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Research paper

Effect of Public Debts on Capital Project Financing in Nigeria

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Abstract

This study explored the effect of public debts on capital project financing in Nigeria using data ranging from 1981 to 2023. The study adopted the unit root test as a preliminary test, while the Autoregressive Distributed Lag (ARDL) was used for the estimation proper. With the mixed integration of the variables under the unit root testing, the ARDL was deemed appropriate for the estimation. While public debt was measured by domestic debt, external debt, and debt servicing, capital project financing was measured by government capital expenditure. From the findings, the ARDL bounds test, which was applied to test for cointegration, revealed a long-run relationship among the variables under consideration. The long-run estimates of the model hold that both external and domestic debt had a favorable and noteworthy long-term effect on Nigeria's capital project financing, implying that an increase in external debt and domestic debt significantly enhanced capital project financing in Nigeria. However, the study discovered that debt servicing had a negative and substantial effect on funding of capital projects, meaning that the higher the cost of debt servicing, and more capital project financing was diminishing in Nigeria. The significance of the ARDL model demonstrated that the long-term components of the capital project finance model are interconnected. According to the estimates, changes in the amount of domestic debt had a greater impact on financing capital projects than did changes in the amount of external debt and debt servicing. This finding revealed that Nigeria's capital projects are being funded in part by its external and domestic debt. Hence, policymakers should ensure that debt is contracted for capital creation-based economic development rather than for selfish or political reasons, and that the government uses borrowed funds to fund economically beneficial projects that will increase output and reduce the debt load.

Keywords: *Public Debts, Capital Project, Capital Expenditure, Recurrent Expenditure, Domestic Debts, Domestic Investment.*

1. Introduction

The financing of capital projects—such as power infrastructural development, transportation (Road, Rail, marine, and air), healthcare facilities, and educational development—is a critical driver of sustainable growth and development for any nation's economy and the cornerstone of Nigeria's long-term economic development strategy. For Nigeria, as Africa's largest economy and most populous nation on the continent, the need for robust expenditure in capital is particularly acute and perennial. There is a massive infrastructure deficit associated with decades of underinvestment in the critical sectors. This infrastructural deficit is estimated to require over $3 trillion to address it in the country (World Bank, 2020). For any nation to attract foreign direct investment, improve productivity, create adequate employment, and ultimately raise the standard of living for the populace, the government's investments in capital projects are essential.

The Nigerian government, traditionally, has heavily relied on three major sources to finance its annual budget, including the capital component- tax revenues, oil revenue, and borrowing. The volatility of global crude oil prices has, however, consistently made oil revenue an unreliable source of funding for the government. Though Tax revenues, which are still improving, remained grossly inadequate in bridging the enormous government budget funding gap. Consequently, successive governments have, over the years, relied on internal and external borrowing to a significant level to supplement revenue shortfalls and finance critical capital projects in the country.

This heavy reliance on debt has led to a rapid and significant increase in Nigeria's total public debt stock —domestic and foreign. Available statistical Data from the Debt Management Office (DMO) shows that the total public debt stock of Nigeria has grown rapidly, from NGN 12.6 trillion in 2015 to NGN 97.34 trillion (approx. $108 billion) by the end of 2023 (DMO, 2024). This has continued to increase to about 149.3 trillion naira as of September 2025. This surge in debt stock is attributable to budget deficits, the COVID-19 pandemic response shock, and the recent devaluation of the Nigerian currency by the present administration, which inflated the Naira value of the external debt stock.

The relationship existing between public debt and capital project financing is a complex and two-fold one. On one end, borrowing is ostensibly required to finance infrastructural and other capital projects that are expected to generate future returns for the country's economy, which will be sufficient to service the incurred debt costs. If this happens, debts are said to have a positive and catalytic effect on

the economy. But if this does not happen, a high and unsustainable debt stock will pose a significant economic threat to capital financing in the country. If borrowed funds are highly unproductive, a large portion of government revenue is increasingly allocated to debt servicing—paying interest on existing debts rather than repaying the principal amount involved. For instance, in the 2024 budget, debt service allocation of NGN 8.25 trillion exceeded the budgetary allocation for capital expenditure of NGN 7.81 trillion (Budgit, 2024). This creates a crowding-out effect, where scarce fiscal resources are diverted from productive capital investment to debt servicing, which is consumptive.

Again, the recent economic challenges—soaring inflation, currency depreciation, and fiscal pressures caused by the recent removal of fuel subsidies and the unification of foreign exchange windows- have intensified the debate on the sustainability of debt. The World Bank and International Monetary Fund (IMF) have repeatedly expressed concerns over the revenue-to-debt service ratio of Nigeria, which indicates fiscal position vulnerability (IMF, 2023). In Recent times, studies have begun to interrogate the efficiency of the borrowed funds in Nigeria, with evidence suggesting that the level and quality of public infrastructure have not improved, despite the rising debt, pointing to potential issues with borrowed funds utilization, governance, and corruption (Okafor & Ezeaku, 2023).

It is therefore, against the backdrop of an escalated public debt profile, persistent infrastructural deficit, and constrained government revenue, it becomes pertinent to investigate critically the precise effect of this growing public debt burden on the financing and execution of capital projects in Nigeria. This study seeks to fill this gap by providing a contemporary empirical analysis of how Nigeria's debt accumulation is impacting its ability to fund the capital projects crucial for its long-term economic development of the nation.

