0.37
FDI	−0.03	−1.54	0.14	0.12	4.87	0.00	0.11	2.41	0.02	0.00	−0.15	0.88
OPEN	0.06	2.02	0.05	0.03	0.72	0.48	0.30	4.02	0.00	−0.16	−3.31	0.00
SER	−0.12	−1.67	0.11	0.31	3.14	0.00	0.14	0.80	0.43	−0.24	−2.11	0.05
CORR	−0.10	−3.30	0.00	−0.22	−5.16	0.00	−0.59	−7.51	0.00	0.07	1.46	0.16
GOVSTAB	−0.04	−5.70	0.00	0.03	2.87	0.01	0.03	1.32	0.20	0.02	1.41	0.17
C	−2.18	−2.94	0.01	−0.55	−0.52	0.61	−17.59	−9.16	0.00	8.90	7.05	0.00
Adj R-sq	0.99			0.79			0.80			0.40		
S.E. of reg	0.05			0.12			0.15			0.10		
L-R var	0.00			0.00			0.01			0.00		

Table 9 Disaggregated public debt and sectoral performance in Nigeria. Source: Author's computations

	Agriculture GDP			Industry GDP			Services GDP		
Variable	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob	Coeff	*t*-stat	Prob
DD_TB	0.13	−8.70	0.00	−0.04	−3.54	0.00	0.05	8.09	0.00
DD_O	0.13	7.45	0.00	0.08	5.58	0.00	−0.09	−12.03	0.00
ED_M	−0.21	−4.07	0.00	0.19	4.60	0.00	−0.03	−1.60	0.12
ED_OFF	−0.28	−4.47	0.00	0.22	4.45	0.00	−0.04	−1.47	0.16
DSEX	0.00	0.73	0.48	0.00	3.80	0.00	0.00	−4.47	0.00
RGDP	0.88	8.28	0.00	0.93	10.90	0.00	0.72	16.69	0.00
URBAN	1.19	2.60	0.02	−1.67	−4.61	0.00	1.23	6.72	0.00
FDI	0.06	4.59	0.00	0.02	1.93	0.07	−0.02	−4.66	0.00
OPEN	−0.04	−1.96	0.06	0.12	6.68	0.00	−0.04	−4.84	0.00
SER	−0.05	−0.90	0.38	0.00	0.04	0.97	0.11	5.07	0.00
CORR	−0.07	−3.09	0.01	0.03	1.85	0.08	−0.05	−5.38	0.00
GOVSTAB	0.00	0.07	0.95	0.01	1.39	0.18	0.00	−1.75	0.09
C	−5.11	−8.77	0.00	4.62	9.96	0.00	−2.42	−10.34	0.00
Adj. R-sq	0.99			0.97			1.00		
S.E. of reg	0.05			0.04			0.02		
L-R	0.00			0.00			0.00		

rising price levels actually reduces economic growth in Nigeria.

The variable of interest in the analysis is that of the threshold slope dummy which shows how different debt ratios affect economic growth in both countries. For the Nigerian case, threshold values less than or equal 40 percent have coefficient of the slope dummy with positive and significant signs. The same goes for the threshold value of less than, or equal to 50 percent. At the debt ratio threshold of less than or equal to 60 percent however, the sign of the coefficient of the slope dummy changed to negative and remained so thereafter. This shows that at external debt-to-GDP ratios between 50 and 60 percent, the impact of external debt on economic growth switches from positive to negative. Thus, the estimated external debt threshold value for economic growth is 60 percent

of GDP. At debt ratios greater than this level, external debt begins to exert negative impacts on growth, whereas at levels below this range, external debt actually delivers positive effects on growth.

Threshold relationships with domestic debts

The results for the threshold estimates using domestic debts are presented in Table 10. It should be noted that the coefficients of the lagged real GDP growth variable in the domestic debt equation are smaller than that of the external debt equation. This reveals the fact that domestic debt provides better long-term stabilizing conditions than external debt. Both trade openness and inflation are significant too, in the estimates for the threshold levels in Nigeria.

It is worthy to note that there are switching values for the domestic debt–growth nexus, where domestic debt promotes growth at certain levels but becomes inimical to further growth after a certain level. In the estimations for Nigeria, the slope coefficient changed from positive to negative between domestic debt-to-GDP ratios of 15 percent and 17 percent. Apparently, this is the threshold range, where further increase that forces the ratio beyond 17 percent of GDP will make domestic debt become growth reducing. Given the size and nature of the debt structures, it is obvious that the threshold for domestic debt should be less than that of external debt in Nigeria.

Granger causality tests

Table 11 indicates that causality flows both ways between the investment rate and debt ratio in Nigeria. Specifically, the investment rate influences the debt ratio, and the debt ratio impacts the investment rate, demonstrating a bidirectional relationship. To investigate this further, the study introduced lagged variables into the model, using past values of the predictor (public debt) to assess their impact on the current economic growth of Nigeria.

