Determining Private Investment Reaction from Government Deficits: Evidence from Nigeria

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Abstract

This study examined the effect of government deficit on private investments in Nigeria for the long-run period of 1981 to 2022. The control variables, which are GDP growth rate, total government revenues, total government expenditures, inflation and private sector credits in Nigeria are coded GDPG, GVR, GVX, INF and CPS. The result of the study showed that, as government deficit impede private investments, its effect was statistically significant, together with a significant negative effect from private sector credits and government revenues. This means that government deficit crowd out private investments in Nigeria from 1981 to 2022, all things being equal. In line with the findings/conclusion made in this study, the following recommendation is put forward: As government deficit coefficient took up a negative sign, it means it impeded private investment in Nigeria. To address the deleterious impact of domestic debt on private investment, government, together with its borrowing from the domestic credit market should get the monetary policy of the Central Bank of Nigeria to address the inflation and exchange rates uncertainties so that the market scope of the private investors will be enlarged.

Keywords: *Government Deficit; Private Investment; Crowding Out/In Effect; ARDL; Nigeria*

1.1 Background to the study

Modern economies have consistently accepted private investment as the surest road to economic growth. According to the literature, nations with high rates of investment experience rapid growth, whereas countries with low investment rates experience moderate growth (Epor, Ibenta, Yua, & Ityavyar, 2023; Enabulu & Epor, 2022; Akomolafe, Bosede, Emmanuel, & Mark, 2015). Nigeria's goal to build its economy has led to efforts to improve its infrastructure, institutions, and human capital. According to Kulu, Brafu-Insaidoo, Peprah, and Bondzie (2022), most Sub-Saharan African (SSA) countries have identified the private sector as the engine of economic growth, making private sector activities very essential to policymakers. To supplement this, the government determined that it was necessary to develop good policies and programs that would provide an enabling environment for both national and foreign investors (Ebhotemhen, 2020). Furthermore, the government deficit is a crucial indication of the government's ability to bridge its

financial gaps. The government deficit is the amount by which a government's total expenditures exceed its total revenue within a given time period, usually a fiscal year. Private investments, on the other hand, are capital expenditures made by individuals, firms, and organizations in a variety of economic sectors. Understanding the relationship between the government deficit and private investments is critical for policymakers, economists, and investors since it can have substantial implications for economic growth, employment, inflation, and overall prosperity.

Depending on the current economic conditions and policy responses, the government deficit can have both positive and negative effects on private investment. During an economic downturn or recession, governments frequently use deficit spending to boost economic activity by increasing public investments, reducing taxes, or implementing social welfare programs (Nwanna & Umeh, 2019). This expansionary fiscal strategy is intended to increase aggregate demand, generate jobs, and assist firms during difficult times. However, long-term deficits might raise concerns about the government's ability to service its debt commitments, thereby crowding out private investments by competing for scarce financial resources in the capital markets (Epor et al., 2023; Enabulu & Epor, 2022). This indicates that the government deficit and private investments are two critical components of a country's economy that are closely related. But the Keynesian school of thought, which pioneered the "Crowd-in Hypothesis," asserted that an increase in government capital expenditure elates private investment by promoting economic activities (Olaifa & Benjamin, 2020). Specifically, government capital expenditure on infrastructure (such as roads, communication services, and electricity, among others) reduced the cost of production by allowing firms to produce and transport more efficiently.

Ogunjimi (2019) highlighted that Nigeria's fiscal operations over the years have resulted in changing degrees of deficit, the financing of which has had far-reaching economic consequences. Nigeria's huge budget deficits have had a negative impact on the economy since they diminished national savings, which in turn raised domestic interest rates, limiting capital creation and crowding out private sector investment. The decline in investment had an impact on employment because enterprises or businesses lowered their demand for labour and other factor inputs. All of these factors lowered national outputs, resulting in trade deficits and balance-of-payments problems, as well as a decrease in people's overall welfare. In this type of circumstance, the economy is confronted with both both a fiscal deficit and a trade deficit simultaneously, we have what is usually referred to as the ‘the twin deficits phenomenon’.

It is worth noting that when private sector funds become scarce as a result of rising government debt, capital funds for public investment fall due to rising debt payment. Developing countries with an underlying hunger for debt, such as Nigeria, should exercise little or no prudence when utilizing debt to cover the government's budget deficit. As a result, Nigeria's investment level has fallen short of the African averages of 35% aggregate investment and 23% private investment (Combey, 2016). According to data from the Central Bank of Nigeria (CBN), domestic private investment averaged 13.90% from 2010 to 2014 and 18.03% between 2015 and 2021. Although private investment has risen better in 2015-2021 than it did during the 2010-2014 period, it is important to establish that domestic private sector investment remains below the 23% criterion.

Empirical research on the link between government deficits and private investments has produced conflicting conclusions due to differences in techniques, data sources, time periods, and country-specific factors. According to some research findings, high levels of government debt relative to GDP can crowd out private investments by raising interest rates and diverting savings away from productive uses (Hamadou, Nourou, Oumarou & Zakariyaou, 2022; Akomolafe, Bosede, Emmanuel & Mark, 2015), which is primarily postulated by debt overhang theory. Some research suggests that public debt has a positive impact on investment (Were & Madete, 2022; Abubakar & Mamman, 2021; Kengdo, Ndeffo & Avom, 2020; Ogunjimi, 2019; Thilanka & Ranjith, 2018; Sánchez-Juárez & García-Almada, 2016), supporting the Keynesian view. These contrasting viewpoints in prior research' findings suggest a lack of consensus on the influence of public debt on investment; thus, it is necessary to adequately resolve the discrepancies. Second, these research have largely focused on either domestic debt, external debt, or a combination of both and their effect on investment.

