



EFFECT OF PUBLIC DEBT ON PUBLIC INVESTMENT IN NIGERIA

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ABSTRACT

Public investment in Nigeria has remained persistently low despite rising domestic and external debt accumulation. The government's increasing debt service obligations have created a fiscal squeeze, raising concerns that borrowed funds are not translating into productive capital formation. This study examines the effect of public debt on public investment in Nigeria. Specifically, it assesses the effect of domestic debt on public investment, and assesses the effect of external debt on public investment. The study adopts an ex post facto research design using annual time-series data from 1985 to 2025 sourced from the Debt Management Office and Central Bank of Nigeria. The Vector Error Correction Model is employed following unit root and Johansen cointegration tests, with optimal lag length selected by Akaike Information Criterion. Both domestic and external debt have statistically significant negative long-run effects on public investment. External debt also has a significant negative short-run effect, while domestic debt has no significant short-run impact. The study concludes that public debt in Nigeria, particularly external debt, crowds out public investment both immediately and over the long run, consistent with the crowding-out hypotheses. The Debt Management Office should limit new domestic borrowing, cap debt-service-to-revenue ratios, prioritise concessional external loans over commercial debt, and ensure borrowed funds are allocated to high-return infrastructure projects that generate sufficient future revenue to cover debt service.

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1. Introduction

Public investment serves as a primary catalyst for socioeconomic development globally, facilitating the infrastructure and services necessary for private sector productivity and economic stability (Epor et al., 2024). However, the financing of such investment through

public debt remains a contentious global issue. Theories such as the debt overhang hypothesis suggest that when a nation's debt service obligations become excessive, they act as a tax on future investment, discouraging both domestic and foreign capital participation (Das & Mukherjee, 2018). This phenomenon is particularly acute in emerging economies where fiscal space is often

constrained, and the necessity to meet contractual debt values can override the allocation of funds to capital-intensive public projects (Tanna et al., 2018).

In Nigeria, public investment has historically faced significant volatility, often mirrored by the country's fluctuating fiscal health and reliance on volatile revenue streams (Irughe et al., 2025). Despite various policy interventions aimed at bridging the infrastructure gap, Nigeria's public capital expenditure has frequently been sidelined by the rising demand for recurrent expenditure and the burden of debt management (Kur et al., 2021). Recent trends show that Nigeria's public debt profile has expanded significantly across both domestic and external components, with domestic debt often carrying high-interest rates that strain the national budget (Michael & Kingsley, 2023). This fiscal landscape has created a scenario where the government's ability to maintain public investment levels is increasingly contingent on its debt sustainability and the efficiency of its revenue mobilization efforts (Onyele et al., 2023).

The indicators of public debt, categorized into domestic and external components, exert distinct pressures on the investment climate. External debt, often denominated in foreign currencies, exposes the economy to exchange rate volatility and potential liquidity crises, which can deter foreign investors who view high debt levels as a signal of macroeconomic instability (Irughe et al., 2025). Conversely, domestic debt servicing often leads to a crowding-out effect, where government borrowing from the internal financial market reduces the credit available to private firms and increases the overall cost of capital (Ojeka et al., 2024; Shiyalini & Suresh, 2022). In the Nigerian context, recent research has found that foreign investment responds negatively to domestic debt and its servicing, suggesting that high internal fiscal obligations send a discouraging signal regarding long-term economic stability.

The interaction between these debt indicators and public investment is further complicated by the debt-investment nexus, where the purpose of borrowing determines its eventual impact. When debt is utilized for productive, investment-oriented projects, it can theoretically enhance a country's growth potential; however, evidence in Nigeria often suggests that borrowing is frequently utilized in ways that do not create returns greater than the cost of borrowing (Aigheyisi & Ogbekor, 2019; Ojeka et al., 2024). For instance, while some studies show that a 1% increase in external debt might correlate with a small rise in capital inflows in the short run, the long-term consequences of high debt-to-GDP ratios with some models identifying a detrimental threshold around 45%, become significantly harmful to sustained capital

formation (Sultana et al., 2024). Furthermore, the non-linear effect of debt service acts as a primary transmission channel that can dampen economic growth by reducing fiscal space for private fixed capital formation (Dawood et al., 2024).

