HUMANUS DISCOURSE Vol. 6. NO 6. 2026
ISSN 2787-0308 (ONLINE)

Debt-service burden and private investment in Nigeria: Interest-rate and credit channels of fiscal crowding out

Suleiman, Ibrahim Adamu[1]
Department of General Studies,
Isa Mustapha Agwai I Polytechnic, Lafia,
Nasarawa State, Nigeria

Iliya Dan Iliya[2]
Department of General Studies,
Isa Mustapha Agwai I Polytechnic, Lafia,
Nasarawa State, Nigeria

Abstract

Nigeria's rising debt-service burden has renewed concern that fiscal financing pressures may constrain investment through higher borrowing costs and reduced credit availability. This study examines the relationship between debt-service burden and private investment in Nigeria, with particular attention to the interest-rate and private-credit channels. Annual data covering 1981–2025 were assembled from the Central Bank of Nigeria, Debt Management Office, National Bureau of Statistics, International Monetary Fund and World Bank. Gross fixed capital formation is used as the operational proxy for investment, while debt-service burden is measured as public debt-service expenditure relative to Federal Government revenue. The analysis combines unit-root tests, an autoregressive distributed lag framework, bounds testing, an error-correction representation, and dynamic short-run regressions with heteroscedasticity and autocorrelation-consistent standard errors. The bounds statistic indicates a long-run association, although the error-correction coefficient is weak, implying that the long-run equilibrium should be interpreted cautiously. The more robust short-run results show that increases in debt-service burden significantly reduce investment growth: a one-percentage-point rise in the debt-service burden is associated with about a 0.25 per cent decline in the growth of gross fixed capital formation, ceteris paribus. The lending-rate and private-credit channels display theoretically plausible signs but are not statistically strong. The results suggest that Nigeria's debt problem is not only the stock of liabilities but the recurrent fiscal burden created by servicing them. Policy should therefore emphasize debt-cost management, revenue strengthening and protection of financing space for productive investment.

Keywords: Debt-service burden; Private investment; Gross fixed capital formation; Crowding out; lending rate; Private-sector credit

JEL Classification: E22, E44, H63, O16

[1] ibrahim.suleiman@imap.edu.ng Tel: +2348036277050
[2] Daniliya2025@imap.edu.ng Tel: +2348063298524

ISSN 2787-0308 (ONLINE)

Introduction

Private investment is central to capital accumulation, productivity improvement and long-run economic growth. In developing economies, however, the financing environment facing private firms is shaped not only by monetary conditions and expected demand but also by the fiscal position of government. When governments rely heavily on domestic and external borrowing, subsequent debt-service obligations can absorb revenue, increase refinancing needs and alter the allocation and price of domestic credit. These mechanisms provide the basis for the classical crowding-out hypothesis, under which fiscal borrowing pressure raises the cost of funds or redirects financial resources away from private borrowers (Blejer& Khan, 1984; Greene & Villanueva, 1991; Laubach, 2009)[3]. The competing crowding-in argument is equally important: when borrowed resources finance infrastructure and other productivity-enhancing public capital, private investment may rise rather than fall (Aschauer, 1989; Ouédraogo et al., 2019)[4]. Whether public indebtedness constrains or complements private capital formation is therefore an empirical question.

Nigeria provides an especially relevant setting for revisiting this question. Public debt and associated servicing obligations increased markedly during the last decade, while the domestic financial system has simultaneously operated under episodes of high inflation, exchange-rate adjustment and tight monetary policy. Recent official assessments emphasize that fiscal vulnerability is increasingly associated with the amount of revenue absorbed by servicing obligations rather than the debt-to-GDP ratio alone. The World Bank's 2025 Nigeria Development Update, for example, identifies the debt-service-to-revenue ratio as a principal source of debt vulnerability, while the IMF estimates that Federal Government interest payments absorbed about 41 per cent of Federal Government revenue in 2024 and 53 per cent in 2025 (IMF, 2026; World Bank, 2025)[5]. Such ratios matter because a government can carry a moderate debt stock yet face severe liquidity and financing constraints when interest costs are high and revenue mobilization is weak.

This fiscal pressure may affect investment through several channels. First, larger debt-service obligations may increase government demand for refinancing and domestic securities. Where financial savings are limited, this

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World Bank. *Nigeria development update: Building momentum for inclusive growth.*(2025).