So, the essential issues are: Is there any relationship between government deficits and investment in Nigeria? How do private investors react to government deficit decisions? Is the empirical outcome from Nigeria changing over time? Can the government deficit and private investment in Nigeria form a long-term cointegration relationship? This research investigates the implications of the government deficit on private investments in Nigeria.

The importance of this study cannot be overstated. This analysis demonstrates the amount and type of the influence that a budget imbalance may have on private investment. As a result, it will act as a reference for the government's fiscal deficit policies, as well as for foreign investors making direct investment decisions. It will improve the current literature on public debt and investment in emerging economies and give references for future research due to the vacuum it will fill, as noted in the problem description.

Private investment, as the dependent variable, is concerned with private expenditure on fixed assets, primarily for productive reasons. With the assumption that the government deficit may have an impact on private investment expenditure, we proceed to examine the effect of the government deficit on the amount of private investment in Nigeria from 1981 to 2022. This indicates that the research spanned 42 years. The researcher chose the time period 1981 to 2022 because he wants to analyze both the long-term and short-term consequences of government deficit policies across Nigeria's various political regimes on private investment in the nation. The study used secondary data acquired from several issues of the World Bank Development Indicators for Nigeria and the Central Bank of Nigeria (CBN). The data covered the period of 1981 to 2022.

The rest of the study is segmented into five sections. Following this introduction is the literature review in section 2. Thereafter, section 3 will deal with data and the methodology that will be used for analysis in section 4. The study is concluded with section 5 that deals with discussion of findings, conclusion and recommendations.

2. Literature Review

2.1 Conceptual Review

A government budget is a document that outlines expected income and intended spending for a fiscal year. It frequently requires legislative approval and political pressure from interest groups. A balanced budget is one in which the predicted government expenditure equals the expected receipts, according to the notion of "living within means." Classical economists pushed for this budget, which ensures that the government's spending does not exceed its revenues. A budget surplus happens when the government collects more income than it spends, resulting in a positive budget balance, whereas a budget deficit occurs when the government spends more money than it gets in taxes. According to Adebisi and Oyeleke (2020), a budget or fiscal deficit arises when a country's revenue falls short of its expenditures in a given fiscal year. This indicates that a country's budget deficit occurs when its expenditures surpass its revenues. In other words, the public savings rate is negative. Put another way, a budget deficit occurs when the government spends more than it earns in taxes. This government deficit is known to have some sort of influence on investment.

Investment is defined as current expenditures for future profits (Origin, Nneka, & Ubah, 2021). From another angle, Enabulu and Epor (2022) observe that economists regard investment as transactions that enhance the amount of real aggregate wealth. This mostly involves the acquisition (or manufacture) of new real durable assets such as factories and machinery. Adeyemi and Oloruntuyi (2019) defined gross capital formation as the total spending on investment by manufacturing units in a domestic economy. It is defined as the total of gross fixed capital formation (GFCF), changes in stocks of the year (CS), and the net acquisition of valuables by enterprises and households. Private investment is one of the most significant macroeconomic factors. Private investment, from a macroeconomic viewpoint, is the acquisition of a capital asset that is intended to provide income while also increasing in value. Oyedokun and Ajose (2018) define private domestic investment as an expenditure intended to expand the overall capital stock of the economy. This is accomplished by acquiring additional capital-producing assets and assets that may create revenue in the domestic economy. Some proponents of private domestic investment (Uremadu, 2006; Adegbike & Owulabi, 2007) believe that developing nations should rely heavily on private domestic investment rather than foreign direct investment. This does not diminish the relevance of FDI, since they are perceived to benefit host nations by accelerating the process of economic growth and development, its multiplier effect is greater (Oyedokun & Ajose, 2018).