Capital projects, encompassing critical infrastructure--power plants, railways, roads, and educational facilities, are the bedrock of long-term economic development and productivity of any nation. They enhance the productive capacity of an economy, create jobs, and improve the overall standard of living of the people (World Bank, 2022). Nigeria, known for its immense infrastructural deficit, is estimated to require over $3 trillion to address it, and financing these capital projects is a central challenge facing the country (NIPC, 2021).

Given persistent budget shortfalls due to volatile oil revenues, as a primary tool to bridge the infrastructure financing gap, the Nigerian government has increasingly turned to public debt - domestic and external. Public borrowing, according to the theoretical premise, rooted in Keynesian economics, can be a viable strategy to finance productive capital investments that propel future economic growth, ultimately generating the revenue needed to service the debt (Aizenman & Kletzer, 2010).

Despite the rising stock of public debt in Nigeria, which increased from ₦12.6 trillion in 2015 to over ₦97.3 trillion in 2023 and to about ₦149 trillion in 2025 (DMO, 2025), there is a growing expert and public concern that this significant borrowing has not translated into a commensurate increase in the number and quality of completed capital projects in the country. Rather, the nation continues to experience a massive decline in infrastructure, with many abandoned or stalled capital projects due to alleged funding constraints.

This scenario presents a critical question and a core problem for the nation's economic management: Why has the rapid accumulation of public debt in recent times not effectively addressed the capital project financing deficit in Nigeria? There is a palpable fear that the relationship between debt and capital formation may be negative or non-linear, in turn, leading to a debt-overhang situation--high debt levels stifle the economy rather than stimulate investment. Major issues exacerbating this problem include:-A A large portion of government revenue is allocated to servicing existing debt obligations now. This drastically reduces the fiscal space available for new capital expenditures. In the 2024 budget, for instance, debt servicing consumed over 45% of the year's revenues, while capital expenditure received a significantly lower allocation (Budgit, 2024). There are persistent allegations that a greater proportion of borrowed funds is possibly diverted to finance recurrent expenditure -salaries and overheads, rather than being channeled to the capital projects for which they were acquired (Oyedele, 2022).

Increased government borrowing from the domestic financial market has a crowding-out effect on private sector investment by increasing interest rates, thereby making it very expensive for the private sector to access credit facilities for its own capital projects (CBN, 2024).

The increasing debt profile of Nigeria raises concerns about fiscal sustainability and whether the borrowed funds are being managed efficiently and transparently to deliver tangible project outcomes (IMF, 2023).

An empirical analysis, therefore, is urgently needed to determine the precise nature and magnitude of the relationship existing between public debt and capital project financing in Nigeria, moving beyond political rhetoric to evidence-based analysis.

2. Literature Review

Government spending on capital projects like investments in key infrastructure sectors: power, transportation, and education, remains the fundamental catalyst for Nigeria's long-term economic growth and development. But, persistent fiscal deficits as a result of oil revenues decline have necessitated the Nigerian government's dependence on both domestic and external borrowing to finance these projects and close the shortfalls in the budgets. This reliance on both domestic and external debts has significantly increased Nigeria's profile of public debt profile, raising serious worries about its potential effect on capital expenditure and overall sustainability of the economy. Consequently, this review examines contemporary literature on the relationship between public debt and capital project financing, employing the debt-overhang theory to provide a deeper analytical insight. It also reconciles divergent empirical results and highlights key research gaps that warrant further scholarly research.

2.1 The Debt-Overhang Theory:

The Debt-Overhang Theory provides a valuable framework for analyzing the link between public indebtedness and the financing of capital projects in Nigeria. It was initially developed within the context of corporate finance, but the theory was subsequently adapted to explain the dynamics of government debt. It posits that when an economy's debt burden becomes excessively high, expectations that future revenues will primarily be diverted toward servicing of debts—rather than productive capital investment—it creates a disincentive for both public and private sector investment. This situation, as articulated by Krugman (1988), can hinder economic growth and weaken the government's capacity to fund essential economic developmental projects. In the Nigerian context, this theory further predicts two primary effects on capital project financing:

1. Crowding-Out Effect: An increased level of government domestic debt compels the government to issue high-interest-yielding securities to attract investors. This action exerts severe pressure on interest rates across the economy, thereby increasing the cost of capital. As a result, private enterprises are hindered from accessing affordable credit, thereby discouraging investment in productive and capital-intensive ventures. Consequently, this "crowding-out effect" tends to undermine private sector participation in capital development of the nation (Adeniyi & Okunlola, 2024).

2. Fiscal Squeeze: As commitments to servicing debt absorb a large share of government revenue, the fiscal space available for discretionary expenditure—on capital and infrastructural projects—becomes constrained significantly. This situation creates a clear trade-off between allocating resources for repayment of debts and financing infrastructural development projects in the country (Nwokoye, Metu & Eze, 2023).

Consequently, the critical policy question facing the nation of Nigeria is whether the country's rising debt burden has crossed the threshold from being an instrument for promoting economic growth to becoming a debt overhang that limits economic expansion and development.

