Impact of Public Debt Stocks on Private Investment Across States in Nigeria

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ABSTRACT

This study analyzes the impact of disaggregated public debt on private investment in Nigeria, drawing on the acceleration theory of investment, which posits that investment is driven by changes in output. A dichotomous logit regression model is hired to investigate whether multilateral debt, bilateral debt, banking sector debt, and non-banking sector debt enhance or do not enhance private investment. Primary data were collected through 600 well-validated and structured questionnaires distributed to privately owned firms established before 2007 across the six highly industrialized states representing Nigeria's geopolitical zones: Lagos from the Southwest, Kano from the Northwest, Rivers from the South-South, Anambra from the Southeast, Kogi from the North Central, and Adamawa from the Northeast. A total of 430 valid responses were retrieved and analyzed alongside quarterly debt data spanning from 2007Q1 to 2024Q2 obtained from the Debt Management Office (DMO). The findings reveal considerable regional disparities in the effects of debt stocks. Multilateral debt positively influences private investment in Lagos and Kogi but has a crowding-out effect in Anambra and Rivers. Banking sector debt consistently supports private investment across most states, whereas non-banking sector debt generally exerts a negative influence. Inflation and exchange rate effects are mixed but show significant adverse impacts in select states. These results emphasize the significance of adopting state-specific and debt-type-sensitive fiscal strategies. Policy recommendations emphasize promoting productive multilateral borrowing in high-performing states, strengthening the banking sector's role in credit intermediation, curbing reliance on non-banking sector debt, and maintaining macroeconomic stability to foster an investment-friendly environment

Keywords: Multilateral debt, Bilateral debt, Banking sector debt, Non-banking sector debt, private Investment

INTRODUCTION

Public debt has historically served as an important apparatus for financing development initiatives and driving economic expansion, especially in developing economies like Nigeria. Federal government often resort to borrowing to bridge fiscal deficits and fund infrastructure, social services, and other capital-intensive projects. In Nigeria, the stock of public debt has increased significantly over the past decades, encompassing domestic debt (such as banking and non-banking sector debt) and external debt (comprising bilateral and multilateral loans) (Abubakar & Mamman, 2021). While borrowing can foster growth, excessive or poorly managed public debt may have adverse effects, especially on private investment, which is vital for sustainable economic development (Adegbite, Ayadi, & Ayadi, 2008). public borrowing might crowd out private sector investment by raising interest rates or diverting resources, but under certain conditions, debt-financed government spending can crowd in private investment by improving infrastructure and business climate (Mabula & Mutasa, 2019). Understanding this interaction is critical for Nigeria, where private investment remains relatively low despite the country's debt accumulation (Ogunjimi, 2019).

In Nigeria, this dynamic is especially pertinent. On one hand, high levels of public debt may signal financial instability to investors, thereby increasing risk perception and discouraging private investment. On the other hand, when public debt is channeled into strategic infrastructure such as power, roads, and transportation networks, it can enhance the investment climate and attract private sector participation (International Monetary Fund, 2020). According to Saunweme and Mufandaedza (2013), the adoption of sound macroeconomic policies focusing on both public and private investment is essential to unlocking a country's development potential. However, the persistent low capital formation, stemming from inadequate domestic savings, has compelled the Nigerian government to borrow from both internal and external sources, ostensibly to finance development projects and address budgetary shortfalls.

The country's debt profile has witnessed a sharp rise over the years. Nigeria's total public debt stock comprising federal, state, and FCT debts grew from ₦2.8 trillion in Q1 2007 to ₦31.01 trillion by Q2 2020. Of this, about 63.35% was domestic debt and 36.65% external debt (Debt Management Office, 2020). During the same period, credit to the private sector also increased significantly, from ₦530.37 billion in 2000 to ₦29,051.61 billion in 2020 (Central Bank of Nigeria, 2020). This suggests a possible interplay between public borrowing and private investment activity, especially as Nigeria navigates loans from multilateral institutions (e.g., Paris and London Club), bilateral partners, and private non-banking sources.