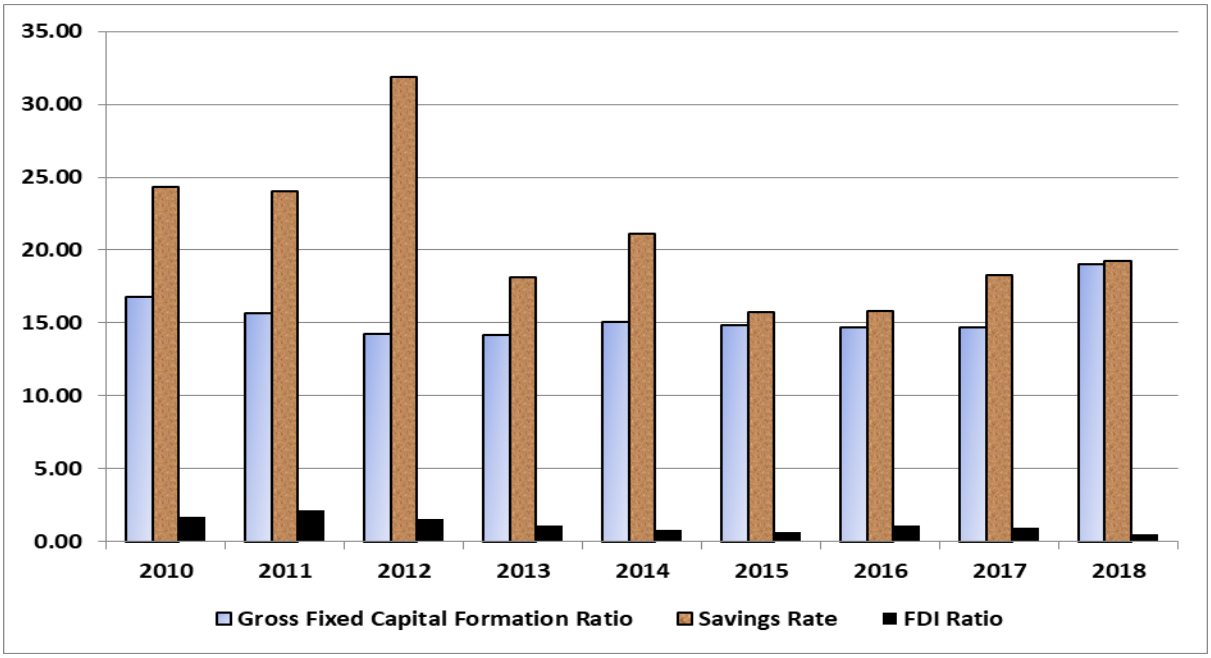
However, the preference for domestic private investment is because borrowing from outside is not a proper strategy for growth and development because it not only has an adverse effect on the balance of payment as these loans will be serviced in the future with the use of their domestic resources, but it also carries a foreign exchange risk such as devaluation of their currency, which is one of the specific conditions for borrowing from International Monetary Fund (Oyedokun & Ajose, 2018). As a result, domestic investment via capital creation is not only critical, but also a precondition for the geometric acceleration of growth and development in any economy since it offers domestic resources that may be utilized to fuel the country's investment effort.

The Nigerian government implements a variety of measures over time to encourage private investment flows. Specifically, the government approved and implemented IMF programs that were closely monitored. The liberalization of the Nigerian economy invites foreign investment in the manufacturing sector and provides incentives for equity ownership in all industries excluding

critical ones such as military equipment. Investors can benefit from advantages such as tax breaks and discounts for the development of local raw materials. Starting in the 1980s, Nigeria embarked on a comprehensive privatization drive as part of its economic reforms. This transition begins with the deregulation of the Nigerian economy in 1986 and continues with many measures implemented by the Nigerian government (such as the adoption of the Structural Adjustment Programme in 1986, the Export Processing Zones Decree in 1991, and the Investment Promotion Commission in 1995). Inflows of foreign direct investment (FDI) were minimal before the 1990s, but post-1990s show remarkable changes and into the twenty-first century.

Despite the Nigerian government's pro-private investment policies, investment performance in Nigeria has not been impressive. Nigeria's gross fixed capital creation is not dependent on domestic savings levels. In a situation where savings do not drive investment, a shift in the saving-investment gap from deficit to large surplus in emerging Asia has resulted in an excess global supply of saving (a global saving "glut") that has been channeled to finance large current account imbalances (Bernanke, 2005). At the same time, this would explain the low long-term real interest rate levels required to balance desired saving and planned investment on a worldwide scale. Figure 1 clearly demonstrates this picture for Nigeria.

Figure 1: Private Investment Performance in Nigeria



Source: World Bank Development Indicators

Aggregate savings have impressed better than the other components of private investment. In 2010 and 2011, it 24.32% and 24.00%, and rose to its highest rate of 31.89% in 2012. The savings rate has continued to decline since then but averaged 20.95% of GDP between 2010 and 2018. This performance is despite the challenges of savings in Nigeria identified by Imoisi, Iyafekhe and

Ezeibekwe (2018) to include: banks' neglect of small and medium class savers in favour of government deposits, low level of savings mobilization at the grass-root level because banks set unrealistic requirements that must be met before accounts can be opened with them, and low and negative savings deposit rates have compounded the problems of low domestic savings.

2.2 Theoretical Framework

Many of the authors who have researched the link between public debt and investment factors have utilized a variety of hypotheses to justify their findings. In this study, the Crowding-out theory is used to explain the link between government deficits and private investment. The crowding out hypothesis, attributed to the Keynesian school of thinking, is used to describe how growing debt levels affect the economy (Epor et al, 2023). They claim that utilizing public debt to pay the fiscal deficit will replace or drive out private investment, slowing economic development. According to Kocha, Iwedi, and Sarakiri (2021), the crowding out effect hypothesis of public debt applies, particularly when the stock of government securities replaces capital stock in portfolios including public assets. Additionally, debt servicing reduces government spending on social programs like education and healthcare, which are crucial for economic growth. Again, a large debt obligation implies that the government's short-term earnings must be utilized to service the debt, squeezing out public investment in the economy (Serieux and Yiagadeesen, 2001). Reducing public investment might lead to a drop in private investment, as certain private and public initiatives are complimentary (Omodero, 2019).

According to the Crowding out stance, government spending can reduce private investment. According to Olaifa and Benjamin (2020), government capital expenditure financed by market borrowing reduces loanable funds and increases the real cost of capital to the private sector, whereas government capital expenditure financed by taxation aggravates the economy and raises input costs, resulting in lower expected output growth and private investment. There is also the prospect of a crowd-in effect, in which government capital spending encourages private investment. This viewpoint maintained that government engagement in economic activity is extremely important in the growth process of any nation.