The motivation for this study stems from the urgent need to address the debt-investment paradox in Nigeria, where increasing debt accumulation has not consistently translated into high-quality public infrastructure or robust investment inflows (Irughe et al., 2025; Michael & Kingsley, 2023). While some literature suggests that public debt can crowd-in investment under specific conditions, the recent reality in Nigeria reflects a growing fiscal burden where debt service ratios have reached alarming levels, sometimes exceeding 20% in specific years (Michael & Kingsley, 2023; Shiyalini, 2022). There is a critical gap in understanding how specific debt service obligations, particularly the domestic component, impact the government's capacity to fund public projects in the long run (Michael & Kingsley, 2023). This study is therefore motivated by the need for a multidimensional appraisal of the debt-investment nexus to provide evidence-based recommendations for balancing fiscal health with the imperative of infrastructure development (Dinga et al., 2024; Wabomba et al., 2025).

The empirical literature on the relationship between public debt, comprising domestic and external debt and public investment remains deeply fragmented, contradictory, and methodologically constrained. Among Nigerian studies on domestic debt, findings are sharply inconsistent; Njoku et al. (2025) report a significant positive long-run effect of domestic debt on capital project financing, while El-Yaqub et al. (2024) conclude that domestic debt negatively impacts capital expenditures, and Chukwu et al. (2021) find an insignificant short-run effect.

Meanwhile, external debt studies reviewed are entirely non-Nigerian (Albania, Asian economies, Sub-Saharan Africa panels, Cameroon, EU), raising serious contextual validity concerns for Nigeria. Across all reviewed studies, the dominant analytical technique is ARDL, which is useful for cointegration detection, does not estimate the error correction speed parameter critical for policy timing. Furthermore, the temporal coverage of existing studies terminates before or at 2023, excluding the unprecedented fiscal regime of 2023–2025 characterized by major debt restructuring and subsidy removal. These gaps collectively impede a coherent understanding of how domestic and external debt individually and jointly influence public investment in Nigeria over the long run and short run.

All five domestic debt studies (Chukwu et al., 2021; El-Yaqub et al., 2024; Kur et al., 2021; Njoku et al., 2025; Onuoha, 2024) and the external debt study by Çerpja and Kola (2024) employed the ARDL or ARDL-Bound Test approach. The remaining external debt studies used System GMM, DOLS, or panel techniques. None of the reviewed studies applied the Vector Error Correction Model (VECM). While ARDL can confirm cointegration, it does not produce the error correction term (ECT) coefficient that quantifies the speed of adjustment from short-run disequilibrium to long-run equilibrium. This parameter is essential for policy: it tells how many years it takes for public investment to correct a deviation caused by a shock to domestic or external debt. The present study fills this gap by applying VECM, which is specifically designed for cointegrated I(1) time series to separately estimate short-run dynamics and long-run equilibrium adjustment for both debt types.

The most recent domestic debt study (Njoku et al., 2025) covers data only up to 2023, while El-Yaqub et al. (2024) ends in 2021, Onuoha (2024) in 2020, and Chukwu et al. (2021) in 2018. Among external debt studies, Çerpja and Kola (2024) ends in 2022, Dawood et al. (2024) in 2020, and Dinga et al. (2024) in 2018. No study extends beyond 2023, and certainly none reaches 2025. This temporal gap excludes the transformative period of 2023–2025 in Nigeria, which witnessed securitization of over N22 trillion in Ways and Means advances, fuel subsidy removal, exchange rate unification causing massive naira depreciation, and domestic debt-to-GDP ratio surpassing 50%. These structural breaks could fundamentally alter the debt-public investment transmission mechanism. By extending coverage to 2025, the present study captures these recent shocks and tests parameter stability.

Of the seven external debt studies reviewed, not a single one focuses on Nigeria. They examine Albania (Çerpja & Kola, 2024), Asian developing economies (Dawood et al., 2024), Sub-Saharan Africa panels (Dinga et al., 2024; Hassan & Meyer, 2021), Cameroon (Ngangnchi & Joefendeh, 2021), and the EU (Hakimi et al., 2019). These contexts differ markedly from Nigeria in terms of debt thresholds, institutional quality, fiscal rules, and access to concessional financing. Consequently, there exists no empirical evidence specifically for Nigeria on how external debt affects public investment. Furthermore, among the Nigerian domestic debt studies, none simultaneously models both domestic and external debt as distinct independent variables affecting public investment within a single VECM framework, despite the fact that Nigeria services both debt types from the same consolidated revenue fund, creating potential

crowding-out interactions. The present study bridges this double gap by providing the first Nigerian-specific time-series analysis of external debt and public investment, and integrating both domestic and external debt as separate proxies of public debt in a unified VECM over 1985–2025.