It could also be seen that causality runs only from savings rate-to-debt ratio and not the other way around. Causality is also seen to be bidirectional between real GDP and debt servicing in Nigeria, implying that while real GDP responds to debt servicing burden in the country, debt servicing also responds to real GDP at any particular level. In the same vein, the result shows that investment Granger causes debt servicing, but debt servicing does not Granger cause investment rate. The result therefore suggests that causality is more pronounced between debt and economic performance, real GDP, and investments rate (Table 12).

Discussion of results

The findings of this study have wide-ranging implications. Firstly, it is evident from the research that external debt can have stronger negative impacts on the economy through its effects on investment and savings. This implies that loans obtained should be utilized in a manner that increases the productive capacity of the economy, facilitating easy repayment and promoting economic development. Furthermore, investments financed

Table 10 Threshold estimation for external debt. Source: Author's computations

tVariable	≤ 40%	≤ 50%	≤ 60%	≤ 80%
constant	0.21	0.15	0.064	0.05
$rgdp_{t-1}$	1.0**	1.01**	1.01**	1.01**
trade openness	0.03	0.02	0.03*	0.03
inflation	−0.07**	−0.07**	−0.06**	−0.06**
external debt ratio	−0.03*	−0.02*	0.06	0.01
threshold effect	0.02*	0.02*	−0.01	−0.01*
adjusted *r*-squared	0.99	0.995	0.994	0.99

Table 11 Threshold estimation for domestic debt. Source: Author's computations

Variable	≤ 10%	≤ 15%	≤ 17%	≤ 20%
constant	0.378	0.337	0.290	0.309
$rgdp_{t-1}$	0.992**	0.989**	0.990*	0.990**
trade openness	0.040**	0.039**	0.043**	0.041**
inflation	−0.049**	−0.047**	−0.052**	−0.047**
domestic debt ratio	−0.078*	−0.037	−0.019	−0.030*
threshold effect	0.014*	0.008	−0.008	−0.007*
adj r-sq	0.99	0.98	0.96	0.99

* is significant at 10%, ** is significant at 5%, *** is significant at 1%

Table 12 Causality test results. Source: Author's computation

Null hypothesis	*F*-stat	Prob
DSEX does not Granger cause EXDR	1.61	0.25
EXDR does not Granger cause DSEX	1.35	0.27
RGDP does not Granger cause EXDR	3.67	0.04
EXDR does not Granger cause RGDP	0.48	0.63
INVR does not Granger cause EXDR	4.36	0.02
EXDR does not Granger cause DSEX	3.39	0.05
SVR does not Granger cause EXDR	3.81	0.03
EXDR does not Granger cause SVR	0.38	0.69
RGDP does not Granger cause DSEX	4.96	0.01
DSEX does not Granger cause RGDP	3.20	0.05
INVR does not Granger cause DSEX	3.83	0.03
DSEX does not Granger cause INVR	0.58	0.57
SVR does not Granger cause DSEX	1.89	0.17
DSEX does not Granger cause SVR	0.54	0.59

by foreign borrowing should generate a real economic rate of return that is at least equal to the interest rate. Similarly, debt repayments should be scheduled in a way that aligns with the benefits received. These findings align with previous research conducted by Adegboye and Arodoye [32].

The study also observed that both external and domestic debts have significant negative impacts on real GDP growth. Similar results were found by Iyoha [33] who demonstrated the depressive effects of debt on the economy. These effects were attributed to the debt overhang phenomenon, which limits investment in debt-ridden economies. Specifically, the study revealed that the coefficient for the domestic debt variable is larger (in absolute terms) than that of the external debt variable. This suggests that domestic debt has a greater negative impact on economic growth in Nigeria. This finding is concerning because it indicates that domestic sources of debt instruments have a more detrimental effect on the economy in the short run. The terms and structure of debt likely play a significant role in this outcome. Favorable debt terms and a manageable debt quantum can mitigate the negative impact on the economy, as noted in Adegboye and Arodoye [32]. There are also indications that domestic debts reach the turning point more quickly than external debt. This can be observed by comparing the effects of default on the economy for domestic and external debts. Therefore, there is a need to exercise caution in accumulating domestic debt to avoid reaching detrimental levels. However, it is worth noting that the domestic component of sovereign debt has received less attention in terms of management in Nigeria over the years. This finding aligns with the earlier works of Adegboye and Arodoye [32].

The study's results also revealed that only domestic debt had a significant negative impact on investment rates, with a one percent increase in domestic debt leading to a 0.16 percent decrease in the investment rate in Nigeria. One explanation for this finding is that a significant portion of domestic debts in Nigeria are owed to government contractors, which discourages private sector investment in the country. Furthermore, the results indicated that external debt and debt servicing both have significant and negative effects on consumption. This suggests that external debt and its servicing have strong debilitating effects on consumption rates in a developing economy like Nigeria. Similar findings were observed in the studies conducted by Sami and Mbah [34]. These results imply that external debt may contribute to rising poverty levels in the country. While the burden of external debt leads to a decline in the performance of the services sector in Nigeria, domestic debt accumulation actually boosts the sector. Thus, as noted by Adegboye [32] external loans have the potential to enhance foreign investment and the overall investment climate in a developing economy.