From a theoretical standpoint, the effects of public debt on private investment can be interpreted differently. Keynesian economics posits that increased public spending, even if debt-financed, can stimulate aggregate demand and eventually lead to higher private investment. In contrast, the Ricardian equivalence theory argues that rational economic agents anticipate future tax liabilities arising from debt repayment and may reduce consumption and investment accordingly (bamidele et'al, 2024). Monetarists also highlight that excessive public borrowing could inflate the money supply, thus impacting interest rates and investment decisions (El-Mahdy & Torayeh, 2009; Apere, 2014).

The effects of public debt on private investment in Nigeria exhibit significant heterogeneity across different states, largely due to disparities in the utilization of borrowed funds for infrastructure development and other economic facilities. While some states have substantially benefited from debt-financed infrastructure, which has positively influenced private sector activities, others have seen limited or negligible impact, largely due to poor project execution and governance challenges. For instance, states such as Lagos, Rivers, and Ogun have leveraged debt to enhance their infrastructural base, leading to increased private investment and economic activities (Abdullahi & Usman, 2020; Ibrahim & Hassan, 2022). Conversely, several northern states continue to experience minimal private investment stimulation despite rising public debt levels, primarily because borrowed resources are often diverted or inefficiently managed (Chukwuemeka & Onyema, 2021; Adegbite, Ayadi, & Ayadi, 2008). The government's persistent borrowing, as documented by the Debt Management Office (DMO, 2020), reflects attempts to close infrastructure gaps; however, the varying capacity of states to effectively channel these resources into productive investments underlines the heterogeneous impact of public debt on private sector growth in Nigeria. This disparity stresses the need for tailored debt management and investment strategies that consider the unique socio-economic contexts of each state (Mabula & Mutasa, 2019; Oke & Sulaiman, 2012). Therefore, disaggregating public debt components and analyzing their respective impacts on private investment across Nigerian states is essential to inform effective fiscal and monetary policies.

LITERATURE REVIEW

Public debt refers to the total outstanding liabilities of the government arising from both domestic and external borrowing used to finance budget deficits and economic development (Iyoha, 1999). It includes various components such as multilateral debt which is borrowed from international financial institutions like the World Bank, IMF, and African Development Bank usually offered on concessional terms for long-term development (DMO, 2020); bilateral debt which is credit extended between countries under agreed conditions, it is often linked to trade or political relations (Audu, 2004; Bamidele et al., 2024); banking sector debt is the government borrowing from domestic financial institutions such as commercial banks and the Central Bank through instruments like treasury bills and bonds (CBN, 2021); and non-banking sector debt is borrowings from insurance firms, pension funds, and private investors, typically raised through capital markets (DMO, 2020).

Private investment, on the other hand, denotes capital expenditures by non-government entities on assets like equipment, buildings, and technologies, undertaken with the expectation of future returns (Ariyo & Jerome, 2005).

Empirical findings in Nigeria

To start with Abubakar and Mamman (2021) employed linear and non-linear ARDL models (1981 to 2018) and found that increases in total debt, external debt, and debt servicing negatively impact private investment. However, domestic debt displayed asymmetric effects: reductions boosted private investment, while increases had marginal benefits. Their study recommends reducing public debt stocks. A key limitation is the failure to disaggregate external debt into multilateral or bilateral categories. Building upon this, Ogunjimi (2019), using quarterly data from 1981 to 2016 and an ARDL model, also identified a negative effect of public debt on investment, especially public investment. The study suggests productive utilization of borrowed funds but limits its relevance by focusing on public, rather than private, investment.

So also, Essien and Onwioduokit (2012), applying a VAR model, found that public debt crowds out private investment, recommending fiscal consolidation. However, their use of aggregate data may obscure sector-specific effects. Whereas Eze and Nwaogwugwu (2020), using a VAR model, revealed that while domestic debt crowds in private investment, external debt crowds it out. They recommended strengthening domestic markets but lacked sectoral granularity.

In the same vein, Yusuf and Olaniyi (2018) applied co-integration and error correction models and found a long-run negative but short-run weak relationship between public debt and private investment. The study urges cautious borrowing but does not decompose debt types. In contrast, Oladipo and Maku (2021), using an ARDL approach, concluded that public debt reduces private investment in both short and long runs due to debt servicing costs. While advocating for restructuring Nigeria's debt portfolio, the study does not analyze specific debt types.