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can raise lending rates and the opportunity cost of private capital. Second, banks may prefer government securities when their risk-adjusted returns become attractive, thereby reducing the share of financial resources available to businesses. Christensen (2004)[6], Mbate (2013)[7], and subsequent Nigerian studies emphasize this credit-allocation mechanism. Third, heavy servicing obligations can compress public capital expenditure. Although this study concentrates on private investment, reduced infrastructure spending can indirectly weaken private returns by raising logistics, power and transaction costs. These channels imply that the fiscal cost of debt may matter independently of the debt stock itself, a distinction increasingly recognized in recent international work on the "debt-service channel" (Kılınç&Tunç, 2026)[8].
The Nigerian empirical literature is substantial but not conclusive. Studies have reported crowding-out effects from domestic borrowing, external debt and debt-service payments (Akomolafe et al., 2015; Anoke et al., 2021; Chuba, 2021)[9], while others find crowding-in effects or statistically weak relationships (Ogunjimi, 2019; Omodero, 2019)[10]. Abubakar and Mamman (2021)[11] show that debt components can affect investment asymmetrically, reinforcing the possibility that the relationship is neither uniform nor adequately captured by a single debt-stock coefficient. More recent Nigerian work continues to examine debt and investment using ARDL and nonlinear specifications, but the distinction between the size of public liabilities and the burden of servicing those liabilities remains underdeveloped, especially when linked explicitly to both lending rates and private-sector credit.

This study addresses that gap by focusing on debt-service burden rather than relying only on debt stock. The principal measure is debt-service expenditure relative to Federal Government revenue, which captures the fiscal pressure created by servicing commitments. The study also investigates whether changes in that burden are transmitted through lending rates and private-sector credit. The empirical period, 1981–2025, spans financial liberalization, the Structural Adjustment Programme, Paris Club debt relief, the global financial crisis, the

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[7]Mbate, M. Domestic debt, private sector credit and economic growth in Sub-Saharan Africa. *African Development Review, 25*(4), 434–446.(2013).
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Chuba, M. A. Crowding-out and crowding-in effects of public borrowing on private domestic investment in Nigeria. *International Journal of Research and Innovation in Social Science, 5*(11), 439–448.(2021).
[10]Ogunjimi, J. The impact of public debt on investment: Evidence from Nigeria. *SSRN Electronic Journal*.(2019).
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[11]Abubakar, A. B., &Mamman, S. O. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model. *CBN Economic and Financial Review, 59*(3), 59–86.(2021).

2016 recession, the COVID-19 shock and the post-2023 macroeconomic reform period. This long horizon permits the analysis to distinguish persistent relationships from short-lived episodes.

The study makes three contributions. First, it shifts the Nigerian debt-investment debate toward servicing pressure and fiscal capacity. Second, it tests two specific financial transmission channels rather than treating crowding out as a black-box relationship. Third, it extends the evidence through 2025 and explicitly tests whether the main result survives when recent reconstructed observations are excluded. The remainder of the paper reviews the relevant theory and evidence, describes the data and econometric strategy, presents the results and discusses their implications for debt management and investment policy.

Literature Review and Theoretical Framework

Theoretical mechanism and debt-service burden

The theoretical starting point is the neoclassical crowding-out mechanism. In a loanable-funds framework, higher government borrowing increases demand for available savings. If private saving and foreign financing do not expand sufficiently, the real cost of funds rises and interest-sensitive private investment declines. Blejer and Khan (1984)[12] formalized the role of government policy in private investment decisions in developing economies, while Greene and Villanueva (1991)[13] emphasized output growth, macroeconomic stability and financing conditions as major determinants of private investment. In this framework, the relevant fiscal variable is not only the stock of public debt. Debt service can itself tighten the budget constraint by requiring repeated interest and principal payments, potentially generating additional borrowing and maintaining upward pressure on financing costs.

Debt-overhang theory provides a related explanation. When current or prospective debt-service obligations become large relative to repayment capacity, expected future taxation and macroeconomic adjustment can reduce the expected return to new investment. Borensztein (1990)[14] links debt overhang to credit rationing and investment, while Deshpande (1997)[15] documents the investment disincentives associated with heavy indebtedness. Cohen (1993)[16] provides particularly relevant evidence by showing that actual debt-service payments, rather than debt stocks alone, can depress investment in heavily indebted developing countries. This distinction is central to the present study: debt stocks measure accumulated liabilities, whereas the debt-

[12]Blejer, M. I., & Khan, M. S. Government policy and private investment in developing countries. *IMF Staff Papers, 31*(2), 379–403.(1984).
[13]Greene, J., & Villanueva, D. Private investment in developing countries: An empirical analysis. *IMF Staff Papers, 38*(1), 33–58.(1991).
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[16]Cohen, D. (1993). Low investment and large LDC debt in the 1980s. *American Economic Review, 83*(3), 437–449.

service burden captures the immediate fiscal pressure exerted by those liabilities.

The crowding-out proposition is not universal. Keynesian and endogenous-growth perspectives emphasize that productive public expenditure can crowd in private investment. Public infrastructure can lower production costs, expand market access and raise the marginal productivity of private capital. Aschauer (1989)[17] showed that public capital and private capital can be complementary, and Ouédraogo et al. (2019)[18] report crowding-in effects of public investment in Sub-Saharan Africa. Francois et al. (2026)[19] similarly show that public investment financed through external official resources can stimulate private investment in developing economies. The sign of the debt-investment relationship therefore depends on what borrowing finances, how it is serviced, and whether financing pressures dominate productivity gains.