2.3 Empirical Review

The study by Epor, Steve, Henry, and Nwakoby (2023) examines the impact of public debt on private investment in Nigeria from 1990 to 2019. The results show that private investment is positively influenced by foreign and domestic debt changes, and negatively influenced by domestic and foreign debt shocks. Hamadou, Nourou, Oumarou, and Zakariyaou (2022)'s study examines the impact of public debt on private investment in 43 Sub-Saharan African countries from 2000-2018. Using the Ordinary Least Squares (OLS) method, Ordinary Doubles Least Squares (ODLS) method, and Quantile regression, the study finds that public debt reduces private investment. Kulu, Brafu-Insaidoo, Peprah, and Bondzie (2022) studied the impact of government domestic payment arrears on private investment in 33 Sub-Saharan African countries from 2007-2018. They found that increased arrears reduce private sector investment due to credit competition. The study also revealed that private investment responds negatively to shocks in government domestic payment arrears.

The study by Were and Madete (2022) examined the relationship between public debt and investment in Tanzania using the autoregressive distributed lag (ARDL) estimation approach for the period 1976–2020. Results showed that increasing external debt boosts public investment, but the long-term negative effect is due to the need to service and repay debt, which depends on government costs. To ensure optimal resource use, prioritizing and enhancing public investment efficiency is crucial. Other funding methods, such as public-private partnerships and financial market development, could also be explored. The study by Abubakar and Mamman (2021) uses ARDL models to analyze the impact of public debt on private investment in Nigeria from 1981 to 2018. Results show that an increase in total debt, external debt, and debt service payment negatively affects private investment, while domestic debt has an asymmetric effect. Domestic debt reduction is more beneficial, but domestic public debt accumulation does not negatively affect private investment. The study by Origin, Nneka, and Ubah (2021) examined the impact of Nigeria's public debt on public investment from 1985-2018. Data was sourced from the Central Bank of Nigeria Statistical Bulletin. Auto-regressive Distributed lag models were used to test the relationship between independent variables and dependent variables. The short-run results showed no significant effect of public debt.

Kocha, Iwedi and Sarakiri (2021)'s study on the impact of public external debt on capital formation in Sub-Saharan Africa from 2000 to 2008 found that increasing external debt stock and interest payments have only a marginal short-term effect. Ebhotemhen (2020) evaluates the impact of debt overhang and crowding out effects hypothesis on investment in Nigeria from 1981 to 2018. Using the Vector Error Correction Model, the study discovered that the Debt-Export Ratio validates the expansionary influence on investment. Agyapong and Bedjabeng (2020)'s study found a significant positive relationship between external debt and foreign direct investment in African economies from 2002 to 2015, using a dynamic panel and the generalized moment estimation technique. The study by Kengdo, Ndeffo, and Avom (2020) examined the impact of external debt on domestic investment in sub-Saharan Africa (SSA) from 1980-2017. The results showed that external debt positively impacted SADC and EAC, with a bearable debt threshold accounting for 74.33% of GDP in the EAC zone. However, CEMAC and ECOWAS had a negative effect, but for a debt threshold below 94.73%, investment was positively impacted. The study suggests promoting public policies to improve domestic investment and ensure sustainable debt.

Olaifa and Benjamin (2020) studied the relationship between government capital expenditure and private investment in Nigeria from 1981 to 2016. They found a long-term relationship, with government capital expenditure on physical assets and defense displacing private sector investment, while human capital and public debt servicing promote private sector investment. The study also revealed a bidirectional causality. Al-Dughme (2019)'s study examined the impact of public debt and public investment on Jordan's economic growth from 1990-2017. Using multiple linear regression, the study found that public debt negatively affects economic growth, with a -0.11 coefficient of effect. Conversely, public investment positively impacts economic growth, with a 0.10 coefficient of effect, indicating that an increase in public investment leads to a 0.10% increase in Jordan's economic growth.

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Thilanka and Ranjith (2018)'s study on Sri Lanka's public debt impact on private investment found a crowding-in effect, suggesting government diverted borrowing funds to stimulate the private sector. The study also found that real GDP positively impacted private investment, suggesting the need for further economic expansion. The findings suggest a positive impact of public debt on private sector growth. The study by Akomolafe, Bosede, Emmanuel, and Mark (2015) examined the impact of public borrowing on private investment in Nigeria from 1986 to 2005. The analysis, using the Johnasen Co-integration test and Vector Error Correction Model, found that domestic debt discourages investment in the short and long run.

Kengdo, Ndeffo and Avom (2020), Ebhotemhen (2020) have contributed to the literature by examining the relationship between public debt factors and investment, and Kulu, Brafu-Insaidoo, Peprah and Bondzie (2022) investigated the effects of domestic debt on investment. This study addresses a gap in previous studies, where fundamental public debt variable like fiscal deficit have received little attention. This study builds on existing literature by developing an individual model to account for fiscal/government deficit effects on private investment. To close the evidence gap, this analysis will add the reaction of private investment to the government deficit variable. There is another theoretical application gap in the literatures studied. A suitable theoretical framework helps this type of study to properly relate variables to the applicable model. This study thinks that the crowding out/in theory is designed to accommodate the evolving and contemporary reality in the determination of investments from government deficit component of Nigeria's fiscal policy.

3. Data and Methodology

The study employed an *ex post facto* research approach to analyze private investment activity in Nigeria with the influence of government deficits from 1981 to 2022. This study strategy was chosen because it will allow the researcher to capture the trend of private investment in Nigeria. The ex-post factor research approach was used since the study is highly reliant on quantitative secondary data.