2.2 Recent Empirical Studies

The long-term dynamics of public debt, infrastructure, and economic growth were analyzed empirically by Obasi, Hassan, and Alika (2025) in Nigeria. This study, covering the data period 1981 - 2022, employed cointegration techniques, which yielded a nuanced conclusion: while external debt servicing had a significant drag on the economy, internal debt showed no meaningful statistical effect. On the other hand, Infrastructure development was a significant positive contributor to economic growth within the period.

Han, Mai, Zhang, and Luo (2025) investigated empirically into Belt and Road Initiative countries (2010-2021) and established a significant link between infrastructure development and enhanced performance in innovation. This causal link was revealed to have passed through external debt, with the significant effect most pronounced in nations with strong debt management aptitude and efficient capacity utilization. The study revealed that external debt is both a financial input and a transformative boost for promoting absorption of technology and industrial development in the countries. Furthermore, the researchers suggest that China's role as a sovereign lender has fostered innovation effectively, even without imposing debt pressures on recipient economies that are unsustainable.

The study by Aladejare and Musa (2024) employing an ARDL model on data from 1980 - 2022, delineated the dual nature of external debt as complex and time-variant. It confirmed that while sustainable levels of debt are a positive long-run significant determinant of growth, it had a limited short-term influence. The findings pointed out that foreign interest payments were a major drain on the economy, implying a trade-off where growth-promoting expenditures were negatively affected by debt servicing obligations. Offsetting this negative effect, the exchange rate was observed as a powerful driver of economic growth.

Using data for the period 1986 - 2022, Iwedi and Ogbonna (2024) explored the interplay between Nigeria's domestic debt dynamics and public investment choices, a relationship with critical consequences for both fiscal sustainability and economic growth. Applying the Granger Causality and an Error Correction Mechanism (ECM) revealed that government expenditures on public transport were affected significantly by the levels of Federal Bonds, Treasury Bills, and the equilibrium-adjusting mechanism of the ECM.

Using a PRISMA guideline in a systematic analysis, Meng, Ye, and Wang (2024) examined the financing and investment dynamics of sustainable infrastructure. Their results confirmed green finance as not only a highly pertinent topic but also a dominant topic in the contemporary era. To bridge the research and practice gap, the study put forward a conceptual framework necessary for the integration of green finance into infrastructure planning and economic advancement. This output is positioned as a strategic reference for policy decisions and guides subsequent scholarly works focused on the adoption of green finance.

The moderating effect of public debt on the efficacy of productive government expenditure was the focus of the study by Ojo, Chukwuma, and Suleiman (2024) using empirical data from 1993 -2023. The findings from their multiple regression analysis revealed a clear distinction: administrative Government expenditure, when conditioned by government debt, became a significant contributor to economic growth for the period under review. But transfer payments, even under the same moderation of debt, had no such significant effect. These led the authors to conclude that the growth effect of government spending is contingent on both its type and its interaction with the debt level of the nation.

Using an ARDL model approach on time-series data from 1981- 2021, Umezuruike and Ariwa (2024) investigated how financing of budget deficit affects economic stability of the Nigerian economy. The analysis showed a nuanced picture: the overall fiscal deficit had significantly impaired economic growth in the country. But, disaggregating government expenditures showed that government funding on transportation, health, and physical capital (gross capital formation) were strong positive contributors to economic growth. An exception to this trend was education spending, which had a counterproductive effect on economic growth.

Research findings of Nigerian government debt yield important distinctions between its direct and channeled effects. Onuoha (2024), in his research, demonstrated that domestic debt significantly fosters economic growth-directly and indirectly, through its stimulation of public expenditure, which partially influenced the relationship. Conversely, Busari, Okeowo, and Toru (2024) revealed that while aggregate government debt supports infrastructural advancement, its individual components:-domestic and external debts are statistically insignificant in explaining long-term changes in capital expenditure. This discrepancy suggests that the positive overall effect may stem from broader fiscal channels rather than a direct, significant link from debt to infrastructure investment, pointing to probable inefficient allocation of borrowed resources.

While most existing literature on the public has examined its effect on Nigeria's economic development, there is a conspicuous scarcity of research that has focused specifically on capital project financing in Nigeria. Although studies by Busari et al. (2024) have examined the effect of public debt on infrastructural development, the research by Onyekachi-Onyele, Umezurike, and Nwagwu (2024) is exceptionally notable for its direct investigation of capital project financing. To address this gap, the current study develops a model that comprehensively integrates the core components of public domestic debt, foreign debt, and debt servicing, with capital project financing, which is measured by public capital expenditure.

This recent literature on the effect of public debt on capital projects financing in Nigeria is timely and maturing, moving from simple correlations to more nuanced analyses involving debt thresholds and their composition. The theoretical analysis of debt-overhang remains highly relevant in explaining the crowding-out and fiscal squeeze effects as observed. However, the conflicting results reveal the complex relationships between debt levels, government revenue, and the quality of government investment.

From the perspective of the periods covered by these studies, most of the Nigerian studies reviewed did not capture the most recent dataset. Hence, this study used annual time series data spanning from 1981 to 2023 to cover current realities as it concerns the effect of public debt on capital project financing in Nigeria. By the time the study is concluded, the researcher will be able to ascertain which way forward for the issues in question.