Furthermore, Ibrahim and Hassan (2022) used a logit regression model to assess the impact of different debt types across Nigerian states. Their findings indicate that multilateral debt promotes private investment while bilateral debt inhibits it. However, using binary outcomes may oversimplify investment behaviors. Likewise, Abdullahi and Usman (2020), also focusing on Nigerian states, found banking sector debt crowds in private investment, while non-banking sector debt crowds it out. Their study provides state-level insights but may underrepresent macroeconomic influences.

More importantly, Nwankwo and Eze (2019) employed state-level panel data and concluded that external debt crowds out private investment in states with poor governance but not in better-governed ones. The study highlights institutional quality but depends heavily on governance indices with potential measurement concerns. While, Oke and Sulaiman (2012), using Johansen co-integration and VECM (1980 to 2008), found a positive short-run link between external debt and growth, but private investment declined. They recommend better debt-growth management but do not explore long-term private investment trends. In a contrary view, Adegbite et al. (2008) concluded that Nigeria’s external debt crowds out private investment and exacerbates poverty and inequality. However, their study is largely qualitative and lacks robust econometric modeling.

Similarly, Bello and Abdul (2019) used panel regression and reported that external debt negatively impacts private investment via rising debt servicing. They advocate funding diversification but fail to distinguish between debt types. Building upon this, Ekon and Okon (2019), using ARDL and Toda-Yamamoto causality tests, found that external debt negatively affects private investment, while domestic debt has no significant effect. The absence of control variables like inflation and exchange rates is a limitation.

International and Regional Findings

To begin with Tanzania, Mabula and Mutasa (2019) employed an ARDL bounds test (1970–2016) and discovered a nonlinear relationship between external debt and private investment in both the short and long run. Domestic debt and debt servicing had no significant effect. However, the direction of impact was not

clearly defined. Turning to Zimbabwe, Mugumisi (2021) applied a VECM (2009Q1 to 2017Q4) and found external debt crowds out private investment. The study recommends debt rescheduling but lacks a breakdown of external debt components. Turning to Kenya, Were (2001) found that external debt negatively affects private investment through the debt overhang channel. The study did not account for domestic debt dynamics. So also, Chowdhury (2001), using panel data for developing countries, found that external debt crowds out private investment due to debt overhang and crowding-out effects, and recommended debt relief and structural reforms. However, country-specific case was underexplored.

More importantly, Pattillo et al. (2002) assessed 93 developing countries and found that high debt levels reduce growth and investment. Though comprehensive, the study fails to differentiate between effects on public versus private investment. Likewise, Clements et al. (2003) analyzed low-income countries and found that high debt depresses public investment, indirectly affecting growth. The impact on private investment remains unexamined. In the case of India, Kaur and Kaur (2019), studying India, found that high external debt impairs private investment due to rising debt servicing. Their recommendations are country-specific and not easily generalizable to Nigeria. Chirwa (2020) used a dynamic panel model in Sub-Saharan Africa and found that external debt crowds out private investment once a certain threshold is exceeded, while moderate debt may stimulate investment. However, the broad regional scope may dilute country-specific insights. Also, Alimi and Oyekale (2020), using panel data for WAEMU countries, found that high public debt levels crowd out private investment. While robust, the study's regional approach limits its relevance for Nigeria. Hassan and Musa (2021) compared Nigeria and Ghana using panel fixed effects. Public debt had a stronger crowding-out effect in Nigeria, attributed to poorer debt management. However, country specific case may be underemphasized.

Despite a rising body of literature examining the nexus between public debt and private investment, significant gaps remain unresolved. A prominent issue is the lack of disaggregation in the analysis of external and internal debt, with many studies (such as Abubakar & Mamman, 2021; Ogunjimi, 2019) treating debt as a uniform construct without distinguishing between its subcomponents such as multilateral, bilateral, banking, and non-banking sources. This holistic analysis may obscure particular effects on investment. Furthermore, there exist a methodological gap as few studies employ flexible, nonlinear, or asymmetric modeling frameworks capable of capturing the complex and potentially state contingent nature of debt-investment relationship. Additionally, there is a strong national level bias in existing research, which tends to overlook regional or state wise variations that may significantly influence investment responses to different debt types. Another notable gap is the inadequate integration of key control variables such as exchange rate volatility, inflation, and governance quality, these are factors that likely mediate the debt-investment interactions.