The study will employ secondary data gathered from various issues of the World Bank Development Indicators for Nigeria as well as the Central Bank of Nigeria (CBN) statistical bulletin during the study period. To this goal, regression models that seek to explain these associations will be developed using basic theories and empirical investigations spanning the years 1981 to 2022.

Model Specification

Based on the theoretical framework, this study will model thus:

$$INV = f(government\ deficit, GDP)$$

$$INV = f(fdc_t, GDP)$$

$$I_v = f(pd_t, GDP)$$

Where, pd_t is public debt at time t

To assess the link between private investment and government deficit in Nigeria, this study will draw on previous research (Origin, Nneka, & Ubah, 2021) that developed empirical models for estimating private investment or fiscal policy impacts. However, this study will change them by accounting for the impact of the government deficit on private investments, with corresponding control variables:

$$I_v = f(fdc, dmd, xtd, dsv, GDP) \quad 1$$

GDP, real interest rates, inflation rate, and credit to the private sector are empirical factors that influence investment. Following that, the study will adopt the model used by Anoke, Odo and Nnabu (2021), Akomolafe, Bosede, Emmanuel and Mark (2015), Epor, Ibenta, Yua and Ityavyar (2023), Enabulu and Epor (2022), Origin, Nneka, and Ubah (2021), and Epor, Yua and Nwakoby (2023) on the relationship between private investment and government deficit that accounts for the effects of GDP and interest rates, credit to the private sector (Lau, Tan, & Liew, 2019), and inflation rate (Omodero, 2019). It should be noted here that public debt is a derived decision, which means that governments borrow to raise spending (Fagbemi & Adeosun, 2020) when revenues and savings are insufficient. This means that modeling investment without including government expenditure and taxation, as well as the long-term repercussions of interest rates and inflation, will be incorrect. The mathematical models can be expressed as:

$$I_v = f(fdc, GDP, gvx, txr, int, inf, cps) \quad 2$$

Where,

I_v	=	I_v is private investment
fdc	=	fiscal deficit
int	=	interest rate
GDP	=	gross domestic product
gvx	=	government expenditure
txr	=	tax revenues
int	=	interest rate
inf	=	inflation rate
cps	=	credit to the private sector

Data Analysis Techniques: The Autoregressive Distributed Lag (ARDL)

Pesaran, Shin and Smith (2001) developed the ARDL bounds testing approach to investigate long-run cointegration relationships among variables. This flexible model, also known as the Autoregressive Distributed Lag (ARDL) approach, involves estimating the following equation to determine the relationship between variables. The bounds testing approach involves estimating the following equation as postulated by Epor, Ibenta, Yua and Ityavyar (2023); Enabulu and Epor (2022), Origin, Nneka and Ubah (2021) and Epor, Yua and Nwakoby (2023):

$$\Delta I_v = \alpha_0 + \alpha_1 I_{v,t-i} + \alpha_2 fdc_{t-i} + \alpha_3 GDP_{t-i} + \alpha_4 gvx_{t-i} + \alpha_5 txr_{t-i} + \alpha_6 inr_{t-i} + \alpha_7 inf_{t-i} + \alpha_8 cps_{t-i} + \sum_{i=1}^{a} \beta_i \Delta I_{v,t-i} + \sum_{i=0}^{b_1} \partial_j \Delta fdc_{t-j} + \sum_{i=0}^{b_2} \varphi_k \Delta GDP_{t-k} + \sum_{i=0}^{b_3} \theta_l \Delta gvx_{t-l} + \sum_{i=0}^{b_4} \omega_m \Delta txr_{t-m} + \sum_{i=0}^{b_5} \pi_n \Delta inr_{t-n} + \sum_{i=0}^{b_6} \rho_p \Delta inf_{t-p} + \sum_{i=0}^{b_7} \emptyset_q \Delta cps_{t-q} + \mu_t \quad (3.10)$$

where, the terms associated with the summation signs in the above models above (ie, β_i, ∂_j, φ_k, $\theta_l, \omega_m, \pi_n, \rho_p, \emptyset_q$) represent the short-run dynamic coefficients; whereas $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8$ are the long-run coefficients, and are the optimum lag lengths and is the white noise error term. In this study, the appropriate lag order of each series of the ARDL model is determined using the Akaike information criterion (AIC).

The hypothesis of the bounds test is specified as:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8$$

$$H_1: \alpha_1 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8$$

According to Pesaran, Shin and Smith (2001), The ARDL bounds test, using the Wald test (F-statistic), can be used to determine cointegration or inconclusiveness. If the F-statistics fall below the lower bound critical value, the null hypothesis is accepted, if it exceeds the appropriate upper bound critical values, the null hypothesis is rejected.