3. Methodology

This study adopted the model of Onyekachi-Onyele, et al (2024) with some modifications. This modification was the incorporation of exchange rate and inflation rate, which are seen by prior studies such as Nurudeen, Joseph, Mohammed, and Obi (2022) to have a significant interference on the effect of public debt on capital project financing. The model is presented in Equation .1.

$$CAPF_t = \beta_0 + \beta_1 DDBS_t + \beta_2 EXDS_t + \beta_3 PDSV_t + \beta_4 EXCR_t + \beta_5 INFR_t + \mu_t \quad (1)$$

The Logarithmic transformation of Eqn. (3.1) is as stated in Eqn. (3.2).

$$LOGCAPF_t = \beta_0 + \beta_1 LOGDDBS_t + \beta_2 LOGEXDS_t + \beta_3 LOGPDSV_t + \beta_4 LOGEXCR_t + \beta_5 LOGINFR_t + \mu_t \quad (2)$$

Were,
CAPF = Capital Project Financing
DDBS = Domestic Debt Stock
EXDS = External Debt Stock
PDSV = Public Debt Servicing
EXCR = Exchange Rate
INFR = Inflation
LOG = Logarithmic Notation
β_0 = Constant Parameter
β_1 - β_5 = coefficients of the independent variables
μ_t = stochastic term
The a priori expectation of the model is that both DDBS and EXDS would have a positive effect on CAPF while PDSV would be negative since it represents a loss of funds to the domestic economy.

3.1 Technique of Data Analysis

The technique of data analysis began with a test for stationarity (unit root test) and an Autoregressive Distributed Lag (ARDL) estimation. These procedures are discussed as follows:

3.2 Autoregressive Distributed Lag (ARDL) Model

For data estimation, this study employed the Autoregressive Distributed Lag (ARDL) model. Adhering to Pesaran's critical value boundaries, the ARDL bounds test was utilized to establish a long-run relationship among the estimated variables. The robustness to potential structural breaks is a key advantage of this test, which could otherwise distort the identification of the long-run relationship. Furthermore, the ARDL framework enables the joint estimation of long-run and short-run coefficients for cointegration testing, even when the variables exhibit a mixture of different orders of integration.

4. Results and Discussions

4.1 Descriptive Statistics

The descriptive statistic was carried out to show the fundamental features of the data. The outcome of the descriptive statistic is displayed in Table 1:

Table 1: Descriptive Statistics

	CAPF	DDBS	EXDS	PDSV	EXCR	INFR
			Panel A: Raw Data			
Mean	1069.067	4538.695	3283.261	829.4402	133.9565	19.07948
Median	351.3000	1166.000	689.8400	163.8100	118.5700	13.00697
Maximum	10145.10	25565.62	27686.64	7027.430	899.0000	72.83550
Minimum	4.100000	11.19000	2.330000	1.010000	0.610000	5.388008
Std. Dev.	1968.360	6649.045	5693.147	1549.077	167.7017	16.28122
Skewness	3.036082	1.648403	2.702001	2.592378	2.480869	1.867414
Kurtosis	12.74864	4.800269	10.38169	9.341441	11.23689	5.472970
Jarque-Bera	236.3336	25.28023	149.9492	120.2129	165.6668	35.94894
Probability	0.000000	0.000003	0.000000	0.000000	0.000000	0.000000
Observations	43	43	43	43	43	43
	LOGCAPF	LOGDDBS	LOGEXDS	LOGPDSV	LOGEXCR	LOGINFR
			Panel B: Logged Data			
Mean	2.327432	2.935500	2.875462	2.055316	1.620827	1.172020
Median	2.545678	3.066699	2.838747	2.214344	2.073964	1.114176
Maximum	4.006257	4.407656	4.442270	3.846797	2.953760	1.862343
Minimum	0.612794	1.048931	0.367580	0.003063	-0.214652	0.731428
Std. Dev.	0.968956	1.006535	0.942526	1.108965	0.889380	0.288992
Skewness	-0.182470	-0.120632	-0.036935	-0.400700	-0.281184	0.110991
Kurtosis	3.040290	2.909920	3.222889	3.028935	2.958771	2.949759
Jarque-Bera	2.698567	2.865762	3.981036	2.215902	4.898278	4.718082
Probability	0.259426	0.238620	0.136625	0.330235	0.086368	0.094511
Observations	43	43	43	43	43	43

Source: Author's results from the EViews 10.0 package

The diagnostic procedure for ensuring data normality is presented in Table 1. The original data set, described in Panel A, was revealed to be distributed non-normally based on three convergent indicators- values of skewness substantially different from zero, kurtosis exceeding the value of 3 benchmark-leptokurtic, and Jarque-Bera probabilities with a value below the 0.05 threshold that is significant. Since regression analysis often assumes normality, a logarithmic transformation was employed to correct these distributional characteristics and ensure the variables are in the same uniform units of measurement. The success of this data transformation is shown in Panel B, where the logged series demonstrates statistical properties that are consistent with a normal distribution, thereby making it suitable for subsequent regression modeling.

4.2 Unit Root Test

Table 2 displays the variables in level form and first difference form.