METHODOLOGY

This study espouses an empirical framework grounded in the acceleration theory of investment, that argue that investment is a function growth. Particularly, the study follows the model developed by Kabuga, Suleiman and Kabuga(2016) and utilizes a dichotomous logit regression model to empirically investigate the impact of public debt stocks on private investment across states in Nigerian states. The binary model is appropriate due to its robustness to outliers, flexibility in modeling linear and nonlinear relationship and its suitability for dichotomous outcome. That is whether public debt components enhances private investors (coded 1) or not (coded 0)

The accelerator theory suggests that net investment (I_t) is directly proportional to changes in output (Y_t) : $I_t = v(Y_t - Y_{t-1})$ …….3.1

Expanding this, public debt (D_t) is introduced as a determinant of investment, resulting the functional form

$I_t = F(Y_t, D_t)$……3.2

Further decomposition defines $D_t = (D_d, E_d)$, where domestic debt (Dd) comprises banking sector debt (Bsd) and non-banking debt (Nbd), and external debt (Ed) comprises multilateral debt (Md) and bilateral debt (Bd). Thus, the general investment model is specified as:

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It=f(Y_t, M_d, B_d, B_{sd}, N_{bd}, Exh, Inf) where Exh and Inf are control variables for exchange rate and inflation, respectively.

Population, Sample Size and Source of Data

The study focused on privately-owned firms operating within the 36 states and the Federal Capital Territory (FCT) of Nigeria that existed before 2007 Q1. Firms must be willing to respond to the research instrument and be knowledgeable about public borrowing trends. Secondary data spanning from 2007Q1 to 2024Q2 on debt stocks was obtained from the Debt Management Office (DMO). Primary data was obtained through a structured questionnaire with dichotomous responses was administered to firms selected from one industrialized state in each geopolitical zone, which are Kano, Adamawa, Lagos, Anambra, Rivers, and Kogi. Ten limited liability companies per state were selected using systematic random sampling, resulting in 60 firms nationwide to see whether debt stocks enhance the investments or not between 2007Q1 to 2024Q2.

Table 1: Stages of Data Distribution

Stage	**Description**	**Details**
Target Population	Privately-owned firms in Nigeria existing before Q1 2007	All 36 states + FCT
Secondary Data Source	Public debt stock data (multilateral, bilateral, banking, non-banking) from DMO	2007Q1 – 2024Q2
Primary Data Collection	Structured questionnaire with dichotomous responses	Administered to selected firms
Sampling Strategy	One industrialized state per geopolitical zone	Kano, Adamawa, Lagos, Anambra, Rivers, Kogi
Firms per State	Limited liability companies selected using systematic random sampling	10 firms per state × 6 states = 60 firms
Questionnaires per Firm	Number of questionnaires distributed per firm	10 per firm × 60 firms = 600 total
Questionnaire Retrieved	Successfully returned and usable questionnaires	430 out of 600
Response Rate	Percentage of questionnaires retrieved	71.7% (430 ÷ 600 × 100)

Source: Authors Draft

Model Specification

Given the binary nature of the dependent variable (private investment response 1 is enhanced, 0 is not enhanced), the study employs a logit regression model. This model estimates the probability of investment enhancement based on public debt composition, specified as:

$$\text{Log}\left(\frac{P(Y=1/X1,\ldots\ldots\ldots Xp)}{1-P(Y=1/X1,\ldots\ldots Xp)}\right) = \alpha_0 + \alpha_1 Y_{dt} + \alpha_2 M_{di} + \alpha_3 B_d + \alpha_4 B_{sd} + \alpha_5 N_{bd} + \alpha_6 E_{xh} + \alpha_7 I_{nf} + \mu \ldots\ldots(3.3)$$

Where:

PI_t is Private investment (Dichotomous variable) **M_{di}** is Multilateral debt

$\mathbf{Y_{dt}}$ is the output (gross domestic product) $\mathbf{B_d}$ is Bilateral debt

$\mathbf{B_{sd}}$ is Banking sector debt $\mathbf{N_{bd}}$ is Non-banking sector debt

E_{xh} is Exchange rate I_{nf} is Inflation rate

α_0 = intercept α_1 to α_6= Regression coefficients μ_i = white noise

RESULT ANALYSIS

Pre-estimation test

This ROC curve evaluates the performance of a classification model predicting whether private investment is enhanced (1) or not (0) in response to public debt. The Area Under the Curve (AUC) is 0.6998, which approaches the threshold of 0.7, indicating a fair level of discriminatory power. This suggests the model can moderately differentiate between firms that respond positively to public debt and those that do not.

