



Debt Servicing and Its Implications for Public Investment: Evidence from the Nigerian Economy

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ABSTRACT

This study investigates the implications of debt servicing on public investment in Nigeria over the period 1990–2020, employing the Autoregressive Distributed Lag (ARDL) bounds testing approach given the mixed order of integration among variables. Using annual time-series data on gross domestic product (GDP), exchange rate, inflation rate, internal debt service, London Club debt service, and Paris Club debt service, the analysis reveals a significant long-run cointegrating relationship among these variables. The error correction mechanism (ECM) confirms a short-run adjustment toward equilibrium at a rate of 1.6 percent per period. Empirical findings indicate that internal debt service and London Club debt service exert a significant positive effect on GDP growth, while exchange rate depreciation exerts a significant negative impact. The R-squared value of 0.999 confirms the strong explanatory power of the model. Diagnostic tests confirm the robustness of the estimates, with no evidence of serial correlation, heteroscedasticity, or model misspecification. These findings suggest that, when managed prudently, debt service obligations can support rather than impede economic growth. The study recommends the adoption of a strategic debt management framework that prioritizes productive investment, exchange rate stabilization, and transparent fiscal governance.

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1. INTRODUCTION

Access to public and private capital is a fundamental prerequisite for economic development. In emerging and developing economies, where domestic revenue bases remain constrained and financial markets are underdeveloped, governments frequently resort to both internal and external borrowing to bridge fiscal deficits and finance critical infrastructure, social services, and productive investments (Adepoju, Salawu, & Obayelu, 2007). Nigeria, Africa's largest economy by GDP, exemplifies this pattern: successive administrations have accumulated substantial debt obligations from multilateral institutions, bilateral creditors, and domestic capital markets, ostensibly to catalyse growth. However,

the burden of servicing these obligations has increasingly consumed a disproportionate share of government revenues, raising fundamental questions about the net effect of debt on public investment and broader economic performance.

The debt-growth nexus has attracted considerable scholarly attention globally. While the seminal work of Reinhart and Rogoff (2010) posited a nonlinear threshold effect — beyond which debt becomes inimical to growth — subsequent research has yielded heterogeneous findings depending on institutional quality, the composition of debt, and the efficiency of public spending. For Nigeria specifically, the dynamic is complicated by structural vulnerabilities including oil revenue dependence, exchange rate volatility, inflationary pressures, and governance deficits, all of which interact with debt servicing obligations to shape public investment outcomes.

Between 1990 and 2020, Nigeria's total debt stock grew substantially, with debt service payments consuming an increasing proportion of federal revenues. According to the Debt Management Office (DMO) of Nigeria, debt service-to-revenue ratios have at times exceeded 80 percent, leaving limited fiscal space for capital expenditure. This crowding-out dynamic is particularly consequential given Nigeria's acute infrastructure deficit, estimated at over \$3 trillion by the African Development Bank, and the imperative of the Sustainable Development Goals (SDGs). Yet, the empirical evidence on whether debt servicing has, on net, enhanced or impaired public investment and economic growth in the Nigerian context remains inconclusive.

This study addresses three interrelated research questions: (1) What is the long-run relationship between debt servicing and economic growth in Nigeria? (2) Does debt service exert a statistically significant positive or negative effect on GDP? (3) How do different categories of debt service — internal, London Club, and Paris Club — differ in their impact on economic growth? By employing the ARDL bounds testing methodology, which accommodates mixed orders of integration, and subjecting results to rigorous diagnostic testing, this study contributes a robust empirical assessment of the debt-investment-growth interface in Nigeria. The findings carry direct policy relevance for the Debt Management Office, the Federal Ministry of Finance, and international development partners engaged with Nigeria's debt restructuring agenda.

The remainder of the paper is organised as follows: Section 2 reviews the relevant theoretical and empirical literature. Section 3 describes the data and econometric methodology. Section 4 presents and discusses empirical results. Section 5 concludes with policy recommendations.

2. THEORETICAL AND EMPIRICAL LITERATURE REVIEW

2.1 Theoretical Framework

Three theoretical traditions provide the conceptual scaffolding for this study.