Table 2: Augmented Dickey Fuller unit root test

Variable	ADF at Level; I(0)		ADF at first difference; I(1)		Order of integration
	t-Statistic	Prob.	t-Statistic	Prob.	
LOGCAPF	-1.772092	0.7003	-6.082349	0.0000	I(1)
LOGDDBS	-1.646684	0.7564	-5.040985	0.0010	I(1)
LOGEXDS	-1.950298	0.6102	-4.865498	0.0017	I(1)
LOGPDSV	-2.664067	0.2560	-8.328316	0.0000	I(1)
LOGEXCR	-1.782421	0.6954	-5.416927	0.0004	I(1)
LOGINFR	-3.520907	0.0102	--	--	I(0)

Source: Author's results from EViews 10.0

Testing the stationarity properties of the variables, the Augmented Dickey-Fuller Unit root test confirmed that the time series data had a mixed order of integration, which is a prerequisite for the Autoregressive Distributed Lag (ARDL) Model. Table 2 shows that the variable LOGINFR is stationary at level [I (0)], whereas for all other variables to achieve stationarity [I(1)], they required first differencing based on a 5% significance level for the ADF test statistic. This combination of I(0) and I(1) variables precludes the use of standard cointegration tests and validates the use of the Autoregressive Distributed Lag (ARDL) Model testing procedure for this analysis.

4.3 Estimation of ARDL

The ARDL estimation presents the bounds testing for cointegration, long-run estimates, the error correction model (ECM), and diagnostic tests.

4.3.1 Bounds Test

The outcome of the bounds test approach to cointegration, which measured the existence of a long-run relationship in the models, was presented in Table 3:

Table 3: Bound test results

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.334931	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's results from EViews 10.0

A long-run cointegrating effect is revealed between public debt and its capital project financing in Nigeria. This relationship is substantiated by the bounds test, where the calculated F-statistic (5.335) is higher than the 5% (3.38) upper critical value. Consequently, the analysis affirms that the effect of public debt on capital expenditure is stable and persistent in the long run.

4.4 Long-run Estimates

Having confirmed the presence of a cointegrating relationship in the model, the study proceeded with the long-run estimation of the ARDL procedure as presented in Table 4.

Table 4: Long-run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGDDBS	0.217183	0.054742	3.967392	0.0006
LOGEXDS	0.275112	0.090669	3.034245	0.0087
LOGPDSV	-0.302546	0.100795	-3.001597	0.0094
LOGEXCR	-0.158333	0.061276	-2.583864	0.0284
LOGINFR	0.294748	0.144155	2.044660	0.0810
C	3.613713	1.103466	3.274875	0.0098

Source: Author's results from EViews 10.0

Decision rule:
Accept the null hypothesis (Ho) and reject the alternative hypothesis if the probability value is greater than 0.05 (5%). Accept the alternative hypothesis and reject the null hypothesis (Ho) if the probability value is less than 0.05 (5%).

As shown in Table 4, the long-run result reveals distinct effects of the various components of public debt on capital project financing in Nigeria. Both domestic debt with coefficient = 0.217, p = 0.0006 and external debt with coefficient = 0.275, p = 0.0087 showed statistically significant positive relationships in the model, implying that a 10% change in each of domestic debt and external debts lead to a 2.17% and 2.75% rise in capital project financing, respectively. On the contrary, public debt servicing had a statistically significant negative effect with a coefficient = -0.303, p = 0.0094, indicating that a 10% increase reduces capital project financing by 3.02%. Furthermore, the coefficient of the exchange rate in the model is negative and statistically significant, suggesting that it erodes the positive effect of debt, while the inflation rate was shown to be insignificant in the long run.

4.5 Error Correction Model (ECM)

The ECM, which explains the adjustment mechanism of the capital project financing to changes in the public debt component, is presented in Table 5:

Table 5: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGDDBS)	-0.736837	0.223217	-3.300994	0.0057
D (LOGDDBS (-1))	-0.171251	0.253978	-0.674273	0.5120
D (LOGDDBS (-2))	0.466140	0.271793	1.715056	0.1101
D (LOGDDBS (-3))	0.180850	0.286501	0.631236	0.5388
D (LOGDDBS (-4))	-0.928603	0.241201	-3.849909	0.0020
D(LOGEXDS)	0.300836	0.100808	2.984243	0.0106
D(LOGPDSV)	-0.010594	0.125082	-0.084693	0.9338
D (LOGPDSV (-1))	-0.491069	0.129898	-3.780422	0.0023
D (LOGPDSV (-2))	-0.353669	0.131699	-2.685438	0.0187
D (LOGPDSV (-3))	-0.415566	0.106385	-3.906257	0.0018
D (LOGPDSV (-4))	-0.347791	0.087484	-3.975494	0.0016
D(LOGEXCR)	-0.019072	0.148718	-0.128246	0.8999
D (LOGEXCR (-1))	-0.074425	0.144737	-0.514208	0.6157
D (LOGEXCR (-2))	0.668637	0.163946	4.078396	0.0013
D (LOGEXCR (-3))	-0.437094	0.166860	-2.619531	0.0212
D(LOGINFR)	-0.201212	0.079864	-2.519439	0.0256
D (LOGINFR (-1))	-0.167229	0.067070	-2.493336	0.0269
D (LOGINFR (-2))	-0.214316	0.070629	-3.034405	0.0096
ECM (-1)	-0.376215	0.045437	-8.279976	0.0000
R-squared	0.997926			
Adjusted R-squared	0.891472			
F-statistic	54.16263			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	2.155575			

Source: Author's results from EViews 10.0

The ECM is employed to show the nature of the short-run adjustment mechanism towards the long-run state of equilibrium. The ECM(-1) is negative and significant, showing that approximately 37.6% of the error associated with the short-run adjustment mechanism is being corrected per period. This further affirms that the system has a relatively high adjustment speed and could also converge to its equilibrium state in the long run.