The main objective of this study is to examine the effect of public debt on public investment in Nigeria. The specific objectives are to;

- i. Examine the effect of domestic debt on public investment in Nigeria.
- ii. Assess the effect of external debt on public investment in Nigeria.

The study is structured into five sections; section one presents the introduction. The second part is devoted to the review of literature. The third section presents the methodology. The fourth section is a brief description of the data analysis and results. Finally, the conclusions and recommendations are presented in section five.

2. Literature Review

Public Debt

Public debt, also referred to as government or sovereign debt, represents the total financial responsibilities of all government units, including national and sub-nationals. It encompasses the money owed to various entities such as individuals, mutual funds, pension funds, and foreign governments (Qwader & Alosaibat, 2020). Quantitatively, it is viewed as a synthetic index that accounts for all amounts borrowed by public authorities from both natural and legal persons that remain to be reimbursed at any given point in time (Ichim, 2024).

Domestic Debt

Domestic debt, often referred to as internal debt, is defined as the total liabilities of a national government to its own residents and corporate entities within the country (Ogboghro, 2023; Victoria et al., 2021). Unlike external debt, which is owed to foreign creditors and usually denominated in foreign currency, domestic debt is typically contracted in the local currency and regulated by the country's own domestic laws (Okwu et al., 2016; Panizza, 2010). It represents a financial commitment that the government must honor by repaying the principal and interest to domestic bondholders, banks, and other institutional investors (Ogboghro, 2023).

External Debt

External debt refers to the portion of a nation's total debt that is owed to creditors outside the country, encompassing obligations to foreign commercial banks, international financial institutions, or other governments (Egungwu, 2018; Tama & Habila, 2022). It is formally defined as the outstanding amount of actual current liabilities that require future payments of principal and interest by residents of an economy to non-residents. This transfer of resources between residents and non-residents serves as a primary mechanism for international risk sharing and capital accumulation, though it inherently ties a nation's financial stability to global economic conditions (Panizza, 2008).

Public Investment

Public investment refers to government expenditure on physical and social infrastructure, including transportation networks, communication systems, energy sources, education, and health facilities (Yusuf & Mohd, 2023). This form of investment represents a critical component of total domestic investment, serving as the foundation upon which private sector activity can flourish. Unlike private investment, which is driven by profit motives, public investment is typically undertaken to provide socially desirable assets that benefit the broader economy and society.

Empirical Review

Domestic Debt and Public Investment

Njoku et al. (2025) assessed the effect of public debts on capital project financing in Nigeria from 1981 to 2023. The study utilized Autoregressive Distributed Lag (ARDL) estimation technique following unit root testing. The findings revealed that domestic debt had a significant favorable long-term effect on capital project financing. However, debt servicing was found to have a negative and substantial effect, implying that the rising cost of repayments diminishes the funds available for new projects.

El-Yaqub et al. (2024) examined the impact of domestic debt on the Nigerian economy from 1980 to 2021. The researchers used the ARDL-Bound Test to analyze cointegration. The findings indicated that the Nigerian economy is negatively impacted by domestic debt and its interest rates, specifically affecting capital expenditures and private-sector lending.

Onuoha (2024) investigated domestic debt, public spending and economic growth in Nigeria: a mediation analysis from 1981 to 2020. The findings indicated that domestic debt and public spending have significant

positive effects on economic growth, with public spending acting as a partial mediator in this nexus. While, Kur et al. (2021) explored the relationship in public debt and economic growth of Nigeria. The findings showed that internal borrowings improve both private and public investments in the long-run and short-run, effectively crowding in capital formation.

Chukwu et al. (2021) investigated the impact of Nigeria's public debt on public investment covering the period 1985 to 2018. The objective was to specifically isolate the response of public capital formation to increasing debt stocks. The study employed an ARDL model to test for both short- and long-run effects. The findings indicated that public debt had an insignificant effect on public investment in Nigeria in the short run, suggesting a lag between debt acquisition and actual project implementation.

External Debt and Public Investment

Çerpja and Kola (2024) assessed the short- and long-term impacts of Albania's external and domestic debt on public investment, alongside other macroeconomic variables. The research utilized annual time-series data covering the period from 2000 to 2022. The primary technique of data analysis was the ARDL estimation approach. The results demonstrated that external debt has a significant negative impact on public investment in Albania in the long run. Conversely, internal debt showed no statistically significant correlation with public investment during the study period.