Long-run and Short-run ARDL Estimation

Once cointegration is established between public debt and investment, the conditional ARDL long-run model can be estimated as specified:

$$\Delta I_v = \alpha_0 + \alpha_1 I_{v,t-i} + \alpha_2 fdc_{t-i} + \alpha_3 GDP_{t-i} + \alpha_4 gvx_{t-i} + \alpha_5 txr_{t-i} + \alpha_6 inr_{t-i} + \alpha_7 inf_{t-i} + \alpha_8 cps_{t-i} + \epsilon_t \quad 3$$

Where,

ω_0 = intercept

α_1–α_8 = coefficients of long-run estimates

ϵ_t = error term of long-run estimates

In the next step, we will obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates. This is specified as follows:

$$\Delta I_v = \alpha_0 + \sum_{i=1}^{a} \beta_i \Delta I_{v,t-i} + \sum_{i=0}^{b_1} \partial_j \Delta fdc_{t-j} + \sum_{i=0}^{b_2} \varphi_k \Delta GDP_{t-k} + \sum_{i=0}^{b_3} \theta_l \Delta gvx_{t-l} + \sum_{i=0}^{b_4} \omega_m \Delta txr_{t-m} + \sum_{i=0}^{b_5} \pi_n \Delta inr_{t-n} + \sum_{i=0}^{b_6} \rho_p \Delta inf_{t-p} + \sum_{i=0}^{b_7} \emptyset_q \Delta cps_{t-q} + \boldsymbol{\Omega} ECT_{t-1} + \psi_t \quad 4$$

Where,

ECT = error correction term derived from equation 4, and

Ω = the speed of adjustment.

ψ_t = error term of the short-run model

The error correction model shows the speed of adjustment needed to restore the long run equilibrium following a short run shock. The **Ω** is the coefficient of the error correction term in the model and must be negative and significant for the return back to long-run equilibrium to hold (Pesara, Shin & Smith, 2001).

4. Data Analysis and Results

The data used in the research have been summarized in table 1, using descriptive analysis in the form of mean, standard deviation, minimum and maximum. The number of observations (42) represent the years covered by the study. The mean of private investment was 32.01%. This revelation showed that the size of private investment is fairly high over the years. An economic activity that possesses this level potentials has the ability to drive the Nigerian economy to sustainable growth and development. Again, table 1 also showed that the previous administrations in Nigeria were running an average annual fiscal deficit of 2.56% since 1981. The means of private sector credit and inflation was 11.66% and 18.92%, while those of government revenues and aggregate spendings was 13.11% and 8.38%, respectively.

Table 1: Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
IV	32.011	26.143	84.648	12.801	18.057	1.287	4.309	42
FDC	-2.557	-2.507	0.784	-8.570	1.847	-0.756	4.090	42
GDPG	3.012	3.424	15.329	-13.128	5.323	-0.811	4.702	42
GVR	13.107	12.431	27.101	5.475	6.030	0.609	2.480	42
GVX	8.378	8.068	17.286	5.089	2.508	1.571	6.024	42
INF	18.915	12.942	72.836	5.388	16.456	1.882	5.450	42
CPS	11.659	8.099	22.755	5.806	5.594	0.614	1.606	42

Source: Authors' computation from CBN Statistical Bulletin

The standard deviation information implies that private investment variable, with standard deviation of 18.65%, exhibited more volatility than all the other variables included in the study. The statistics of skewness which is a measure of asymmetry of the distribution of the series around its mean indicated that all the variables, except fiscal deficit and economic growth, were positively skewed, implying that these distributions have long right tails. Also, the Kurtosis which measures the peakedness or flatness of the distribution of the series revealed all the variables of the study were leptokurtic, suggesting that the distribution is more peaked at the top relative to the normal.

Correlation Analysis

The coefficients shown in the Pearson Correlation Coefficient matrix in table 2 indicates the strength of the linear relationship between the variables. From the Pearson Correlation Coefficient Matrix in table 2, it is observed that the correlation coefficients from private investment was found to be positively related with government expenditures and external debt.

Table 2: Correlation analysis of variables for Nigeria

	I	FDC	GDPG	GVR	GVX	INF	CPS
I	1						
FDC	-0.290	1					
GDPG	-0.630	0.290					
GVR	-0.180	0.190	0.470	1			
GVX	0.210	-0.530	0.060	0.500	1		
INF	0.200	-0.230	-0.210	0.020	0.220	1	
CPS	-0.660	0.030	0.130	-0.370	-0.490	-0.280	1

Source: Authors' computation from CBN Statistical Bulletin

The correlation matrix is used to analyze the linear association between dependent and independent variables, as well as the collinearity between them. Correlation analysis helps determine which variables should be dropped for a near perfect correlation. A linear relationship of ± 0.80 indicates a strong linear relationship, and no strong linear relationship among independent variables, indicating no need for any variable drop.

Stationarity Tests:

The ARDL models don't require pre-testing for unit root problems, as they can accommodate I(0) and I(1) variables or mutually cointegrated variables. However, they don't accommodate series of order 2, necessitating unit root tests (Epor et al, 2023). The order of integration of time series was investigated using the Augmented Dickey and Fuller test.

Table 3: Stationarity Tests at Levels and First Difference

Variables	ADF Tests: Levels	ADF Tests First Difference	Order of Integration

	ADF Test Statistic	p-values	ADF Test Statistic	p-values	
Iv	-3.8181	0.0056			*I(0)*
fdc	-3.1080	0.0337			*I(0)*
gdpg	-3.1852	0.0283			*I(0)*
gvx	-1.9078	0.3255	-10.3556	0.0000	*I(1)*
gvr	-2.1428	0.2297	-5.9858	0.0000	*I(1)*
cps	-1.0317	0.7329	-5.9130	0.0000	*I(1)*
inf	-3.0488	0.0387			*I(1)*

Source: Authors' computation from CBN Statistical Bulletin

The ADF tests represented in table 3 rejected the null hypothesis of the presence of unit root at levels for private investment, fiscal deficits, economic growth rate inflation and because their test statistics were greater than 3.0 and produced a probability less than 5%. So I, FDC, GDPG, and INF series were integrated of order zero, that is *I*(0). On the other hand, the ADF test fails to reject the null hypothesis of no unit root for aggregate government expenditure, government revenues, and private sector credits at levels. However, they became stationary at first difference, making them integrated of order one, that is *I*(1).