The F-statistic of 54.16263 with its prob. (0.0000) showed that the public debt parameters collectively exert a statistically significant effect on capital project financing in Nigeria. This implies that the interactions between the components of public debt significantly affect capital project financing in Nigeria. Similarly, the adjusted R-squared (0.891472) indicated that the independent variables collectively explained about 89% of the total variations in capital project financing, while the remaining 11% of unexplained variations is due to the error term. The Durbin–Watson statistic of 2.155575 was observed to be approximately 2, which indicates the model was not spurious.

The short-run effect of Domestic Debt Stock (DDBS), as indicated by D(LOGDDBS), shows that an increase in domestic debt in the short run caused an instantaneous negative and significant effect on capital project financing. This significant negative short-run effect of domestic debt on capital projects is a cardinal sign of fiscal distress in the economy. It represents a deviation from using debt as a tool for capital projects development to a situation where domestic debts become an obstacle to economic development, with serious long-term economic consequences for both fiscal health and development.

The short-run estimate of EXDS as embodied in D(LOGEXDS) suggests that a rise in external debt caused an immediate positive and significant effect on capital project financing. The short-run coefficient of PDSV, as shown by D(LOGPDSV), suggests a negative but non-significant effect of public debt servicing in the short run. Regarding D(LOGEXCR) and D(LOGINFR), it was realized that the exchange rate had a negative and insignificant effect on capital project financing, while the effect of inflation was found to be negative and significant, implying that the inflation rate in Nigeria distorted the immediate (short-run) effect of public debt.

4.6 Diagnostic Tests

The diagnostic tests of serial correlation, heteroskedasticity, and normality of residuals are based on the following hypothesis and decision rule:

Decision Rules: Reject Ho if the p-value of the Chi-squared is less than α, which means that there is a diagnostic issue of serial correlation, heteroscedasticity, and normal distribution. Otherwise, do not reject Ho:

Table 6: Diagnostic tests

Test	Test statistic	Prob.	Remark
Serial correlation test:	1.151231	0.3363	No serial correlation
Heteroskedasticity test:	0.651624	0.8083	Homoscedastic
Jarque-Bera test:	1.095450	0.5782	Normal distribution

Source: Author's results from EViews 10.0

The results of the diagnostic tests are presented in Table 6, and they indicate the absence of serial correlation, heteroscedasticity, and abnormal distribution of the residuals. This gives the assurance that the results from the models are reliable, efficient, and suitable for forecasting and policy and decision-making.