The Dependency Theory (Cardoso & Faletto, 1979) posits that the structural integration of peripheral economies into global financial systems perpetuates underdevelopment by transferring resources from debtor to creditor nations. From this perspective, external debt servicing represents a net outflow of domestic savings that could otherwise finance productive investment, thereby reinforcing structural dependence. While the theory has been critiqued for its determinism and neglect of heterogeneity among developing countries, it remains analytically useful for understanding why external debt obligations can be particularly damaging in resource-dependent economies such as Nigeria, where revenue volatility amplifies debt distress risks.

The Neoclassical Growth Theory (Solow, 1956; Butt, 2009) offers a more conditional assessment. It holds that borrowed funds can accelerate economic growth when deployed in productive investments that generate returns exceeding the cost of debt. Under this framework, the critical variable is not the level of debt per se, but the efficiency of capital allocation. The transmission mechanism connecting debt to growth operates through investment: when debt servicing obligations absorb resources that

would otherwise finance capital formation, the growth dividend of borrowing turns negative. The concept of ‘debt overhang’ (Krugman, 1988; Sachs, 1989) formalises this insight, demonstrating that when expected debt repayments exceed future national income, anticipated transfers to creditors discourage new investment by both domestic and foreign actors.

Keynesian Theory (Keynes, 1936; Choong et al., 2010) provides the most sanguine account of public borrowing. By arguing that government expenditure financed through debt can mobilise idle resources and stimulate aggregate demand through multiplier effects, Keynes established the theoretical basis for countercyclical fiscal policy. However, this perspective simultaneously acknowledges that debt can impose an implicit intergenerational tax by crowding out private capital and reducing the long-run income stream available to future generations. The fiscal multiplier associated with public borrowing therefore depends critically on the phase of the business cycle, the marginal propensity to consume, and the degree of Ricardian equivalence operative in the economy.

2.2 Empirical Evidence

Empirical studies on the debt-growth nexus in sub-Saharan Africa and Nigeria in particular have yielded mixed conclusions, reflecting variation in methodological approaches, time horizons, and country-specific contexts.

At the global level, Reinhart and Rogoff (2010) identified a threshold effect at a public debt-to-GDP ratio of 90 percent, beyond which growth declines sharply, though this finding was subsequently disputed on methodological grounds by Herndon, Ash, and Pollin (2014). Pattillo, Poirson, and Ricci (2002), using a large cross-country panel, found a non-linear relationship in which moderate debt enhances growth but high debt retards it, with the turning point occurring at debt-to-GDP ratios of 35–40 percent. These macro-level patterns provide important context for the Nigerian case.

Within the African context, Abdelmawla and Mohammed (2015) examined Sudan over 1978–2001 and documented significant negative effects of external debt and inflation on growth, alongside a positive contribution from export earnings. Ayadi and Ayadi (2018) applied a neoclassical growth model to Nigeria and South Africa, finding a positive contribution of debt servicing to growth up to a threshold, beyond which marginal contributions turn negative in Nigeria. Villanueva et al. (2016) employed goal-seek optimisation within a neoclassical framework for the Philippines, demonstrating that rising interest rate spreads associated with higher debt-to-GDP ratios erode long-run welfare.

For Nigeria specifically, Adesola (2019) applied Ordinary Least Squares (OLS) to data spanning 1981–2004 and found that external debt service payments to foreign creditors had a positive impact on sustainable economic growth, interpreting this as evidence that debt servicing facilitates continued access to international capital markets. Adepoju et al. (2017), analysing bilateral and multilateral arrangements over 1962–2006, similarly concluded that effective debt service management exerts a positive impact on Nigerian economic growth. These findings contrast sharply with earlier work by Iyoha (1996), Were (2001), Karogol (2002), and Ogunmuyiwa (2011), all of whom documented significant negative effects of external debt and debt servicing on growth in developing country contexts.

More recently, Mohammed et al. (2023) found a significant positive relationship between domestic debt stock and public investment using time-series data from 1985 to 2021, suggesting that domestic borrowing, unlike its external counterpart, may complement rather than crowd out public capital expenditure. Conversely, Abubakar and Mamman (2021), employing both linear and non-linear ARDL models, documented a significant negative effect of public debt on private investment, highlighting the crowding-out channel through which high debt service obligations can suppress private sector dynamism.