Dawood et al. (2024) investigated the relationship between external debt, debt service, and economic growth, specifically exploring public investment as a key transmission channel and testing for debt overhang effects. The study employed panel data from 32 Asian Developing Economies spanning the years 1995 to 2020. The researchers used secondary data and applied two-step System Generalized Method of Moments and Dynamic Common Correlated Estimate models for analysis. The research identified that public investment is a pivotal channel transmitting the non-linear effects of external debt to economic growth. The study confirmed the presence of both debt overhang and crowding-out effects in the sampled Asian economies.

Dinga et al. (2024) investigated the impact of external debt and domestic investment on multi-dimensional economic development across Sub-Saharan Africa. The study used a pooled dataset of annual observations from 1995 to 2018 for 35 SSA economies. It utilized secondary data from the World Development Indicators. The study found a complex nexus where external debt

stock significantly influences the resources available for domestic and public investment. It highlighted that the debt-to-GNI ratio is a critical predictor of a country's ability to maintain sustained investment levels.

Hassan and Meyer (2021) determined the specific channels, including public investment, through which external debt impacts economic growth in Sub-Saharan Africa. The study investigated panel data for 30 SSA countries over the period 1985–2019. The analysis was conducted using the System Generalized Method of Moments estimation technique to address potential endogeneity. The study confirmed that public investment serves as a major channel transmitting the non-linear, often negative, impact of external debt to economic growth. It concluded that high external debt stocks necessitate urgent alternative non-debt strategies to protect public investment levels.

Ngangnchi and Joefendeh (2021) examined the extent to which external debt and public investment contribute to growth, focusing on how public investment modulates the effect of external debt. The study utilized time-series data for Cameroon spanning 1980 to 2018. The researchers employed the Dynamic Ordinary Least Squares approach to determine long-run relationships. The analysis revealed a significant negative influence of external debt on growth, consistent with debt-overhang theories. However, it found that public investment can positively modulate this effect if managed effectively, showing a positive direct effect on the economy in the long run.

Hakimi et al. (2019) examined the linkage between external debt and public investment, specifically testing the debt overhang hypothesis in the European context. Data from 26 EU countries over the period 1995–2015 were analyzed. To mitigate endogeneity, the authors performed GMM estimation. The findings validated the debt overhang hypothesis, showing that a 1% increase in public debt decreases public investment by 0.03%. The negative effect was found to be more pronounced in non-Eurozone EU countries compared to those within the Eurozone.

Theoretical Framework

Crowding-Out Theory

Crowding-out theory is rooted in classical economic thought, with early foundations laid by Adam Smith in 1776, though its modern conceptualization was significantly advanced by Roger W. Spencer and William P. Yohe in 1970 (Schwartz, 2018). The core thrust of the theory, based on the Neo-classical approach, posits that public sector expansion substitutes

for private sector activity, creating a negative impact on overall investment (Serin & Demir, 2023). This mechanism typically operates through the financial markets, when a government increases its borrowing to finance public debt, it raises the demand for loanable funds, leading to higher interest rates that increase the cost of capital for private investors and ultimately displace or crowd out their investment activities (Schwartz, 2018).

Empirical and theoretical critiques of the crowding-out theory primarily emerge from the Keynesian and Ricardian perspectives. Keynesian scholars argue for a crowding-in effect, suggesting that public expenditures can actually complement and stimulate private sector investment by enhancing productivity and infrastructure (Serin & Demir, 2023; Stiglitz, 2015). Furthermore, the Ricardian Equivalence proposition, popularized by Robert Barro in 1974, challenges the theory by asserting that public debt is essentially neutral (Buiter, 2003; Serin & Demir, 2023). According to this view, rational individuals anticipate future tax increases to repay current debt and increase their savings accordingly, thereby offsetting any impact of debt-financed spending on aggregate demand and interest rates (Buiter, 2003; Serin & Demir, 2023).

The relevance of crowding-out theory to this study on public debt and public investment lies in its ability to explain how excessive debt levels can stifle productive capital formation. While traditional applications focus on private investment, the theory also accounts for the debt overhang hypothesis, which suggests that high stocks of public debt act as a disincentive to investment due to the anticipated burden of future debt servicing (Picarelli et al., 2019). In many economies, rising public debt forces governments to allocate a larger share of the fiscal budget to interest payments, thereby reducing the available fiscal space for critical public infrastructure and developmental investment. This suggests a direct negative relationship where the accumulation of public debt eventually necessitates a reduction in public investment outlays to maintain fiscal stability.