Interest-rate and credit channels

A second strand of literature concerns the interest-rate channel. Government deficits and debt can influence long-term rates and sovereign yields by increasing the supply of public securities and altering expectations about inflation, monetary policy and fiscal sustainability. Kinoshita (2006)[20], Laubach (2009)[21], and Baldacci and Kumar (2010)[22] provide evidence that fiscal conditions can raise interest rates or sovereign borrowing costs. In a developing financial system, this transmission may be particularly consequential because private firms frequently depend on bank credit rather than deep corporate bond markets. Higher lending rates increase the user cost of capital and can postpone or cancel investment projects whose expected returns no longer cover financing costs.

The credit channel focuses on quantities rather than prices. Government securities can become attractive assets for banks because they carry low regulatory risk, provide liquidity and may offer high yields. Banks can therefore increase claims on government at the expense of loans to firms. Christensen (2004)[23] identifies this risk in Sub-Saharan African domestic debt markets, and Mbate (2013)[24] links domestic public debt to private-sector credit and growth

[17]Aschauer, D. A. Does public capital crowd out private capital? *Journal of Monetary Economics, 24*(2), 171–188.(1989).
[18]Ouédraogo, R., Sawadogo, H., &Sawadogo, R. Impact of public investment on private investment in Sub-Saharan Africa: Crowding in or crowding out? *African Development Review, 31*(3), 318–334.(2019).
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in the region. The "lazy bank" hypothesis similarly predicts that banks facing profitable sovereign instruments may undertake less costly credit appraisal and extend fewer loans to private firms. Recent firm-level evidence from developing economies indicates that access to finance is an important mechanism through which high public debt can depress private investment (Islam & Nguyen, 2026)[25].

Nigerian and comparative empirical evidence

Nigerian evidence reflects these competing mechanisms. Akomolafe et al. (2015)[26] find evidence consistent with crowding out, while Akpansung (2018)[27] examines domestic debt, private credit, lending rates and output and reports comparatively weak financial-channel effects. Omodero (2019)[28] finds that domestic debt does not automatically displace private credit, illustrating that banking responses depend on the broader monetary and financial environment. Akanbi (2020)[29] likewise reports a negative relationship between government domestic borrowing and private-sector credit, although statistical strength varies across specifications. The debt-investment relationship itself is also mixed. Ogunjimi (2019)[30] finds crowding-in effects from some debt components, whereas Anoke et al. (2021)[31] report that public debt crowds out domestic private investment in the long run. Chuba (2021)[32] provides evidence especially relevant to the interest-rate mechanism: domestic public borrowing raises interest rates and private domestic investment is negatively related to those rates. Abubakar and Mamman (2021)[33], using symmetric and asymmetric dynamic models, find adverse effects from total debt, external debt and debt-service payments, while domestic debt effects are asymmetric. More recent

[25]Islam, M. R., & Nguyen, C. P. Distributional crowding-out effects of public debt on private investment in developing economies. *Journal of International Money and Finance, 164*.(2026).
[26]Akomolafe, K. J., Bosede, O., Emmanuel, O., & Mark, A. Public debt and private investment in Nigeria. *American Journal of Economics, 5*(5), 501–507.(2015).
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[33]Abubakar, A. B., &Mamman, S. O. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model. *CBN Economic and Financial Review, 59*(3), 59–86.(2021).

studies continue to find that the sign and magnitude of debt effects depend on the debt measure and econometric specification (Yola et al., 2025)[34].

International evidence reinforces the case for nonlinearity and heterogeneity. Penzin et al. (2022)[35] report threshold behaviour in the public debt-private investment nexus in emerging economies, while Husain et al. (2023)[36] find asymmetric debt-investment responses in India. Khan et al. (2025)[37] similarly document asymmetric crowding-out effects in Pakistan. Eberhardt and Presbitero (2015)[38] and Égert (2015)[39], however, caution against assuming that a single universal debt threshold applies across countries or specifications. Threshold estimates can be sensitive to sample composition, debt definitions and econometric design. For this reason, the present study does not impose an arbitrary "safe" debt-service ratio. Instead, its central focus is the sign and transmission of servicing pressure, with sensitivity analysis used to assess whether recent high-burden years dominate the result.

Research gap and hypotheses

The literature therefore leaves three issues unresolved for Nigeria. First, much of the evidence uses domestic, external or total debt stocks, whereas the fiscal burden of servicing debt relative to revenue is less systematically modeled. Second, studies that discuss crowding out often infer the mechanism from the sign of a debt coefficient rather than testing the lending-rate and credit channels directly. Third, the macroeconomic environment after 2021 differs sharply from earlier periods, making an updated sample important. These gaps motivate four null hypotheses:

$H0_1$:Debt-service burden has no significant effect on investment in Nigeria;
$H0_2$: Debt-service burden has no significant effect on lending rates;
$H0_3$: Debt-service burden has no significant effect on private-sector credit; and
$H0_4$: The estimated debt-service effect is not robust to alternative sample endpoints.