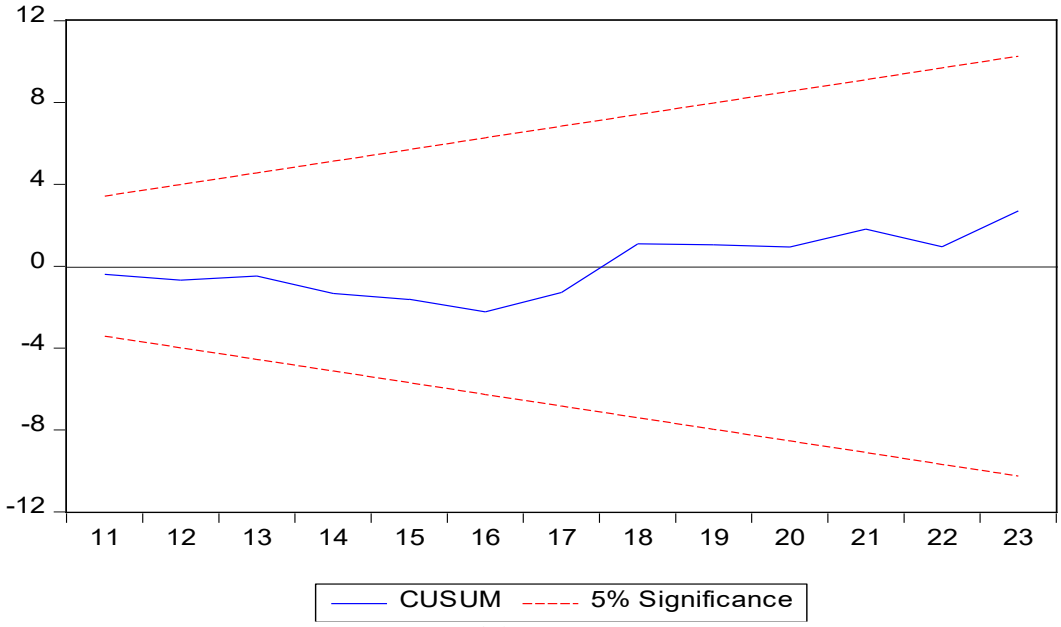

Fig. 1: cumulative sum (CUSUM) test

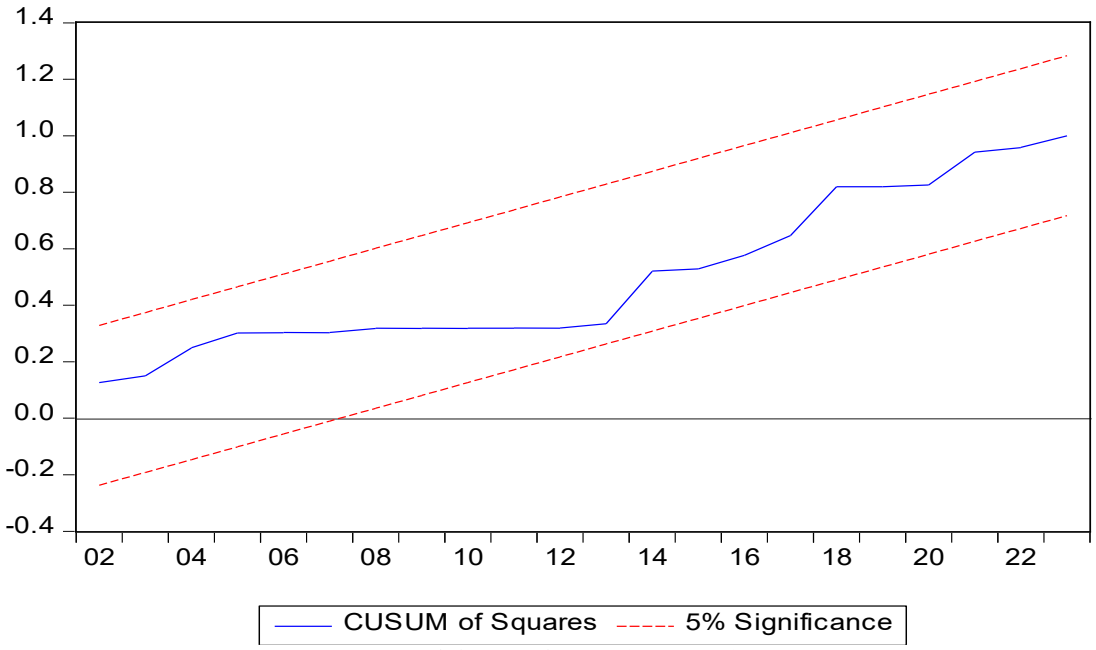

Fig. 2: cumulative sum of squares (CUSUMSQ) test

The stability of the model's coefficients was examined with the CUSUM and CUSUMSQ tests, as presented in Figures 1 & 2. As the plots of both statistics fall within critical bounds of 5%, the results, shown in Figures 1 and 2, reveal the null hypothesis of a stable, correctly specified model and cannot be rejected. This result confirms that the long-run coefficients are stable. In summary, diagnostic tests validate the use of the ARDL model, indicating correct model specification, stable regressors, normal residuals distribution, and the absence of autocorrelation and heteroscedasticity.

4.7 Discussion of Findings

From the ARDL estimation, it was seen that the accumulation of domestic debt caused an increasing and significant effect on capital project financing in Nigeria in the long run. This implied that debt accumulated from internal sources helped to enhance the capital expenditure of the Nigerian government in the long run. However, in the short run, it was found that domestic debt stock caused a diminishing and significant effect on capital project financing, indicating that there could be a crowding-out of domestic investments in the short run due to increased government borrowing from domestic sources, as observed by Ariwa and Umezurike (2024). This short-run significant negative effect of public debts on capital project financing may be due to high debt servicing and fiscal squeeze, where a greater proportion of the revenue is committed to servicing debts, thereby crowding out new investments. And this crowding out occurs when the government's extensive borrowing from the domestic market, primarily through high-yielding bonds, raises interest rates across the economy. These economic problems lead to underinvestment in Critical Sectors. This affects the funding of essential infrastructures and

the government's investment in human capital. This view aligned with Ajah and Jacob (2021); Alonge, Olaoye, and Ayeni-Agbaje (2022); Ekuma, Inyiama, and Okwo (2024); Onuoha (2024); Onyekachi-Onyele et al. (2024), who had found that domestic debt improved capital project financing in the Nigerian economy. On the other hand, Anaemena Onwuatuelo, Ogbonna, and Ezeaku (2023); Busari et al. (2024); Chukwu, Ogbonnaya-Udo, and Ubah (2021); Haruna, Aigbedion, and Ologunla (2024); Obasi et al. (2025) found an insignificant effect of domestic debt on capital project financing. This shows that prior authors hold differing views regarding the effect of domestic debt, probably due to the time periods covered and the procedure used for data analysis, as seen in the above-mentioned studies.