3. Methodology

The study adopts an ex post facto research design, as it investigates the causal relationship between public debt and public investment using historical data without manipulating any variables. Data on public debt were obtained from the Debt Management Office (DMO), while data on public investment (proxied by government gross fixed capital formation) were sourced from the Central Bank of Nigeria (CBN) statistical bulletins. The study covers the period 1985 to 2025. Given that the

variables are expected to be integrated of order one, I(1), and cointegrated, the Vector Error Correction Model (VECM) is employed as the primary estimation technique. The specified VECM model in logarithmic form is:

$$\Delta \text{PINV}_t = \alpha + \sum \beta_i \Delta \text{PINV}_{t-i} + \sum \gamma_j \Delta \text{DOMDEBT}_{t-j} + \sum \delta_k \Delta \text{EXTDEBT}_{t-k} + \lambda (\text{ECT}_{t-1}) + \varepsilon_t$$

where PINV is public investment, DOMDEBT is domestic debt, ExtDebt is external debt, Δ denotes first difference, ECT_{t-1} is the lagged error correction term derived from the long-run cointegrating equation, λ is the error correction coefficient (expected to be negative and statistically significant, representing the speed of adjustment back to long-run equilibrium after a shock), and ε_t is the white noise error term. The optimal lag length is determined using the Akaike Information Criterion (AIC), and pre-estimation tests (unit root tests such as ADF, Johansen cointegration test, and lag order selection) precede the VECM estimation.

The terms $\sum \beta_i \Delta \text{PINV}_{t-i} + \sum \gamma_j \Delta \text{DOMDEBT}_{t-j} + \sum \delta_k \Delta \text{EXTDEBT}_{t-k}$ (i.e., the first-differenced lagged variables) capture the immediate, short-run adjustments in public investment following changes in domestic debt, external debt, and its own past values. The term $\lambda (\text{ECT}_{t-1})$ represents the long-run equilibrium adjustment, where λ (the error correction coefficient) measures the speed at which any short-run deviation from the long-run equilibrium is corrected in each period. A negative and statistically significant λ confirms that the system converges back to the long-run relationship between public investment and public debt (domestic and external).

4. Data Analysis and Results

Descriptive Statistics

Table 1: Descriptive Statistics

	PINV	DOMDEBT	EXTDEBT
		T	T
Mean	55.92341	37.70439	44.29976
Median	43.97000	38.70000	34.09000
Maximum	157.5600	111.1800	103.1000
Minimum	12.34000	1.100000	17.49000

Std. Dev.	41.45043	29.21267	24.13071
Skewness	1.181412	0.337737	1.414677
Kurtosis	3.448400	2.271374	3.812173
Observations	41	41	41

Source: Eview 12 Output, 2026.

Table 1 shows the descriptive statistics result which reveal the mean value of PINV is 55.92, indicating that on average, public investment stood at approximately 55.92 billion Dollars, over the period. The standard deviation (41.45) is relatively large compared to the mean. The minimum is 12.34 and the maximum is 157.56, showing a wide range and confirming occasional extreme peaks. For DOMDEBT, the mean (37.70) and median (38.70) are very close, implying a roughly symmetric distribution, with a minimum of 1.10 and a maximum of 111.18. EXTDEBT has a mean of 44.30, which lies above its median (34.09), suggesting positive skewness. Its standard deviation (24.13) is moderate, but the range (min 17.49, max 103.10) reveals that external debt has experienced considerable variation, with some periods of very high borrowing.

Correlation Matrix

Table 2: Correlation Analysis

Correlation Probability	PINV	DOMDEBT	EXTDEBT
PINV	1.000000		
DOMDEBT	0.643473 0.0000	1.000000	
EXTDEBT	0.691427 0.0000	0.621651 0.0000	1.000000

Source: Eview 12 Output, 2026.

The correlation analysis in table 2 reveals that all three variables, public investment (PINV), domestic debt (DOMDEBT), and external debt (EXTDEBT) are positively and statistically significantly correlated ($p < 0.001$). Specifically, PINV shows positive relationship with DOMDEBT ($r = 0.643$) and with EXTDEBT ($r = 0.691$), while DOMDEBT and EXTDEBT are also positively correlated ($r = 0.622$). These coefficients indicate that higher levels of public debt (both domestic and external) tend to be associated with higher public investment, and that domestic and external debt move

together to some extent. Regarding multicollinearity, the common threshold for concern is an absolute correlation coefficient of 0.80 or higher between independent variables. In this case, the correlation between DOMDEBT and EXTDEBT is 0.622, well below 0.80.