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[34]Yola, A. T., Iliyasu, N. M., & Mustapha, A. M. Effect of domestic debt and exchange rate on private investment in Nigeria: An asymmetric ARDL approach. *Journal of Economic Studies, 22*(1), 1–14.(2025).
[35]Penzin, D. J., Salisu, A. A., &Akanegbu, B. N. A note on public debt–private investment nexus in emerging economies. *Bulletin of Monetary Economics and Banking, 25*(1), 25–36.(2022).
[36]Husain, S., Alam, M. N., &Hisam, M. W. Crowding-in or crowding-out? The linkage between private investment and public debt of India using symmetric and asymmetric cointegration methodology. *International Journal of Applied Economics, Finance and Accounting, 16*(2).(2023).
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A further issue concerns the distinction between debt stocks, debt flows and debt-service ratios. Debt-to-GDP indicators describe solvency in relation to national output, but they may understate the immediate fiscal constraint in countries where government revenue is structurally low. A debt-service-to-revenue measure is closer to a liquidity or budgetary-pressure indicator because it relates mandatory servicing commitments to the resources directly available to government. This distinction is particularly relevant for Nigeria, where revenue mobilization has historically lagged behind the size of the economy. World Bank (2025)[40] evidence shows that debt-service-to-revenue ratios remained elevated even when conventional debt-to-GDP indicators were not exceptionally high by international comparison. The implication is that debt sustainability and investment effects should be considered jointly with fiscal capacity, rather than inferred from debt stocks alone.

The composition of borrowing also matters for the crowding-out mechanism. Domestic debt can compete directly with firms for naira-denominated financial resources, especially when banks and institutional investors allocate portfolios toward government securities. External debt may initially reduce pressure on domestic credit markets, but it introduces exchange-rate exposure and may generate large local-currency servicing costs after depreciation. Abubakar and Mamman (2021)[41] and related Nigerian studies show that domestic and external debt components need not have identical effects on investment. The post-2023 exchange-rate adjustment makes this distinction even more salient because external interest and principal payments translate into substantially larger naira obligations when the domestic currency weakens. A debt-service burden measure partly captures this interaction because it records the realized fiscal cost rather than only the original face value of debt.

Recent work also emphasizes that the relationship may vary across firms and sectors. Large corporations with access to retained earnings, foreign credit or capital markets may be less sensitive to domestic crowding out than small and medium-sized firms that depend heavily on bank lending. Islam and Nguyen (2026)[42] show that financing constraints shape the distributional impact of public debt on private investment in developing economies. Aggregate time-series coefficients therefore represent an average of potentially heterogeneous responses. This provides another reason for interpreting the lending-rate and credit-channel estimates cautiously: weak aggregate coefficients do not imply that financially constrained firms are unaffected. Instead, they may indicate that aggregate credit measures conceal reallocation across borrower types, maturities and sectors.

[40]World Bank. *Nigeria development update: Building momentum for inclusive growth.*(2025).
[41]Abubakar, A. B., &Mamman, S. O. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model. *CBN Economic and Financial Review, 59*(3), 59–86. (2021).
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ISSN 2787-0308 (ONLINE)

Data and Methodology

The study adopts an ex post facto time-series design using annual Nigerian macroeconomic data from 1981–2025. Data are obtained from the Central Bank of Nigeria (CBN), Debt Management Office (DMO), National Bureau of Statistics (NBS), International Monetary Fund (IMF), and World Development Indicators (WDI). Where reporting frameworks changed, observations were harmonised using contemporaneous official aggregates from the same statistical vintage to preserve consistency.

Investment (INV) is proxied by gross fixed capital formation (GFCF), consistent with previous Nigerian debt–investment studies such as Abubakar and Mamman (2021)[43]. Because aggregate GFCF includes both private and public capital formation, the results are interpreted as responses of fixed-capital investment to fiscal financing pressures.

Table 1. Variable Definitions and Measurement

Variable	Symbol	Measurement	Expected sign	Source
Investment	INV	Gross fixed capital formation; natural logarithm	DV	CBN/IMF/WDI
Debt-service burden	DSB	Debt service or interest payments/FGN revenue × 100	–	CBN/DMO/IMF
Lending rate	LR	Annual bank lending rate (%)	–	CBN/WDI
Private-sector credit	PSC	Private-sector credit/GDP (%)	+	CBN/WDI/IMF
Inflation	INF	Annual average CPI inflation (%)	–	NBS/CBN/WDI/IMF

***Source**: Authors' compilation.*

Debt-service burden is measured as:

$$DSB_t = \frac{DS_t}{REV_t} \times 100 \qquad (1)$$

Where DS_trepresents Federal Government debt-service obligations and REV_trepresents Federal Government revenue. The ratio is preferred to absolute debt-service values because it captures the fiscal pressure imposed by servicing obligations relative to available government resources. Historical observations are derived from CBN fiscal statistics, while recent observations are harmonised with corresponding fiscal-burden indicators reported in IMF and Nigerian-authority data. Robustness estimates ending in 2021 and 2023 are used to verify that the results are not driven by recent reporting changes.