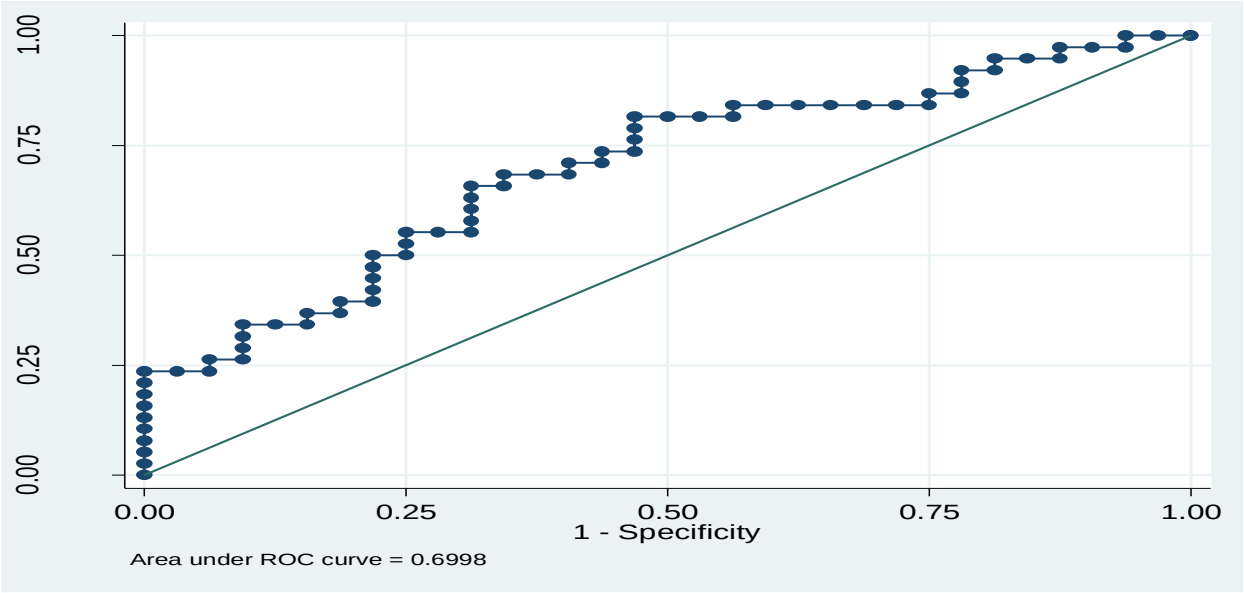

Figure 1: Receiver Operating Characteristic (ROC**)**

Source : Computed by the author using Stata14

The curve remains above the 45-degree reference line, confirming that the model performs better than random guessing. While not excellent, the nearly 0.70 AUC implies the model has a reasonable predictive capacity, and with slight improvements in variable selection or model tuning, it could offer stronger accuracy in forecasting private investment responses.

Logistic regression- State specific analysis

To start with Kano (North west), table 2 result shows that output (Yt) positively and significantly influences private investment as its Coefficient is 0.013 and p- value is 0.019, aligning with the acceleration theory of investment, which argues that increased output stimulates investment. Banking sector debt (Bsd) also has a positive and significant effect its Coefficient is 0.021 and p-value is 0.011), suggesting that bank-originated domestic debt enhances private capital formation. These findings are in harmony with Eze and Nwaogwugwu (2020), who observed a crowd-in effect of domestic debt, particularly banking debt. Inflation (Inf) is positive and significant with p-value being 0.013, possibly reflecting moderate inflation expectations stimulating investment, although this finding may appear not compatible with economic orthodoxy and deserves deeper sectoral exploration. Conversely, external debt variables (Md and Bd) and exchange rate (Exh) are statistically

insignificant, although the negative coefficient of bilateral debt (Bd) aligns with Ibrahim and Hassan (2022), who found such debts to be investment inhibiting.