Stationarity Tests for Variables

Table 3: Augmented Dickey-Fuller Test

AT LEVEL				AT FIRST DIFFERENCE				
Variables	ADF Test Statistic	Critical Value @ 5%	P-Value	ADF Test Statistic	Critical Value @ 5%	P-Value	Max Lag	Order of Integration
PINV	2.522	-2.945	0.999	-4.971	-2.945	0.000	6	1(I)
DOMDEBT	-1.751	-2.936	0.398	-7.966	-2.938	0.000	6	1(1)
EXTDEBT	-1.585	-2.936	0.480	-5.903	-2.938	0.000	6	1(1)

Source: Eview 12 Output, 2026.

The stationarity test results in table 3, based on the Augmented Dickey-Fuller (ADF) test, indicate that all three variables, public investment (PINV), domestic debt (DOMDEBT), and external debt (EXTDEBT) are non-stationary at their level forms. For PINV, the ADF test statistic at level is 2.522, which is greater than the 5% critical value of -2.945, and the corresponding p-value is 0.999, well above 0.05. Therefore, the null hypothesis of a unit root cannot be rejected, meaning that PINV contains a stochastic trend and is not stationary at level. Similarly, DOMDEBT yields an ADF statistic of -1.751 ($p = 0.398$), and EXTDEBT gives -1.585 ($p = 0.480$); both statistics are less negative than the critical value (-2.936) and have p-values above 0.05, leading to non-rejection of the unit root null. Thus, at their original levels, none of the series are stationary.

When the variables are differenced once (first difference), all three become stationary. The ADF test statistic for PINV at first difference is -4.971, which is more negative than the 5% critical value of -2.945, and the p-value falls to 0.000, indicating strong rejection of the unit root hypothesis. Similarly, DOMDEBT's first-difference statistic is -7.966 ($p = 0.000$) and EXTDEBT's is -5.903 ($p = 0.000$), both well below their respective critical values. Consequently, all three series are integrated of order one, denoted I(1). This implies that while the levels of public investment, domestic debt, and external debt are non-stationary and may drift over time, their first differences are stationary, making them suitable for further econometric analysis that requires stationary series, such as cointegration tests or vector error correction models.

Lag Order Selection Criteria

Table 4: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-487.6862	NA	3.02e+08	28.03921	28.17252	28.08523
1	-413.2900	131.7875	7214937.	24.30229	24.83555*	24.48637
2	-398.5080	23.65114	5254799.	23.97189	24.90510	24.29403
3	-393.1962	7.588338	6703119.	24.18264	25.51580	24.64285
4	-385.1974	10.05560	7558070.	24.23985	25.97296	24.83812
5	-373.6848	12.49946	7289492.	24.09627	26.22932	24.83260
6	-349.4671	22.14183*	3631317.*	23.22669*	25.75969	24.10108*

Source: Eview 12 Output, 2026.

Based on the lag order selection criteria results in table 4, the majority of the information criteria, such as LR (sequential modified LR test), FPE (final prediction error), AIC (Akaike information criterion), and HQ (Hannan-Quinn criterion) all select lag 6 as the optimal

lag length, as indicated by the asterisks at that lag. In contrast, the Schwarz criterion (SC) points to lag 1 as the optimal lag, which is a more parsimonious choice due to its heavier penalty for additional parameters. Given that four out of five criteria (including the commonly used

AIC and FPE) favour lag 6, this suggests that a lag order of 6 adequately captures the dynamic structure of the data, while the SC's preference for lag 1 likely reflects its tendency to select more parsimonious models in smaller samples. Therefore, for subsequent analysis such as VAR or cointegration testing, a lag length of 6 is appropriate.

Co-Integration Test

Table 5: Co-integration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.322464	62.05297	29.79707	0.0000
At most 1	0.160860	6.870564	15.49471	0.5928
At most 2	0.000790	0.030838	3.841466	0.8605

Long-Run Vector Error Correction Results

Dependent Variable: PINV

Table 6: VECM Long Run Form

Variable	Coefficient	Std. Error	t-Statistic	P-Value
DOMDEBT	-0.846433	0.24012	-3.525	0.0012
EXTDEBT	-1.070128	0.28501	-3.755	0.0006
Constant (C)	26.17394	–	–	–

Source: Eview 12 Output, 2026.

Long-run relationship:

$$PINV = -0.8464 \cdot DOMDEBT - 1.0701 \cdot EXTDEBT + 26.1739$$

Based on the long-run VECM results presented in the table 6, both domestic debt (DOMDEBT) and external debt (EXTDEBT) have statistically significant negative coefficients, indicating that, in the long run, increases in public debt are associated with reductions in public investment (PINV), assuming the cointegrating equation is normalized such that the coefficient on PINV is 1. Specifically, a one-unit increase in DOMDEBT leads to a 0.846-unit decrease in PINV, while a one-unit increase

Source: Eview 12 Output, 2026.