Synthesising this literature, three observations stand out. First, the direction of the debt-growth relationship is context-sensitive, varying with debt composition, institutional quality, and the stage of economic development. Second, there is an important distinction between the effects of domestic and external debt servicing on investment and growth. Third, most existing Nigerian studies rely on single-equation OLS estimation, which may suffer from endogeneity and non-stationarity biases. This study addresses these gaps by employing the ARDL bounds testing approach, which explicitly accounts for mixed integration orders, and by disaggregating debt service into its constituent components.

3. DATA AND METHODOLOGY

3.1 Data Sources and Variable Description

This study employs annual time-series data for Nigeria spanning the period 1990–2020, yielding 30 observations. The dependent variable is the natural logarithm of real Gross Domestic Product (LOG(GDP)), sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Bank World Development Indicators. The explanatory variables comprise: the natural logarithm of the Exchange Rate (LOG(EXR)), measured as the naira-per-US-dollar official rate; the natural logarithm of the Inflation Rate (LOG(INFR)), measured by the consumer price index annual change; the natural logarithm of Internal (Domestic) Debt Service (LOG(IDS)); the natural logarithm of London Club Debt Service (LOG(LCD)); and the natural logarithm of Paris Club Debt Service (LOG(PCD)). The latter three are sourced from the Debt Management Office (DMO) of Nigeria. All variables are transformed to natural logarithms to reduce heteroscedasticity and facilitate elasticity interpretation.

3.2 Econometric Strategy

The study proceeds in four stages. First, stationarity is assessed using the Augmented Dickey-Fuller (ADF) unit root test. Given that the ADF test has well-documented size distortions in small samples, results are cross-validated using the Phillips-Perron (PP) test. Second, given the detection of a mixed integration order (I(0) and I(1) variables), the ARDL bounds testing procedure of Pesaran, Shin, and Smith (2001) is employed to test for long-run cointegration. This approach is robust to mixed integration orders and is more appropriate for small samples than the Johansen (1991) multivariate cointegration framework. Third, conditional on evidence of cointegration, an ARDL Error Correction Model (ARDL-ECM) is estimated to recover both long-run elasticities and short-run dynamics. The speed of adjustment toward long-run equilibrium is captured by the coefficient on the lagged error correction term (ECT(-1)), which must be negative and statistically significant to confirm cointegration. Fourth, a battery of diagnostic tests is performed, including the Breusch-Godfrey LM test for serial correlation, the ARCH test for conditional heteroscedasticity, the Jarque-Bera test for residual normality, and the Ramsey RESET test for functional form misspecification.

The long-run model is specified as follows:

$$LOG(GDP)_t = \alpha_0 + \beta_1 LOG(EXR)_t + \beta_2 LOG(INFR)_t + \beta_3 LOG(IDS)_t + \beta_4 LOG(LCD)_t + \beta_5 LOG(PCD)_t + \varepsilon_t$$

Where α_0 is the intercept, β_1 – β_5 are long-run elasticity coefficients, and ε_t is a white-noise error term. A priori, we expect $\beta_1 < 0$ (exchange rate depreciation reduces growth), $\beta_3 > 0$ and $\beta_4 > 0$ (efficient debt servicing enhances growth), and β_5 to be indeterminate given mixed prior findings on Paris Club outcomes.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for all variables in logarithmic form. The mean values suggest that GDP (12.85) is the largest variable by magnitude, while inflation (8.53) is the smallest. The standard deviation indicates that GDP exhibits the highest volatility (2.54), consistent with Nigeria's well-documented macroeconomic instability, while inflation displays the lowest dispersion (1.36), possibly reflecting periods of administered price controls. All variables exhibit negative skewness, indicating distributions with longer left tails. The kurtosis statistics are predominantly below 3, suggesting mesokurtic (approximately normal) distributions, with the exception of exchange rate, which is leptokurtic, reflecting the sharp devaluation episodes that characterise Nigeria's exchange rate history. The Jarque-Bera probability values exceed 0.05 for all variables except GDP, confirming that the residuals are approximately normally distributed.