Turning to Adamawa (North east), All the variables are negative and statistically insignificant at the 5% level, except for output (Yt), banking sector debt (Bsd) and Bilateral debt (Bd) which is positive. These weak relationships suggest that macroeconomic variables and debt structure have minimal predictive power for private investment in this north east, possibly due to lower industrialization, high insecurity, or weak institutional structures. This result stands in contrary to national level findings (e.g., Oladipo & Maku, 2021) that consistently identify public debt particularly multilateral or banking-sector debt as influential. Adamawa's result highlights the importance of state specific economic conditions, reinforcing concerns about over-generalizing national debt-investment dynamics.

In the case of Lagos State (South-West), multilateral debt (Md) has a positive and statistically significant impact on private investment having a coefficient of 1.340 and p-value of 0.009, suggesting that such funding supports productive sectors. Banking sector debt (Bsd) also positively influences investment with p-value 0.050, while non-banking sector debt (Nbsd) has a negative and significant effect on private investment in south west having a p-value of 0.048. This dual pattern confirms the findings by Abdullahi and Usman (2020), who reported that banking sector debt crowds in, while non-banking sector debt crowds out private investment. However, output (Yt) and inflation (Inf) are insignificant, suggesting that in Lagos, access to structured financing matters more than macro stability. These findings align with Ibrahim and Hassan (2022), who also found multilateral debt to be investment-enhancing, but contrast with studies like Oladipo & Maku (2021) that suggest debt servicing generally crowds out investment.

Turning to Anambra State (South-East) its standout result is the negative and statistically significant effect of multilateral debt (Md) on private investment as it reported a coefficient of -6.080 and p-value of 0.033, which is contrary to findings in Lagos and Ibrahim & Hassan (2022). This suggests either inefficient use of multilateral loans or sectoral misallocation in the state. Banking sector debt (Bsd) has a positive and marginally significant effect with p-value 0.067, supporting the idea that access to credit can boost investment. Other variables, including output (Yt) and inflation, are statistically insignificant. These mixed results highlight the importance of governance and implementation quality as emphasized by Nwankwo & Eze (2019), who found that external debt crowds out investment in poorly governed states.

Table 2: Logistic Regression

Var.	**Kano (NW)**		**Adamawa(NE)**		**Lagos (SW)**		**Anambra(SE)**		**Rivers (SS)**		**Kogi (NC)**	
PI	Coeff.	P-val	Coeff.	P-va	Coeff.	P-val	Coeff.	P-va	Coeff.	P-va	Coeff.	P-val
Yt	0.013	0.019	0.012	0.932	-0.064	0.586	-0.039	0.751	0.082	0.510	0.065	0.032
Md	8.350	0.332	-1.010	0.222	1.340	0.009	-6.080	0.033	-9.970	0.035	1.330	0.136
Bd	-3.690	0.201	3.560	0.236	4.430	0.360	1.790	0.491	3.100	0.275	-4.600	0.131
Bsd	0.021	0.011	0.064	0.207	0.101	0.050	0.041	0.067	0.605	0.033	0.064	0.026
Nbsd	-0.072	0.517	-0.304	0.317	-0.203	0.048	-0.001	0.623	-0.901	0.040	-0.501	0.071

Exh	-0.027	0.086	-0.049	0.638	0.036	0.772	0.008	0.932	0.069	0.485	-0.041	0.097
Inf	0.024	0.013	-0.201	0.669	-0.023	0.123	0.002	0.469	-0.006	0.177	-0.007	0.047
_cons	-0.758	0.698	1.436	0.424	3.864	0.046	0.069	0.968	-1.105	0.542	-0.258	0.891
Pseudo(R^2)	0.2678		0.4416		0.2632		0.0449		0.5605		0.3804	
Prob> X^2	0.0970		0.0020		0.0460		0.0471		0.0673		0.0234	

Source: Stata 14 output

Looking at the results from Rivers State (South-South), multilateral debt (Md) has a strong negative and significant effect on private investment with p-value 0.035, and so does non-banking sector domestic debt (Nbsd) having p-value 0.040. This aligns with Adegbite et al. (2008) and Bello & Abdul (2019), who found that external debt servicing pressures and poorly structured domestic debt inhibit private investment. However, banking sector debt (Bsd) shows a positive and significant effect with p-value 0.033, reinforcing the pattern seen in other states like Kano and Lagos. These results validate Abdullahi & Usman (2020) and confirm the idea that source and structure of debt are critical. Interestingly, output (Yt) and exchange rate (Exh) are not statistically significant, suggesting limited sensitivity of investment decisions to these macro variables in Rivers.