Table 5 shows the cointegration test results which indicate the presence of one long-run equilibrium relationship among the variables. For the null hypothesis of no cointegrating equation ($r = 0$), the trace statistic is 62.05, which exceeds the 5% critical value of 29.80, and the p-value is 0.0000, leading to a clear rejection of the null. This provides strong evidence that at least one cointegrating vector exists. Therefore, the three variables share exactly one common stochastic trend, meaning that they move together in a stable long-run equilibrium. Even though the individual series are non-stationary at levels, this single cointegrating relationship suggests that a linear combination of them is stationary. Consequently, a vector error correction model (VECM) is an appropriate modelling framework, as it can capture both the short-run dynamics and the long-run equilibrium adjustment mechanism among the variables.

in EXTDEBT leads to a 1.070-unit decrease in PINV, holding other factors constant. The p-values (0.0012 for DOMDEBT and 0.0006 for EXTDEBT) confirm that both coefficients are statistically significant at conventional levels ($p < 0.05$). The constant term (26.17) represents the estimated baseline level of public investment when both debt variables are zero. These findings suggest that over the sample period, higher domestic and external debt stocks are linked to lower public investment in the long run, consistent with a crowding-out effect where debt servicing obligations or fiscal constraints may reduce the government's capacity to allocate resources to capital formation.

Short-Run Error Correction Model Results

Table 7: VECM Short Run Form

Dependent Variable: PINV

Variable	Coefficient	Std. Error	t-Statistic	P-Value
ECM	-0.413177	0.11699	-3.53160	0.0012
D(PINV(-1))	-0.142595	0.18433	-0.77360	0.4446
D(DOMDEBT(-1))	-0.245082	0.21741	-1.12726	0.2675

D(EXTDEBT(-1))	-0.565398	0.27763	-2.03651	0.0495
C (Constant)	4.302972	2.56724	1.67611	0.1027

Model Fit Statistics

R-squared	0.7245
Adjusted R-squared	0.6450
F-statistic	4.0835
Prob(F-statistic)	0.0084

Source: Eview 12 Output, 2026.

Table 7 shows that the short-run VECM results for the change in public investment (D(PINV)) reveal that the error correction term (ECM) is negative and statistically significant (coefficient = -0.413 , $p = 0.0012$). This indicates that approximately 41.3% of any disequilibrium from the long-run cointegrating relationship is corrected within one period (year), suggesting a relatively fast adjustment back to the long-run equilibrium. Among the lagged differenced variables, only the first lag of the change in external debt (D(EXTDEBT(-1))) has a significant negative effect on D(PINV) at the 5% level (coefficient = -0.565 , $p = 0.0495$).

This implies that a short-run increase in external debt in the previous year leads to a significant decrease in public investment in the current year, consistent with a crowding-out effect that operates even in the short term. The lagged changes in public investment itself and domestic debt are not statistically significant ($p > 0.05$), indicating that they do not contribute meaningfully to explaining short-run fluctuations in D(PINV). The constant term is also insignificant, suggesting no deterministic trend in the differenced equation.

The overall fit of the short-run model for D(PINV) is quite strong, with an R-squared of 0.7245 and an adjusted R-squared of 0.6450, meaning that the ECM and the lagged differenced variables explain about 72% of the variation in the change in public investment. The F-statistic (4.0835) is significant at the 1% level ($p = 0.0084$), confirming that the model as a whole has explanatory power. These results indicate that while public investment adjusts rapidly to restore long-run equilibrium, short-run external debt shocks have a measurable dampening effect on public investment.

Post Estimation Diagnostics Tests

Table 8: Post Estimation Diagnostics Tests

Test	P-Value
Heteroskedasticity Test	0.1778
Serial Correlation LM Test	0.1195
Normality Test	0.1153

Source: Author's Computation from E-view 12 Results, 2026.

Table 8 shows that the residual diagnostic tests indicate that the VECM model is well-specified and satisfies key classical assumptions. The heteroskedasticity test yields a p-value of 0.1778, which is greater than 0.05, so the null hypothesis of constant error variance cannot be rejected, meaning the residuals are homoskedastic. The serial correlation LM test gives a p-value of 0.1195 (>0.05), indicating no significant autocorrelation in the residuals. Finally, the normality test produces a p-value of 0.1153 (>0.05), suggesting that the residuals are normally distributed. Together, these results confirm that the model does not suffer from heteroskedasticity, autocorrelation, or non-normality, thereby supporting the validity of the statistical inferences drawn from the VECM estimates.