[43]Abubakar, A. B., &Mamman, S. O. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model. *CBN Economic and Financial Review, 59*(3), 59–86.(2021).

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Recent national-account observations are treated using internally consistent macroeconomic aggregates because Nigeria rebased its GDP to 2019 prices in 2025. Investment values for the terminal period are therefore derived from investment-to-GDP ratios and nominal GDP reported within the same statistical framework, thereby avoiding inconsistencies across national-account vintages.

1 Model Specification

The general ARDL model is specified as:

$$\ln INV_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \ln INV_{t-i} + \sum_{j=0}^{q_1} \beta_j DSB_{t-j} + \sum_{k=0}^{q_2} \gamma_k LR_{t-k} + \sum_{m=0}^{q_3} \delta_m PSC_{t-m} + \sum_{n=0}^{q_4} \theta_n INF_{t-n} + \tau t + \varepsilon_t \quad \textbf{(2)}$$

The ARDL approach is appropriate where variables are a mixture of $I(0)$and $I(1)$, provided none is $I(2)$(Pesaran et al., 2001). Stationarity is therefore examined using the Augmented Dickey-Fuller test (Dickey & Fuller, 1979).
Cointegration is tested using the unrestricted error-correction representation:

$$\Delta \ln INV_t = \alpha_0 + \lambda_1 \ln INV_{t-1} + \lambda_2 DSB_{t-1} + \lambda_3 LR_{t-1} + \lambda_4 PSC_{t-1} + \lambda_5 INF_{t-1} + \sum \omega_i \Delta X_{t-i} + u_t \quad \textbf{(3)}$$

The bounds test evaluates:

$$H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0 \quad (4)$$

A negative and significant adjustment coefficient indicates convergence toward long-run equilibrium.

2 Short-Run Crowding-Out Model

Greater emphasis is placed on the short-run dynamic specification:

$$\Delta \ln INV_t = \alpha + \psi \Delta \ln INV_{t-1} + \beta \Delta DSB_t + \gamma \Delta LR_t + \delta \Delta PSC_t + \theta \Delta INF_t + \varepsilon_t \quad (5)$$

The coefficient $\beta$is the principal crowding-out parameter. Since investment is expressed in logarithmic difference form, a one-percentage-point increase in debt-service burden changes investment growth by approximately:

$$100\beta\% \quad (6)$$

Heteroskedasticity- and autocorrelation-consistent standard errors are applied following Newey and West (1987).

3 Transmission Channels

The interest-rate channel is examined as:

$$\Delta LR_t = a_0 + a_1 \Delta DSB_t + a_2 \Delta INF_t + \mu_t \quad (7)$$

While the private-credit channel is specified as:

$$\Delta PSC_t = b_0 + b_1 \Delta DSB_t + b_2 \Delta LR_t + b_3 \Delta INF_t + \nu_t \quad (8)$$

A positive $a_1$and negative $b_1$would be consistent with debt-service pressure operating through higher financing costs and reduced private-sector credit. These equations are interpreted as transmission-channel tests rather than formal causal mediation models.

ISSN 2787-0308 (ONLINE)

4 Diagnostics and Robustness

Model adequacy is assessed using the Breusch-Godfrey serial-correlation test, Breusch-Pagan heteroskedasticity test, Jarque-Bera normality test, and Ramsey RESET test. Robustness is further examined by re-estimating the principal model over 1981–2021, 1981–2023, and 1981–2025. This establishes whether the estimated crowding-out effect is stable across alternative sample endpoints and changing fiscal environments.

Empirical Results

The descriptive statistics indicate substantial variation in Nigeria's macroeconomic environment over the study period. The logarithm of gross fixed capital formation averages 7.98, while the debt-service burden averages 35.08 per cent of Federal Government revenue. The burden ranges from about 4.65 per cent in the lowest year to more than 97 per cent in the highest year. Lending rates average 17.30 per cent, private-sector credit averages about 10.03 per cent of GDP, and inflation averages 19.48 per cent. The high dispersion of debt-service burden and inflation confirms that the sample spans markedly different fiscal and monetary regimes.

The correlation matrix should not be interpreted causally, but it provides useful preliminary information. Investment is positively correlated with private-sector credit (0.78), whereas its simple correlation with inflation is negative (-0.20). The correlation between debt-service burden and investment is positive in levels (0.23), reflecting common long-term trends and the fact that both fiscal obligations and nominal capital formation rise with the scale of the economy. This reinforces the need for dynamic and differenced models rather than reliance on contemporaneous level correlations.