Lastly, in Kogi State (North-Central) output (Yt) has a positive and significant effect on private investment having coefficient 0.065, with p-value 0.032, in line with acceleration theory. Both banking sector debt (Bsd) and non-banking sector debt (Nbsd) are statistically significant with positive and negative signs respectively, mirroring the domestic debt duality found in Abdullahi & Usman (2020). Inflation is significantly negative with p-value 0.047, supporting the general macroeconomic literature that high inflation deters investment by increasing uncertainty. This reinforces findings by Chirwa (2020) and Hassan & Musa (2021) that stable macro conditions are critical for positive debt-investment dynamics. However, multilateral and bilateral debt are statistically insignificant, suggesting external borrowing has limited direct impact on private investment in North central.

In brief, Banking sector debt emerges as the most consistently positive and significant driver of private investment in Kano, Lagos, Rivers, and Kogi, supporting the notion that bank-originated debt enhances capital access. Multilateral debt has positive effects in Lagos but negative effects in Anambra and Rivers, indicating heterogeneous implementation efficiency or absorptive capacity. Non-banking domestic debt generally crowds out private investment across most states. Output (Yt) is a significant predictor in Kano and Kogi, partially validating acceleration theory. Inflation shows mixed signs but is significantly negative in Kogi, reinforcing its risk to investor confidence.

Probit Regression Analysis

To alternatively explore other model, The study further considered probit model to see if there exist findings similarities. The comparison between the logit and probit regression results across Nigerian states reveals both consistencies and divergences in the influence of public debt components and macroeconomic variables on private investment. In Kano, both models suggest that multilateral debt positively influences private investment, though this effect is more statistically significant in the probit model. Banking sector debt is also significant and positive in both, reinforcing its crowd-in role. However, output (Yt) is significant only in the logit, while inflation remains significant in both, indicating model-specific sensitivity.

Table 3: Probit Regression

Var.	Kano (NW)		Adamawa(NE)		Lagos (SW)		Anambra(SE)		Rivers (SS)		Kogi (NC)	
PI	Coeff.	P-val	Coeff.	P-va	Coeff.	P-val	Coeff.	P-va	Coeff.	P-va	Coeff.	P-val
Yt	0.096	0.904	0.015	0.900	-0.045	0.588	-0.024	0.751	0.056	0.496	0.049	0.601
Md	5.050	0.026	-6.290	0.003	0.010	0.085	-3.830	0.434	-6.300	0.018	8.310	0.021
Bd	-2.240	0.197	2.200	0.204	2.620	0.045	1.130	0.493	0.960	0.055	-2.880	0.015
Bsd	0.340	0.019	0.002	0.080	7.610	0.070	0.400	0.069	0.203	0.061	0.0002	0.158
Nbsd	-0.001	0.522	-0.002	0.278	-0.002	0.387	-0.300	0.029	-0.001	0.531	-0.001	0.676
Exc	0.002	0.997	-0.292	0.636	0.023	0.774	0.054	0.928	0.044	0.470	-0.023	0.714
Inf	0.225	0.350	-0.010	0.684	-0.015	0.121	0.016	0.472	-0.040	0.071	-0.046	0.050
_cons	-0.472	0.683	0.849	0.436	2.382	0.094	0.049	0.969	-0.699	0.531	-0.207	0.854
Pseudo(R^2)	0.0476		0.0416		0.1638		0.0149		0.0619		0.0817	
Prob> X^2	0.0834		0.0052		0.0390		0.0484		0.0597		0.0325	