Table 1: Descriptive Statistics of Study Variables (Logarithmic Form)

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
LOG(GDP)	12.852	2.542	-0.254	1.795	2.094	0.355
LOG(EXR)	9.785	1.783	-0.807	2.253	3.685	0.158
LOG(INFR)	8.529	1.360	-0.203	1.630	2.379	0.304
LOG(IDS)	10.378	1.917	-0.317	1.966	1.718	0.424
LOG(LCD)	10.425	1.268	-0.026	1.828	1.604	0.448
LOG(PCD)	12.103	1.983	-0.130	2.142	0.937	0.625

Source: Authors' computation (2025). Observations = 30 for all variables.

4.2 Unit Root Analysis

Table 2 presents the results of the Augmented Dickey-Fuller unit root test. All variables are non-stationary at levels, except inflation rate (LOG(INFR)), which is integrated of order zero, $I(0)$. All remaining variables achieve stationarity at first difference, confirming integration of order one, $I(1)$. The mixed integration order — a combination of $I(0)$ and $I(1)$ variables — validates the use of the ARDL bounds testing approach and precludes the application of the Johansen cointegration technique, which requires all variables to be $I(1)$.

Table 2: Augmented Dickey-Fuller Unit Root Test Results

Variable	ADF at Level	ADF at First Difference	Order of Integration
LOG(EXR)	-2.469	-4.726***	$I(1)$
LOG(GDP)	-1.707	-5.625***	$I(1)$
LOG(INFR)	-2.809*	—	$I(0)$
LOG(IDS)	-2.348	-4.928***	$I(1)$
LOG(LCD)	-2.244	-4.729***	$I(1)$
LOG(PCD)	-2.285	-5.059***	$I(1)$

*Source: Authors' computation (2025). ***, **, * denote significance at 1%, 5%, and 10% levels, respectively. Critical values are from MacKinnon (1996).*

4.3 ARDL Bounds Cointegration Test

The results of the ARDL bounds cointegration test are reported in Table 3. The computed F-statistic of 92.82 substantially exceeds the upper bound critical value of 3.38 at the 5 percent significance level and 4.15 at the 1 percent level. This decisively rejects the null hypothesis of no long-run cointegrating relationship among the variables, confirming that GDP, exchange rate, inflation rate, and the three debt service components share a stable long-run equilibrium trajectory. The magnitude of the F-statistic relative to the critical bounds suggests a strong and robust cointegrating relationship.

Table 3: ARDL Bounds Cointegration Test

	F-Statistic	Lower Bound (I(0))	Upper Bound (I(1))
Estimated Model	92.825***	—	—
Critical Value: 1%	—	3.06	4.15
Critical Value: 5%	—	2.39	3.38

*Source: Authors' computation (2025). *** denotes significance at the 1% level. Critical values from Pesaran, Shin and Smith (2001).*

4.4 ARDL Error Correction Model: Short-Run Dynamics and Long-Run Estimates

Table 4 presents the estimated ARDL-ECM coefficients, capturing both short-run dynamics and the adjustment toward long-run equilibrium. The results merit detailed discussion.

Exchange Rate (LOG(EXR)): The exchange rate exerts a large, negative, and statistically significant effect on GDP ($\beta = -4.542$; $p < 0.01$). This finding is consistent with the theoretical expectation that naira depreciation raises the cost of imported intermediate goods and capital equipment, suppresses domestic investment, and erodes real purchasing power. Given that Nigeria remains heavily import-dependent for manufacturing inputs and capital goods, this result highlights the macroeconomic significance of exchange rate management as a complement to debt strategy.

Inflation Rate (LOG(INFR)): Inflation exerts a positive and significant effect on GDP ($\beta = 1.931$; $p < 0.01$). While counterintuitive at first glance, this finding is consistent with the Tobin (1965) portfolio substitution effect, whereby moderate inflation incentivises agents to substitute money holdings for real productive assets, stimulating capital formation. It is also consistent with the structuralist tradition, which views moderate inflation as an accompaniment to growth in developing economies undergoing structural transformation. This result aligns with Nazifi (2014) and should be interpreted with caution given Nigeria's history of high and volatile inflation.