The study provides clear evidence that external debt limits human development in developing countries, even though it appears to have relatively positive effects on per capita income. Therefore, while external debt tends to promote per capita income, its impact on the quality of life (as measured by the Human Development Index) is undesirable. The pressure of external debt seems to be more fully realized in the long run. Conversely, domestic debt has more short-term effects on the economy, as also demonstrated by Festus and Saibu [35]. The results show that the coefficient of domestic debt passed the significance test for the Human Development Index (HDI), unemployment, and Consumer Price Index (CPI) equations. Based on the signs of the coefficients, the findings indicate that domestic debt leads to a decrease in HDI and unemployment in the country, while it also contributes to an increase in the price level. Essentially, public debt and its servicing obligations result in a lower quality of life among developing countries.

Summary and conclusion

In this study, the researchers delved into the impacts of public debt on various aspects of Nigeria's economy using 41 annual observations from 1981 to 2022. The study utilizes secondary sources to obtain data, including annual public debt series (comprising external and domestic debts) and gross domestic product (GDP) series as a proxy for economic growth. The main variables analyzed in this study are the public debt series (divided into domestic debt and external debt) and the GDP series, with GDP serving as the dependent variable and public debt as the independent variables. The findings shed light on several key points that contribute to our understanding of the relationship between debt and economic development in the country. The findings are as thus: Firstly, the study revealed that both external and domestic debt have a significant negative impact on the growth rate of real GDP in Nigeria. This implies that public debt, regardless of its origin, tends to depress economic growth. The researchers emphasized the importance of managing debt levels effectively to mitigate these adverse effects. Furthermore, the researchers uncovered a noteworthy relationship between external debt and aggregate demand in Nigeria. They found that debt exerts a negative influence on investment, savings, and consumption, indicating that it hampers overall economic activity. These findings highlight the need for careful consideration of the implications of debt on the country's demand dynamics. Another significant discovery was the impact of public debt on the sectoral

composition of output in Nigeria. The study revealed that debts have a dual effect, improving the industrial sector while depressing agriculture and services. This suggests that the allocation of resources and investment patterns are influenced by the presence of debt, leading to a restructuring of the economy's sectoral composition. The researchers emphasized the pivotal role of public debt in economic development in Nigeria. The findings underscored that debt has broader implications beyond its immediate impact on GDP growth. It serves as a crucial factor shaping the trajectory of economic development in the country. Interestingly, the study found that domestic debt has a more positive impact on economic growth in Nigeria compared to external debt. This outcome indicates that debts originating within the country have a greater potential for driving economic progress. The researchers highlighted the significance of understanding the differential effects of domestic and foreign debts in order to formulate effective debt management strategies. Moreover, the study unveiled a strong and significant difference between the effects of domestic debt and foreign debt on economic growth and development in Nigeria. This implies that the source of debt matters in influencing economic outcomes. The researchers emphasized the importance of considering the unique dynamics associated with different types of debt in order to make informed policy decisions. The researchers also discovered a significant threshold relationship between debt accumulation and economic growth in Nigeria. They identified specific thresholds, such as 50–60 percent for Nigeria, at which debt accumulation begins to have a more pronounced impact on economic growth. These findings underscore the need for prudent debt management practices to avoid crossing critical thresholds that may hinder economic progress. Contrary to some expectations, the study found that public debt in Nigeria does not significantly affect economic growth and development. This suggests that other factors, such as governance, institutional quality, and economic policies, may have a more dominant influence on these outcomes. The findings call for a holistic approach in understanding the complex interplay of various factors that shape economic growth and development. Lastly, the researchers revealed that the source of debt, whether domestic or external, does not necessarily matter in terms of how debt affects economic growth and development in Nigeria. This finding suggests that the impact of debt is more contingent on other factors and dynamics within the economy. It highlights the need for comprehensive analyses that consider a wide range of factors beyond debt origin alone.

Limitations

This study provides valuable insights into the relationship between public debt and economic growth in Nigeria, but several limitations need to be acknowledged. Data availability and quality issues, particularly regarding state government fiscal operations and debt figures, restricted the scope and accuracy of the analysis. The sectoral impact analysis, while significant, lacked nuance due to broad categorization and data constraints. Identified debt-to-GDP thresholds may not be universally applicable or consistent over time, limiting generalizability. The study did not extensively account for external economic shocks or global financial conditions, which are crucial for understanding debt sustainability. The reliance on historical data may not fully reflect future trends, and practical challenges in policy implementation were not fully addressed. Further granularity in disaggregating debt sources and including more comprehensive economic development metrics could provide deeper insights. Addressing these limitations in future research will enhance the understanding of public debt's impact on Nigeria's economic growth.

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Author contributions
UCA wrote the theoretical literature, constructing an idea or hypothesis for research and/or manuscript, planning methodology to reach the conclusion. ISK collected the data, wrote the empirical literature, funding: providing personnel, environmental and financial support and tools and instruments that are vital for the project. CHA involved in supervision and proofreading of the manuscript, editing, funding: providing personnel, environmental and financial support. KIO conceived and designed the analysis, collected the data, performed analysis, organizing and supervising the course of the project or the article and taking the responsibility. All authors have read and approved the final manuscript.

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