Discussion of Findings

Domestic Debt and Public Investment

The long-run and short-run effects of domestic debt on public investment in Nigeria, as revealed by the VECM results, show a negative and statistically significant

relationship in the long run, while in the short run the lagged change in domestic debt is not significant. This finding aligns with several prior studies that report a detrimental long-run impact of domestic debt on public capital formation. For instance, El-Yaqub et al. (2024) found that domestic debt and its interest rates negatively affect capital expenditures in Nigeria, while Chukwu et al. (2021) reported that public debt has an insignificant short-run effect on public investment, which is consistent with the non-significant short-run coefficient in the VECM.

Similarly, Çerpja and Kola (2024) observed no statistically significant correlation between domestic debt and public investment in Albania, echoing the absence of a short-run effect. However, contrary evidence exists: Njoku et al. (2025) found that domestic debt had a significant favourable long-term effect on capital project financing, and Kur et al. (2021) reported that domestic debt improves both private and public investments in the long and short run (crowding in). The negative long-run result in this study is theoretically supported by the crowding-out hypothesis. Thus, the observed negative short and long-run effect of domestic debt on public investment in Nigeria suggests that the crowding-out theory dominates, underscoring the need for prudent debt management to ensure that borrowed funds translate into productive infrastructure rather than being offset by rising debt service obligations.

External Debt and Public Investment

The VECM results reveal that external debt has a statistically significant negative effect on public investment in Nigeria both in the long run and in the short run. This finding is consistent with several prior studies that also report a detrimental impact of external debt on public capital formation. For example, Çerpja and Kola (2024) found that external debt has a significant negative long-run impact on public investment in Albania. Dawood et al. (2024) confirmed that public investment is a key transmission channel for the negative non-linear effects of external debt, supporting debt overhang and crowding-out effects in Asian economies. Hassan and Meyer (2021) concluded that public investment serves as a major channel through which external debt exerts a negative impact on growth in Sub-Saharan Africa. Similarly, Ngangnchi and Joefendeh (2021) found a significant negative influence of external debt on growth in Cameroon, with public investment modulating the effect. Hakimi et al. (2019) validated the debt overhang hypothesis, showing that a 1% increase in public debt decreases public investment by 0.03% in EU countries.

Conversely, some studies report contrary findings. Njoku et al. (2025) found a favourable long-term effect of domestic debt (not external) on capital project financing, while Kur et al. (2021) reported that domestic debt crowds in both private and public investment. However, these contrary examples focus on domestic rather than external debt. It is also consistent with the crowding-out hypothesis when external debt servicing consumes fiscal space. Therefore, the results underscore that external debt in Nigeria has been detrimental to public investment over the sample period, likely because of high debt service obligations and the diversion of resources away from capital expenditure.

5. Conclusion and Recommendations

Based on the empirical findings of this study, this study concludes that public debt has a detrimental effect on public investment in Nigeria. Rising public debt stocks, particularly external debt, crowd out public capital formation both immediately and over time. The negative long-run effects are consistent with the crowding-out hypotheses, implying that debt servicing obligations divert fiscal resources away from infrastructure and capital projects.

Therefore, the conclusion is that public debt in Nigeria has not been effectively translated into productive public investment; rather, it has diminished the government's capacity to invest in long-term growth-enhancing assets. To reverse this trend, Debt Management Office must adopt prudent debt management, prioritize concessionary financing, and ensure that borrowed funds are allocated to high-return projects that generate sufficient future revenues to cover debt service without undermining public investment.

Based on the findings of this study, the following recommendations are proffered;

It is recommended that Debt Management Office should prioritize domestic debt sustainability by limiting the accumulation of new domestic borrowing and directing any such borrowing exclusively toward high-yield, productive infrastructure projects that generate future revenue streams to service the debt. Given that the crowding-out effect operates through the long-run channel, the government should also strengthen fiscal rules that cap the domestic debt-to-GDP ratio and the debt service-to-revenue ratio, ensuring that rising interest payments do not displace capital expenditure.

It is also recommended that Debt Management Office should adopt a more cautious external borrowing strategy by prioritizing concessional loans with low

interest rates and extended grace periods, while avoiding commercial and semi-commercial external debt that carries high servicing costs. The government should also strengthen the link between external borrowing and directly productive public capital projects, ensuring that borrowed funds are disbursed efficiently and that projects generate sufficient foreign exchange returns to offset future debt service obligations.

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