Internal Debt Service (LOG(IDS)): Domestic debt service exhibits a strong positive and significant effect on GDP ($\beta = 4.766$; $p < 0.01$). This is the study's most striking finding and is consistent with Mohammed et al. (2023) and Tajudeen (2020). The result suggests that when domestically borrowed funds are channelled into productive fiscal outlays — infrastructure, education, health, and social transfers — the economic returns can be substantial. It also reflects the fact that domestic debt service, unlike external debt service, involves transfers within the Nigerian economy, limiting net resource outflows and preserving domestic demand.

London Club Debt Service (LOG(LCD)): London Club debt service has a positive and significant impact on GDP ($\beta = 0.917$; $p < 0.01$), consistent with Chinaemerem et al. (2013) and Adesola (2019).

This finding suggests that honouring London Club commercial debt obligations may enhance Nigeria's sovereign creditworthiness, facilitating access to international capital markets at lower rates and enabling additional investment-enhancing borrowing. It also reflects the debt restructuring agreements that converted London Club obligations into more manageable instruments.

Paris Club Debt Service (LOG(PCD)): Paris Club debt service has a negative but statistically insignificant effect on GDP ($\beta = -0.777$; $p = 0.054$), suggesting that official bilateral debt obligations, which often carry conditionalities restricting fiscal space, may be less beneficial to growth than commercial debt servicing. However, the borderline p-value warrants caution in interpretation.

Error Correction Term (ECT(-1)): The estimated coefficient on the lagged error correction term is -0.017 , which is negative and statistically significant at the 1 percent level ($t = -44.14$). This confirms the existence of a stable long-run equilibrium and indicates that approximately 1.6 percent of the deviation from the long-run equilibrium is corrected each year. While this adjustment speed appears modest, it is consistent with the structural rigidities characteristic of the Nigerian economy and suggests that shocks to the debt-growth relationship are gradually but persistently absorbed.

Model Fit: The R-squared value of 0.999 and adjusted R-squared of 0.998 indicate that the model explains virtually all variation in GDP, confirming the joint explanatory power of the included variables. The Durbin-Watson statistic of 1.661 is within the acceptable range, providing preliminary evidence against first-order serial correlation.

Table 4: ARDL Error Correction Model Estimates (Dependent Variable: $\Delta\text{LOG}(\text{GDP})$)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta\text{LOG}(\text{EXR})$	-4.542	0.122	-35.353	0.001
$\Delta\text{LOG}(\text{INFR})$	1.931	0.053	38.421	0.002
$\Delta\text{LOG}(\text{IDS})$	4.766	0.276	17.323	0.004
$\Delta\text{LOG}(\text{PCD})$	-0.777	0.237	-3.082	0.054
$\Delta\text{LOG}(\text{LCD})$	0.917	0.066	13.911	0.008
ECT(-1)	-0.017	0.004	-44.143	0.001

Source: Authors' computation (2025). $R^2 = 0.999$; Adjusted $R^2 = 0.998$; Log-likelihood = 41.579; Durbin-Watson = 1.661.

4.5 Diagnostic Tests

Table 5 presents the results of four diagnostic tests. The Breusch-Godfrey LM test for serial correlation yields an F-statistic of 2.474 ($p = 0.410$), confirming the absence of autocorrelation in the residuals. The ARCH heteroscedasticity test returns an F-statistic of 1.410 ($p = 0.247$), indicating homoscedastic residuals. The Jarque-Bera normality test ($p > 0.05$) confirms that residuals are normally distributed. Finally, the Ramsey RESET test ($F = 2.466$; $p = 0.257$) fails to reject the null of correct functional form specification. Collectively, these results affirm the reliability and robustness of the ARDL-ECM estimates.

Table 5: Diagnostic Test Results

Test	F-Statistic	Probability	Decision
Breusch-Godfrey Serial Correlation LM	2.474	0.410	No serial correlation
ARCH Heteroscedasticity	1.410	0.247	Homoscedastic residuals
Ramsey RESET (Functional Form)	2.466	0.257	Correct specification
Jarque-Bera Normality	—	> 0.050	Residuals normally distributed

Source: Authors' computation (2025).

5. CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion

This study has examined the implications of debt servicing for public investment and economic growth in Nigeria over the period 1990–2020 using the ARDL bounds testing cointegration framework. Three principal conclusions emerge from the analysis.

First, there exists a stable and significant long-run cointegrating relationship among GDP, exchange rate, inflation, internal debt service, London Club debt service, and Paris Club debt service in Nigeria. This finding affirms that debt servicing and macroeconomic performance are inextricably linked in the Nigerian context and that short-run deviations from equilibrium are gradually, if slowly, corrected.

Second, the relationship between debt servicing and economic growth is nuanced and category-specific. Internal debt service and London Club debt service exert positive and significant effects on GDP, suggesting that, under appropriate institutional conditions, debt obligations need not crowd out growth but can instead reflect productive borrowing and enhanced market confidence. Paris Club debt service, by contrast, appears marginally negative, potentially reflecting the fiscal conditionalities and repayment structures associated with official bilateral creditors.

Third, exchange rate depreciation represents the most potent drag on growth among the variables examined, with a coefficient of -4.542, underscoring the centrality of exchange rate stability to Nigeria's macroeconomic management agenda. This result is especially salient given the persistent naira volatility observed since 2015 and the structural dependence on imported capital and intermediate goods.

These findings contribute to the growing empirical literature on the debt-growth nexus in sub-Saharan Africa and offer a more granular, disaggregated perspective on debt service categories than most prior Nigerian studies. They align broadly with the conditional optimism of the Neoclassical and Keynesian frameworks while validating aspects of the Dependency Theory's concern with external obligations.

5.2 Policy Recommendations

Drawing on the empirical findings, this study advances five evidence-based policy recommendations:

(i) **Productive Debt Allocation:** The Nigerian government should institutionalise a rigorous debt utilisation framework that earmarks borrowed funds exclusively for high-return capital projects — power infrastructure, transport, digital connectivity, and human capital — with independent monitoring of disbursements and outcomes. The positive effect of internal debt service on GDP is conditional on productive deployment of the underlying borrowings.

(ii) **Exchange Rate Stabilisation:** Given the powerful negative effect of exchange rate depreciation on GDP, the Central Bank of Nigeria should pursue a consistent and transparent exchange rate policy that reduces volatility and uncertainty. Measures include deepening the foreign exchange market, encouraging export diversification to broaden the foreign exchange supply base, and reducing import dependence through targeted industrial policy.

(iii) Domestic Debt Prioritisation: The marked difference in growth effects between internal and external debt service suggests that a strategic shift toward domestic borrowing, where economically viable, could preserve more resources within the Nigerian economy. The DMO should actively develop the domestic capital market, including deepening the sukuk, green bond, and diaspora bond markets, to broaden the domestic investor base and reduce reliance on external creditors.

(iv) Debt Restructuring and Renegotiation: For existing Paris Club obligations, Nigeria should leverage multilateral frameworks to renegotiate terms that provide greater flexibility in fiscal spending, particularly for capital investment. Debt-for-development swaps, which convert portions of bilateral debt into locally financed development projects, offer a promising mechanism for aligning debt service with growth objectives.

(v) Fiscal Transparency and Governance: The positive relationship between debt service and growth is contingent on the quality of public financial management. Strengthening budget transparency, procurement integrity, and fiscal reporting — consistent with the Open Government Partnership and Public Expenditure and Financial Accountability (PEFA) frameworks — is essential to ensure that debt-financed expenditures translate into measurable development outcomes.

5.3 Limitations and Future Research

This study is subject to several limitations. The sample period of 30 observations, while appropriate for ARDL estimation, constrains the precision of long-run estimates and the generalisability of findings. The analysis is aggregate, and does not disaggregate public investment by sector (infrastructure, education, health), which would provide more granular policy insights. Furthermore, potential structural breaks arising from the 2005 Paris Club debt relief, the 2008–2009 global financial crisis, and the 2016 oil price collapse are not explicitly modelled. Future research should address these limitations by employing threshold regression models, structural break tests, and panel data approaches covering multiple African oil-exporting economies, to better identify the debt-growth relationship and its heterogeneity across institutional and structural contexts.

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