It has been established by Pesaran, Shin and Smith (2001) that the bounds technique allows a mixture of I(1) and I(0) variables as regressors. Based on this ground, we proceed to perform the ARDL bounds test for cointegration.

ARDL Bounds Test for Cointegration

In this section, we proceed to investigate long-run cointegration, where public and private investments are tested as the dependent variable. The calculated F-statistics report is in Table 4. The estimated F-statistics of the ARDL bound testing to be compared with the critical value proposed by Pesaran, Shin and Smith (2001).

Table 4: ARDL Bounds Tests for Public investment-public debt models in Nigeria

F-statistic	6.47	5% Upper Bound Value	Decision
Sig. level	5%	3.28	Reject H0

Source: Authors' computation from CBN Statistical Bulletin

The study reveals that the government deficit-private investment model has long-run cointegration, with all F-statistics exceeding critical values from ARDL bounds tests. When private investment was used as the dependent variable, the model provided higher F-statistics values at the 5% significance level (6.47 > 3.28), indicating that government deficits have long-term linkages with private investments during 1981-2022, considering government expenditure, income, private sector credits, and inflation.

Model Estimations

The ARDL model, a multivariate model, is used to estimate the long-run relationship between private investment and government deficit. The Akaike model is selected as default for the lag specification, as long-run model specifications require this model estimation.

In the model involving government deficit and private investment, the individual country's lag selection criteria based on Akaike model selection are defined as:

government deficit-private investment model - ARDL - (3, 1, 1, 1, 1, 1, 1)

Based on the lag specification of the ARDL lags, the long run model is given as:

$$Iv = 44.98 - 1.48 * CPS + 0.68 * GDPG - 0.97 * GVR - 0.54 * GVX + 0.31 * INF - 2.56 * FDC$$

From the model estimation above, the coefficient of fiscal deficit is negative for private investment in Nigeria, while the coefficients of private sector credits were negative, meaning that increasing debt of government drains away the funds available for the private sector.

ARDL Short-run Error Correction and Long-run Model Estimates

The study confirms the long-run relationship by estimating the error correction term, which must be negative and statistically significant. This correction corrects divergence from the long-run equilibrium in the short-run. Based on the bounds test, the study estimates short-run ARDL-ECM models for all Nigerian government deficit-private investment models.

As shown in Table 6, the error correction model coefficients in Nigeria's fiscal deficit-private investment model revealed the expected negative coefficient and are statistically significant at the 1% significance level (i.e., p = 0.0000). This conclusion implies that there is considerable error occurring, as well as a correction of the error to long-run equilibrium in the prior eras. Approximately 38.99% of the mistake made in previous years was addressed in the fiscal deficit-private investment model.

The fiscal deficit and ECT variables account for 75.02% of changes in the fiscal deficit-private investment model in Nigeria. The regression models are significant (p = 0.0000), indicating that all fiscal deficit and control variables are relevant in explaining public and private investment performance. The Durbin-Watson statistic value of 2.3175, lying between 1.4 and 2.5, indicates that both fiscal deficit-public investment and fiscal deficit-private investment models are free of first-order serial correlation.

Table 6: The ARDL-ECM for fiscal deficit-investment model

ARDL ECM Estimates			ARDL Long-run Estimates		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(IV(-1))	0.0697	0.4112	FDC	-2.5633	0.0398**
D(IV(-2))	-0.4042	0.0003***	CPS	-1.4758	0.0006***
D(CPS)	0.0497	0.7985	GDPG	0.6840	0.2140
D(GDPG)	-0.0462	0.6779	GVR	-0.9758	0.0275**
D(GVR)	0.2522	0.0453**	GVX	-0.5455	0.6396
D(GVX)	-1.6549	0.0000****	INF	0.3137	0.0174**
D(INF)	0.0252	0.4295	C	44.9841	0.0003***
D(FDC)	-2.5997	0.0000****			
ECT(-1)*	-0.3899	0.0000****			
Adjusted R-squared	0.7502				
Prob(F-statistic)	0.0000				
Durbin-Watson stat	2.3175				

*, **, *** are significance at 10%, 5% and 1%

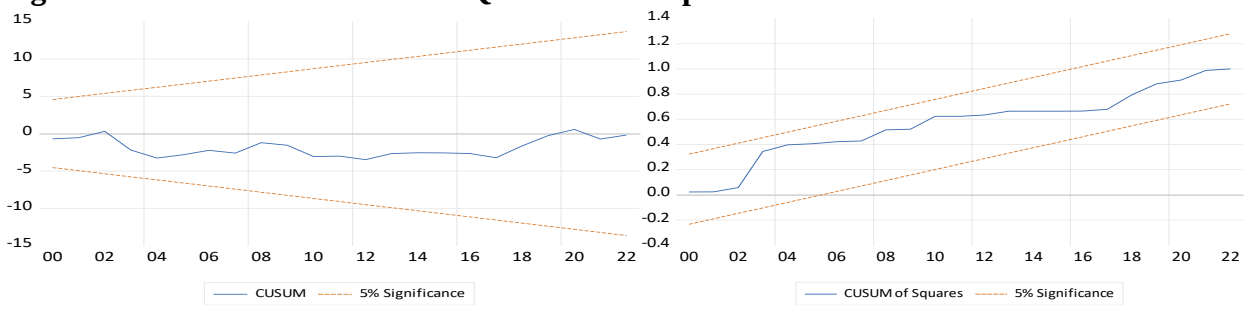
Source: Authors' computation from CBN Statistical Bulletin

The p-value for government/fiscal deficit in the deficit-private investment models in Nigeria (0.0398), being less than the significance level (0.05), means that government deficit has a statistically significant negative effects ($\boldsymbol{\beta}$ = -2.56) on private investment in Nigeria for the long-run period of 1981 to 2022. So, the null hypothesis that government deficit has no significant effect on private investment in Nigeria is rejected because the negative coefficient of government deficit is significant.