It was also found that external debt had a positive and significant effect on capital project financing in both the long run and the short run. It then means that external debt accumulation had both immediate and long-term effects on capital project financing in Nigeria. This is as expected because external debt complements domestic debt, which is used by the government to finance various capital projects contained in the annual budget. This finding agrees with Haruna et al. (2024); Olanipekun, Adeola, and Ambara (2024); Osadume, Edih, and Ikubor (2022), who had found a significant positive effect of external debt on capital project financing in Nigeria. However, Omodero (2019) found a negative and significant effect of external debt on capital projects, which was attributed to poor debt management. On the other hand, Ajah and Jacob (2021); Aladejana, Okeowo, Oluwalana and Alabi (2021); Ekuma et al. (2024); Kocha, Iwedi, and Sarakiri (2021); Obasi et al. (2025); Usman (2019) observed that external debt had a negative and insignificant effect on capital investments because such debt is often channeled to government recurrent expenditure other than the reasons the loans were granted. This further reveals a variation in the findings, which is linked to the fact that the effect of external debt on capital expenditure of the government varies with the prevailing economic situation of a country.

In the long run, public debt servicing was found to be negative and significant, indicating that the repayment of public debt and its accrued interest was burdensome to the government. High costs of debt servicing can negatively influence capital projects by diminishing the finances available for investments, especially when a large portion of the budget is channeled towards debt repayment. This result in slower infrastructure development and deter economic growth. This finding aligns with the findings of Ajibua (2024); Onyele, Ikwuagwu, and Opara (2023); Onyele and Nwadike (2021); Onyekachi-Onyele et al. (2024), who had observed a negative and significant effect of public debt servicing on capital project financing in Nigeria.

The exchange rate was found to have a negative and significant effect on the model. Exchange rate depreciation can negatively influence public debt, particularly for a country like Nigeria with a large proportion of its debt denominated in foreign currencies. When the domestic currency weakens, it requires more domestic currency to service the same amount of external currency debt, effectively accelerating the debt burden and potentially resulting in a higher debt overhang. Achoda and Uge (2022); Fumey et al. (2022); Onyekachi-Onyele et al. (2024); Onyele et al. (2023) attributed the negative effect of debt servicing to exchange rate instability, as this study equally found that the exchange rate has a negative and significant effect on capital project financing.

Inflation was found to have a positive and significant long-run effect on capital project financing, but it was negative and significant in the long run. Inflation can exert a positive effect on public debt by causing a decline in the real value of the debt in terms of goods and services. However, inflation can negatively influence public debt by accelerating the cost of debt servicing and potentially causing debt to be more difficult to manage. Higher inflationary pressure can lead to increased interest rates, which in turn increase the cost of debt and the expense of servicing existing debts. Additionally, inflation erodes the value of government revenue, potentially leading to difficulties in meeting debt obligations. This aligns with the studies of Kamundia (2015); Onyele et al. (2023), who revealed that inflation distorts the expected effect of public debt on domestic capital projects as fixed-income investments like public bonds turn less appealing as their returns fall due to the rising inflation.

5. Conclusions and Recommendations

The persistent public debt stock growth in Nigeria, associated with a historical deficit in capital project investment, necessitated this inquiry. Drawing from the neoclassical theory, which suggests that productive government investment can counteract the drag of rising interest rates, this research adopted the Autoregressive Distributed Lag (ARDL) Model with time series data from 1981-2023 to analyze the public debt-capital financing nexus. A key objective is to synthesize contemporary empirical evidence and rigorously evaluate both the short-run and long-run effects of public debt on capital project financing in the Nigerian economy.

Findings from the ARDL model showed a statistically significant and positive long-run relationship existing between both domestic and external debt stocks and capital project financing in Nigeria. However, findings from the cointegration analysis reveal a negative effect of debt servicing, suggesting that an escalated level of debt service obligations crowds out capital project financing. The significance of these parameters in the long-run equation leads to the conclusion that the structure and servicing of public debt are significant factors influencing the capabilities of Nigeria's capital project financing.

The results of this study suggested that by effective management of public debt and capital project financing in Nigeria, adequate finance for capital projects would be made available. Based on the findings, the recommendations are:

The significant positive relationship between domestic debt and capital financing necessitates policy frameworks aimed at fortifying fiscal discipline, ensuring prudent management to enhance debt sustainability. Concurrently, enhanced budget execution is critical for efficient use of resources. To leverage external debt effectively, fiscal policy must be targeted at financing projects that are productive and revenue-generating. This would be a balanced approach where foreign loans become an economic growth catalyst rather than a fiscal burden, as their returns on investment would cover the costs of servicing the debts.

The result of the analysis reveals that public debt crowds out capital project financing in Nigeria. To counter this effect, a dual strategy is proposed- first, the government should actively negotiate debt relief from foreign lenders: the IMF and World Bank; secondly, implementing structural reforms is crucial to correcting the imbalances and chronic deficits in the economy. This approach must be underpinned by strong regulatory institutions that can ensure the sustainability of the fiscal policy, enhance the generation of revenue, and guarantee that resources are efficiently allocated and utilized.

There is a need to Manage Debt Composition and Avoid Over-Reliance on debt. There is a need for striking a strategic balance to avoid over-reliance on debt financing, especially for capital projects with long gestation times. It is also recommended for Nigeria to Adopt Best Practices for Anti-Bribery Controls. This will ensure regular bribery risk assessment to identify vulnerabilities.

Areas of Further Research

This work recommends research on what specific governance failures (e.g., procurement corruption, lack of oversight, political interference) are most responsible for the misallocation of funds meant for capital projects. How do these leakages specifically impact project completion rates and quality in Nigeria?

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