Table 2. Descriptive statistics (1981–2025)

Variable	Mean	Std. dev.	Minimum	Maximum
ln(GFCF)	7.984	2.200	4.468	11.812
Debt-service burden (%)	35.084	24.669	4.654	97.102
Lending rate (%)	17.298	4.682	8.917	31.650
Private credit/GDP (%)	10.027	4.230	4.948	20.776
Inflation (%)	19.480	16.055	5.386	72.836

The ADF results show that lnINV, DSB, PSC and INF are non-stationary in levels at the 5 per cent level but become stationary after first differencing. The lending rate is stationary in levels at the 5 per cent level. The integration pattern therefore consists of I(0) and I(1) variables, supporting the use of ARDL while ruling out the need for an I(2)-based framework.

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ISSN 2787-0308 (ONLINE)

Table 3. Augmented Dickey-Fuller unit-root tests

Variable	ADF level	p-value	ADF first diff.	p-value	Order
ln(GFCF)	-1.031	0.742	-3.806	0.003	I(1)
Debt-service burden	-2.422	0.136	-10.040	<0.001	I(1)
Lending rate	-3.084	0.028	—	—	I(0)
Private credit/GDP	-1.141	0.698	-5.629	<0.001	I(1)
Inflation	-2.508	0.114	-6.863	<0.001	I(1)

The ARDL bounds statistic is 6.21 in the specification containing a deterministic trend. Its upper-tail probability is approximately 0.002, providing evidence against the null of no level relationship. However, the coefficient on lagged lnINV in the unrestricted error-correction representation is -0.073 and statistically insignificant (p = 0.261). The sign is consistent with convergence, but the lack of significance indicates that adjustment toward the estimated long-run path is weak. This combination bounds evidence of a level relationship but an imprecise adjustment coefficient suggests that long-run coefficients should not be treated as the paper's strongest evidence. The analysis therefore emphasizes the short-run dynamic specification, which is better behaved statistically.

Table 4. ARDL bounds and error-correction evidence

Statistic	Estimate	p-value	Decision
Bounds F-statistic	6.207	0.002 (upper-tail pprox.)	Evidence of level relationship
Lagged lnINV adjustment coefficient	-0.0734	0.261	Negative but statistically weak
Deterministic trend	0.0189	0.098	Weakly significant

In the short-run model, the lagged growth of investment is positive and significant (coefficient = 0.466, p = 0.003), indicating persistence in capital formation growth. Most importantly, the change in debt-service burden carries a coefficient of -0.00246 and is statistically significant at the 1 per cent level (p = 0.001). Because the dependent variable is the change in log investment, this estimate implies that a one-percentage-point increase in debt-service burden is associated with approximately a 0.25 per cent reduction in the growth of gross fixed capital formation, holding the other short-run changes constant. A 10-percentage-point increase in the fiscal burden is therefore associated with an investment-growth reduction of roughly 2.5 per cent. H01 is rejected.

Changes in lending rates have a positive but insignificant coefficient in the investment-growth equation (0.0056, p = 0.239), while changes in private-sector credit enter negatively and insignificantly (-0.0143, p = 0.256). Inflation changes are positive and weakly significant only at the 10 per cent level (0.0015, p = 0.092). These coefficients should not be read as structural long-run effects. Their main implication is that the contemporaneous direct burden of debt servicing is more clearly identified than the financial channels within the annual data.

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ISSN 2787-0308 (ONLINE)

Table 5. Short-run dynamic investment equation (HAC standard errors)

Variable	Coefficient	Std. error	z-statistic	p-value
Constant	0.0914	0.0340	2.686	0.007
ΔlnINV(t-1)	0.4664	0.1576	2.960	0.003
ΔDSB	-0.00246	0.00074	-3.320	0.001
ΔLR	0.0056	0.0048	1.178	0.239
ΔPSC	-0.0143	0.0126	-1.135	0.256
ΔINF	0.0015	0.0009	1.684	0.092

The channel regressions reinforce this interpretation. A one-percentage-point increase in DSB is associated with a 0.024 percentage-point increase in the lending rate, but the coefficient is not statistically significant (p = 0.580). In the private-credit equation, the DSB coefficient is -0.0148, consistent with a crowding-out direction, but again statistically insignificant (p = 0.179). Thus H02 and H03 cannot be rejected. The evidence does not support a strong claim that lending rates or private credit statistically mediate the debt-service effect in annual aggregate data. This is an important result because it distinguishes the presence of a crowding-out association from proof of a particular transmission mechanism.

The diagnostics for the short-run model are satisfactory. The Breusch-Godfrey test does not reject the null of no serial correlation (p = 0.405), the Breusch-Pagan test does not reject homoskedasticity (p = 0.930), the Ramsey RESET test provides no evidence of functional-form misspecification (p = 0.235), and the Jarque-Bera test is consistent with approximately normal residuals (p = 0.721). The Durbin-Watson statistic is 2.02. HAC standard errors are nevertheless retained because annual macroeconomic data can exhibit mild heteroskedasticity and serial dependence that conventional standard errors may understate.