Model Stability Tests

The CUSUM and CUMSUMQ stability test were used to ascertain the stability of the residuals in the system of models adopted. In this respect, the cumulative sum of Recursive Residuals (CUSUM) and the cumulative sum of squares (CUMSUMQ) of Recursive Residuals are used to assess residual stability.

Figure 2: CUSUM and CUMSUMQ in the deficit-private investment model



Source: Authors' computation from CBN Statistical Bulletin

The first CUSUM and CUMSUMQ tests were done for the deficit-private investment model (figure 2). Since the CUSUM and CUMSUMQ lines in figure 2 are within the five percent (5%) lines, it indicates the stability of the residuals. So, we conclude that the deficit-private investment model in Nigeria indicates residual stability.

Diagnostic Tests

To ensure the validity of the estimates of the parsimonious models above, tests to verify the extent of the affirmation or violations of the assumptions of Least Squares estimates (of which the ARDL is part of) were carried out. They include the Breusch-Godfrey Serial Correlation LM, Heteroscedasticity and Jarque-Bera Normality tests.

Table 7: Diagnostic Tests

Test statistics	p-values	Decision
Jarque-Bera test for Normality	0.6529	Nomarlly distributed
Breusch-Godfrey Breusch-Godfrey Serial Correlation LM Test	0.1459	No serial correlation
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.7678	Homoskedastic distribution

Source: Authors' computation from CBN Statistical Bulletin

Since the p-values of the Jarque-Bera statistics for the government deficit-private investment model is greater than 0.05 (ie, 0.6529 > 0.05), we conclude that there is no statistical evidence of the presence of no normality in the government deficit-private investment for Nigeria. Similarly, as the p-value of the Breusch-Godfrey Serial Correlation LM test statistics for the government deficit-private investment model is greater than 0.05 (ie, 0.1459 > 0.05), we conclude that there is no statistical evidence of the presence of serial correlation in the government deficit-private investment model for Nigeria. And finally, as the p-values of the Breusch-Pagan-Godfrey Heteroskedasticity Test statistics for the government deficit-private investment model is greater than 0.05 (ie, 0.7678 > 0.05), we conclude that there is no statistical evidence of the presence of heteroskedasticity in the government deficit-private investment model for Nigeria.

5. Discussion of Findings, Conclusion and Recommendations

The first goal was to investigate the impact of the government deficit on private investment in Nigeria. The findings revealed that the null hypothesis, which stated that the government deficit has no substantial influence on private investment in Nigeria, is rejected since the negative coefficient of government deficit is significant. This conclusion is consistent with that of Hamadou, Nourou, Oumarou, and Zakariyaou (2022), who discovered that public debt lowers private investment, and Al-Dughme (2019), who discovered that public debt has a negative and statistically significant impact. This clearly illustrates the crowding out effect of government debt on private investment. The negative effects of government debt, namely the government budget deficit, indicates the presence of a crowding-out effect (Agyapong & Bedjabeng, 2020). While it is a frequent posture by scholars that the crowding out effect is only associated with debt servicing (Omodero, 2019), this study has proven that government deficit is also associated with crowding out effect.

According to Ogunjimi (2019), Nigeria's fiscal operations over the years have resulted in various degrees of deficit, the financing of which has had far-reaching consequences for the economy. Nigeria's high budget deficits throughout time have had negative consequences on the economy since they diminished national savings, which in turn boosted domestic interest rates, so limiting capital formation and crowding out private sector investment. The decline in investment had an impact on employment because enterprises or businesses lowered their demand for labour and other factor inputs. All of these factors lowered national outputs, resulting in trade deficits and balance-of-payments problems, as well as a decrease in people's overall welfare. When the economy has both a budget deficit and a trade deficit at the same time, this is known as the "twin deficits phenomenon."

Conclusion

This study examined the effect of government deficit on private investments in Nigeria for the long-run period of 1981 to 2022. The control variables, which are GDP growth rate, total government revenues, total government expenditures, inflation and private sector credits in Nigeria are coded GDPG, GVR, GVX, INF and CPS. The result of the study showed that, as government deficit impede private investments, its effect was statistically significant, together with a significant negative effect from private sector credits and government revenues. This means that government deficit crowd out private investments in Nigeria from 1981 to 2022, where all things being equal.

Recommendations

In accordance with the findings/conclusions reached in this study, the following proposal is proposed: The fact that the government deficit coefficient has turned negative indicates that it has hampered private investment in Nigeria. From To address the negative impact of domestic debt on private investment, the government, in conjunction with its borrowing from the domestic credit market, should get the monetary policy of the Central Bank of Nigeria to address the inflation and exchange rate uncertainties, so the market scope of the private investors will be enlarged.

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