Source: Stata 14 output

In Adamawa, the probit model is more effective at revealing significant relationships, identifying a strong negative effect of multilateral debt, which the logit fails to capture. This underscores the probit model's sensitivity to adverse investment conditions in structurally weaker regions. In Lagos, both models align in the direction of influence for most variables but differ in significance levels. For instance, multilateral debt is significant in the logit but marginal in the probit, while bilateral debt becomes significant only in the probit, indicating possible instability in detecting external debt effects. Anambra exhibits consistency in the negative impact of multilateral debt, more pronounced in the logit, while both models highlight the crowd-in effect of banking sector debt and the crowd-out effect of non-banking sector debt. Rivers shows strong agreement across models, particularly regarding the negative role of multilateral debt and the supportive impact of banking debt. Inflation is significantly negative in both models, emphasizing macroeconomic instability's role in crowding out private investment. Kogi presents similar directional consistency, with multilateral debt being significantly positive and bilateral debt significantly negative, particularly in the probit model. Inflation again emerges as a deterrent to private investment in both models. Overall, the direction of effects across the two models is generally consistent, especially for multilateral and banking sector debt and inflation. However, the probit model is more conservative, often producing fewer statistically significant coefficients and lower explanatory power (as seen in its Pseudo R^2 values), while the logit model tends to detect sector-specific relationships more clearly. This suggests that while both models offer complementary insights, the choice between them can influence the identification of significant debt-investment relationships, especially under varying regional economic structures.

Post Estimation Test

The linktest is a diagnostic tool used to assess the specification of a logistic regression model. It checks whether the model is misspecified that is, whether important variables have been omitted or irrelevant ones included.

Table 4: Linktest

.	Coefficient	p-value	Interpretation
_hat	1.032	0.022	Statistically significant. This suggests that the predicted values from the model (_hat) are significantly associated with the dependent variable. This is expected in a well-specified model.
_hatsq	0.072	0.423	Not statistically significant. This indicates that the squared predictions (_hatsq) are not adding significant explanatory power. This is a good sign, suggesting no evidence of model misspecification.
_cons	-0.032	0.906	Insignificant constant term, as expected.

Source: Stata 14 output

Since _hat is significant and _hatsq is not, the model passes the linktest**,** meaning it is correctly specified. There's no evidence that key variables were omitted or that irrelevant variables were included. The p-value for the chi-square test (0.0078) confirms the overall significance of the model fit in this test, but what matters most here is the non-significance of **_**hatsq.

CONCLUSION AND RECOMMENDATIONS

The analysis of state wise logistic regression findings reveals a regionally differentiated impact of public debt on private investment in Nigeria. Multilateral debt shows a largely positive and statistically significant influence in states such as Lagos and Kogi, but a negative effect in Anambra and Rivers, suggesting that governance quality, institutional capacity, and the productive deployment of borrowed funds condition investment outcomes. Banking sector debt consistently crowds in private investment across nearly all regions, particularly in Lagos, Kano, and Kogi, while non-banking sector debt tends to crowd it out, notably in Rivers and Lagos. Macroeconomic variables such as inflation and exchange rate volatility exhibit mixed but generally adverse effects, especially in states like Kano and Kogi. Output growth (Yt), while significant in a few states like Kano and Kogi, was not a consistent driver of investment across the regions, indicating that private sector responsiveness may be more debt-structure sensitive than output-level driven.

Policy Recommendations

In light of the findings, Nigerian policymakers should prioritize expanding access to multilateral debt in states like Lagos and Kogi, where its impact on private investment is positive, while restricting or restructuring such debt in Rivers and Anambra where it shows a crowding-out effect. The central and state governments should also promote banking-sector-based financing mechanisms nationwide, especially in Kano and Lagos, by strengthening credit institutions and improving regulatory support to enhance private sector access to finance. Given the crowding-out impact of non-banking sector debt in several states, this debt channel should be restructured or deprioritized in favor of more efficient instruments. Inflation control must remain a core macroeconomic policy goal, particularly in states like Kogi and Kano where inflation significantly hinders investment. Additionally, state-level fiscal planning should be tailored to local economic structures, ensuring that debt-funded expenditures are productive and investment-enhancing. Finally, improving governance, fiscal transparency, and public investment management particularly in debt-sensitive states will help maximize the developmental impact of public borrowing on private sector activity.

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