Table 6. Sample-endpoint robustness of the debt-service coefficient

Sample	N	ΔDSB coefficient	p-value	Inference
1981–2021	39	-0.00220	0.006	Negative; significant
1981–2023	41	-0.00268	0.002	Negative; significant
1981–2025	43	-0.00246	0.001	Negative; significant

The sample-endpoint robustness exercise is particularly important because 2022–2025 contain the largest data-reconstruction component. When the model is estimated only through 2021, the DSB coefficient remains negative (-0.00220) and statistically significant (p = 0.006). Extending the sample through 2023 produces a coefficient of -0.00268 (p = 0.002). The full 1981–2025 estimate is -0.00246 (p = 0.001). The stability of the sign and approximate magnitude across these samples indicates that the principal crowding-out result is not created by the terminal reconstructed observations. H04 is therefore rejected: the result is robust to alternative endpoints.

Overall, the empirical evidence supports a narrow but important conclusion. Rising debt-service burden is associated with slower capital-formation growth in Nigeria, and this result survives exclusion of the most recent years. By contrast, the annual data do not provide strong statistical evidence that the effect operates contemporaneously through lending rates or the measured

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ISSN 2787-0308 (ONLINE)

private-credit ratio. The distinction matters for policy because it suggests that fiscal servicing pressure may affect investment through several interacting mechanisms—including expectations, public-capital compression, exchange-rate effects and refinancing uncertainty—rather than through a single observable bank-lending channel.

Discussion

The negative short-run effect of debt-service burden is consistent with the central crowding-out proposition and with evidence that actual servicing obligations can be more relevant for investment than debt stocks alone. Cohen (1993)[44] reached a similar conclusion for heavily indebted developing countries, while the Nigerian evidence of Abubakar and Mamman (2021)[45] also identifies adverse investment effects from debt-service payments. The present result adds to that literature by normalizing servicing pressure by fiscal revenue and by extending the Nigerian sample through the recent high-interest and post-reform period.

The magnitude is economically meaningful. A 10-percentage-point increase in the servicing burden corresponds to roughly a 2.5 per cent reduction in capital-formation growth in the dynamic model. Nigeria has experienced debt-service ratios that move by much more than 10 percentage points across fiscal regimes. This means that changes in servicing pressure can have macroeconomically relevant investment consequences even when the debt-to-GDP ratio appears moderate by international standards. The result supports the argument that debt sustainability in low-revenue economies cannot be assessed solely through debt stocks. Revenue capacity and the cost structure of debt are central.

The weak statistical evidence for the interest-rate channel deserves careful interpretation. It does not imply that interest rates are irrelevant to Nigerian investment. Chuba (2021)[46] and related work provide evidence that borrowing and rates can interact, and contemporary CBN reports show lending rates rising in a tight monetary environment. Rather, the present annual specification fails to isolate a stable contemporaneous pathway from changes in debt-service burden to changes in lending rates. Monetary policy, inflation expectations, banking-sector liquidity, exchange-rate conditions and regulatory changes all influence lending rates, making it difficult for a single fiscal variable to dominate at annual frequency.

The same caution applies to private-sector credit. The negative DSB coefficient in the credit equation is directionally consistent with crowding out, but it is not statistically precise. This mixed result is consistent with the Nigerian literature,

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[45]Abubakar, A. B., &Mamman, S. O. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model. *CBN Economic and Financial Review, 59*(3), 59–86.(2021).
[46]Chuba, M. A. Crowding-out and crowding-in effects of public borrowing on private domestic investment in Nigeria. *International Journal of Research and Innovation in Social Science, 5*(11), 439–448.(2021).

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where some studies find that government borrowing reduces private credit while others report weak or even complementary relationships (Akanbi, 2020; Omodero, 2019)[47]. Banks can simultaneously expand total balance sheets, increase holdings of government securities and grow selected private lending. Consequently, the relevant effect may be sector-specific or firm-specific rather than visible in an aggregate credit-to-GDP ratio.

Another possible mechanism is fiscal expenditure compression. When servicing obligations absorb a large share of revenue, capital expenditure may be postponed, scaled down or financed through additional borrowing. Lower public infrastructure investment can then reduce the productivity of private capital. This indirect crowding-out route is consistent with the complementarity emphasized by Aschauer (1989)[48] and the crowding-in evidence from Sub-Saharan Africa. In other words, servicing pressure can crowd out private investment not only because government competes with firms for funds, but also because it limits the infrastructure spending that would otherwise raise private returns.

The weak long-run error-correction coefficient also deserves emphasis. The bounds test suggests a level relationship, but convergence to a stable equilibrium is statistically imprecise once a deterministic trend is included. Nigeria's repeated structural changes provide a plausible explanation. Financial liberalization in the late 1980s, debt relief in the mid-2000s, banking reforms, oil-price cycles, the 2016 recession, COVID-19 and the post-2023 policy transition all changed the institutional environment in which debt and investment interact. Eberhardt and Presbitero (2015)[49] and Égert (2015)[50] caution that debt effects are heterogeneous and sensitive to regime and specification. The short-run result is therefore more credible than a claim of a single invariant long-run debt-service elasticity over four decades.

The robustness results improve confidence in the core conclusion. The negative coefficient appears in samples ending in 2021, 2023 and 2025, with similar magnitude. This is important because it demonstrates that the finding is not an artifact of the recent reconstructed observations. At the same time, the use of aggregate GFCF remains a limitation. The variable captures economy-wide fixed-capital formation rather than pure private investment. If public investment responds differently to servicing pressure, the estimated coefficient may understate or overstate the effect on private firms. Future research should

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Omodero, C. O. Domestic debt and private sector credit in Nigeria: An empirical investigation. *ActaUniversitatisDanubius. Œconomica, 15*(6), 188–207.(2019).
[48]Aschauer, D. A. Does public capital crowd out private capital? *Journal of Monetary Economics, 24*(2), 171–188.(1989).
[49]Eberhardt, M., &Presbitero, A. F. Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics, 97*(1), 45–58.(2015).
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ISSN 2787-0308 (ONLINE)

exploit a consistent private-sector investment series, firm-level capital expenditure, bank-level sovereign exposure or sectoral credit allocations.

The broader policy implication is therefore not that Nigeria should avoid borrowing altogether. Debt can support investment when it finances projects with high social and economic returns and when maturity, currency and interest-rate structures keep servicing costs manageable. The empirical concern is the fiscal burden created when servicing obligations grow faster than reliable revenue. Debt management should thus be evaluated jointly with revenue mobilization, expenditure quality and domestic financial-market development.
The results also have implications for the design of fiscal adjustment. A policy response that reduces debt service by sharply cutting productive public investment could improve a narrow fiscal ratio while simultaneously lowering the productivity of private capital. The appropriate objective is therefore not simply to minimize debt service in isolation, but to improve the relationship between the cost of borrowing and the economic returns generated by borrowed funds. Debt-financed expenditure that expands power supply, transport connectivity or other productivity-enhancing infrastructure can support private investment even when it increases the debt stock. Conversely, borrowing used mainly to finance recurrent expenditure may create future servicing obligations without generating the additional tax base or productivity gains needed to support repayment.

Revenue policy is equally central. When the denominator of the debt-service ratio is persistently small, even moderate interest obligations can create severe fiscal pressure. Improvements in tax administration, compliance and the efficiency of non-oil revenue collection can therefore reduce the investment consequences of debt without requiring abrupt debt reduction. This interpretation is consistent with the recent IMF and World Bank emphasis on Nigeria's revenue constraint. It also explains why the debt-service burden is a more policy-relevant variable than debt stock alone for an economy with a comparatively low public-revenue share of GDP.

Finally, the absence of statistically strong channel coefficients suggests a useful agenda for future research. Monthly or quarterly bank-level data could identify whether increases in government securities holdings precede changes in commercial lending to manufacturing, agriculture or SMEs. Firm-level panel data could test whether companies with greater dependence on domestic bank financing cut capital expenditure more strongly when fiscal servicing pressure rises. Such designs would provide a sharper test of the mechanism than annual aggregate data and would help distinguish price-based crowding out through lending rates from quantity-based crowding out through credit allocation.

Conclusion and Policy Implications

This study examined whether Nigeria's debt-service burden crowds out investment and whether the relationship operates through lending rates and private-sector credit. Using annual data for 1981–2025, the analysis finds a robust negative short-run relationship between changes in debt-service burden and the growth of gross fixed capital formation. A one-percentage-point

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ISSN 2787-0308 (ONLINE)

increase in the servicing burden is associated with about a 0.25 per cent reduction in investment growth, and the result remains negative and statistically significant when the sample is truncated at 2021 and 2023. The evidence therefore supports the view that servicing pressure, not only the size of public debt, is relevant for domestic capital formation.

The interest-rate and private-credit channels are directionally plausible but statistically weak. The findings therefore do not justify a strong claim that either channel independently mediates the debt-service effect in annual aggregate data. Fiscal crowding out many instead operate through a combination of refinancing pressure, expectations, reduced public capital spending, exchange-rate risk and financial allocation.

Policy should focus on lowering the cost and volatility of debt service rather than pursuing debt reduction as an end in itself. This requires strengthening non-oil revenue, lengthening debt maturities where cost-effective, limiting expensive short-term refinancing, improving the currency composition of debt and protecting productive capital expenditure. Domestic borrowing strategies should also avoid creating incentives that make sovereign assets persistently more attractive to banks than productive private lending.

The study is limited by the use of aggregate GFCF as the investment proxy and by definitional changes in fiscal and national-accounts series at the end of the sample. These limitations are mitigated by source triangulation and endpoint robustness tests but cannot be eliminated completely. Future work should use firm-level or sectoral private-investment data and higher-frequency financial variables to identify the transmission channels more precisely.

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