

Fiscal Pressures and Public Investment: A Study of Public Debt Sustainability and Capital Expenditure in Nigeria

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Abstract

This study investigates the effect of public debt sustainability on capital expenditure in Nigeria, examining the relationship between selected fiscal indicators and government investment over a 33-year period (1990–2022). Guided by concerns about rising debt levels and their implications for economic development, the research adopts an ex-post facto design, utilizing validated secondary data extracted from the Central Bank of Nigeria's statistical bulletins. The study's population comprises aggregate national fiscal records, including data on public debt, GDP, government revenue, borrowing, and capital expenditure—treated as macroeconomic proxies for understanding fiscal behaviour. Using descriptive statistics, correlation analysis, and multiple regression via the Ordinary Least Squares (OLS) technique, the study evaluates the impact of debt indicators on capital expenditure. The regression model confirms that Public Debt to Total Government Borrowing (PTGB) has a positive and statistically significant effect on capital expenditure, suggesting that increased borrowing facilitates public investment. Conversely, Public Debt to GDP Ratio (PGDP) demonstrates a negative and significant impact, implying that excessive debt relative to GDP constrains government spending. Other variables—Public Debt to Government Revenue (PGRN) and Debt Servicing Obligation Ratio (DSOR)—were not statistically significant. The model achieved an R^2 of 0.542, indicating moderate predictive strength. Based on these findings, the study recommends the implementation of a strategic debt management framework, improvement in revenue mobilization, and stronger oversight mechanisms to ensure that debt financing is effectively linked to productive and sustainable capital investments.

Key Words: Fiscal policy, debt servicing, government budget, economic growth, public sector accounting, revenue mobilization

1.0 Introduction

Capital expenditures are investments with possible multiplier effects on the economy in terms of public benefits. In most cases government intervention has brought stability in income and employment in the economy. A capital expenditure is an amount spent to acquire or significantly improve the capacity or capabilities of a long-term asset such as equipment or buildings (Cuong, Phu, Amélie & Duc, 2018). Usually, the cost is recorded in a balance sheet account that is reported under the heading of Property, Plant and Equipment. The asset's cost (except for the cost of land) will then be allocated to depreciation expense over the useful life of the asset. The amount of each period's depreciation expense is also credited to the contra asset account Accumulated Depreciation.

Capital expenditure is the money spent by the government on the development of machinery, equipment, building, health facilities, education, etc. It also includes the expenditure incurred on acquiring fixed assets like land and investment by the government that gives profits or dividend in future (IMF,2019). Capital expenditure, which leads to the creation of assets are long-term in nature and allow the economy to generate revenue for many years by adding or improving production facilities and boosting operational efficiency. It also increases labour participation, takes stock of the economy and raises its capacity to produce more in future (Ayinde & Ayinde, 2012).

Capital expenditure are payments for acquisition of fixed capital assets, stock, land or intangible assets. A good example would be building of schools, hospitals or roads. However, it is important to note that much donor-funded "capital" expenditure, though referring to projects, includes

spending on non-capital payments. Government capital expenditure is an expenditure on assets and it is also the purchase of items that will last and will be used time to time in the provision of a good services.

Capital expenditure are budgeted expenses incurred by the government of any economy to ensure the certainty of projects execution which are of economic benefit to the government, citizens and economy of the country. The federal government capital expenditure over time has covered major infrastructures in the economic which includes; construction and rehabilitation of federal roads, fixed assets for the administration of the federal government running of its activities, agriculture equipment, power supply, industrialization for economic services, building of hospitals, schools and social amenities for social community services, payment of debts owed locally and internationally by the government to liquidate its debts obligations as transfers. All these expenditures are categorized as major expenditure which only the federal governments will solely take responsibility in ensuring that these facilities and services are being provided for the growth of its economy.

Osiegbo et al., (2010) posited that the federal government capital expenditure is another means of stimulating the economic growth of Nigeria by means of its fiscal policies consideration. When the federal government seems to boost the economy activities, it executes projects through the approved budgeted funds meant for its capital expenditure for that year. In other words, it is termed the “federal government capital expenditure fiscal year policy”; since it is possessing the characteristics and role of fiscal policy towards the growth of an economy then federal government capital expenditure should be a fundamental element of economic variables which could characterize the wellbeing of productivity within the Nigerian economy.

Capital expenditure growth is the rising expenditure undertaking by the federal government on capital projects for the production of economic growth in a country. An increasing capital expenditure is expected to contribute to growing Gross Domestic Product Growth Rate (GDPGR).

Nigeria’s capital expenditure remains fraught with significant challenges, largely stemming from insufficient funding for infrastructure and neglect in maintaining existing assets (Ndubuisi, 2019). These deficiencies have impeded economic growth, led to suboptimal use of resources, and contributed to mounting unemployment. Additionally, escalating public debt has intensified fiscal constraints, making it more difficult for the government to

support capital investment while maintaining debt sustainability.

Nigeria faces persistent challenges in sustaining public debt, driven by a growing debt-to-GDP ratio and mounting fiscal pressure from debt servicing obligations (Abu & Gamal, 2020). Ineffective debt management has constrained government capacity to fund essential capital projects, thereby undermining the nation’s potential for economic expansion. To address this issue, a robust and integrated strategy is required—one that harmonizes capital investment priorities with sound debt management practices to promote enduring fiscal stability. That is the focus of this study which is to examine the effect of public debt sustainability and capital expenditure in Nigeria. Specifically, the study sought to determine the effect of ratio of public debt to government budget ratio on capital expenditure as well as the effect of the ratio of debt service obligation to government revenue on capital expenditure.

2.0 Literature Review and Theoretical Foundations

Osiegbo, Onuorha et al (2010) asserted that total federal government capital expenditure rose from ₦5.46 Billion or 4.06% of GDP in 1985 to ₦121.14 Billion or 4.17% of GDP in 1995 and rose higher to ₦519.47 Billion or 3.56% in 2005. It rose higher from ₦519.47 Billion or 3.56% in 2005 to ₦957.30 Billion or 11.08% in 2014. This trend was largely explained by the pattern of federal government capital expenditure on economic service sector in general but specifically, the increase largely accounted for the outlay on transfer payments, administration and economic service but there was a decline in the social and community service in 2009.

A functional breakdown of federal government capital expenditure showed that outlay on transfer payments rose by 2.21% in 2005 to 4.76% in 2006 then fell down to 3.03% in 2007 and a further drop to 1.80% in 2008 explaining low rate of debt borrowings to the Nigerian economy. This transfer payments rose in 2009 by 18.23% with a difference of 16.43% which was as a result of federal government capital expenditure on dredging of River Niger, construction of the East-West road, massive importation of fertilizer products. The transfer payments dropped again to 6.75% in 2010 as a result of change in governance in the federal government system while in 2011 and 2012, it rose to 22.59% and 30.39% respectively due to the high level of insecurity in the North-East part of Nigeria. But in 2013 and 2014, the transfer payments declined negatively to -2.29% and -4.41% respectively which explains that the federal government did participate fully in the capital expenditure implementation in the Nigerian economy.

One of the reasons for increasing government expenditure, especially in Nigeria is inflation. Inflationary pressures have the tendency of adversely resulting in increased government expenditures that reflect rise in the prices of factors inputs and goods and services. Increase in Another reason for increase in government expenditure is the national debt. When there is an increase in national debt the Nigerian federal government resort to borrowing often at increased cost of borrowing or high cost of debt repayment. Increase in Population also contribute to increase in government expenditure. The recent trend of increase in the population of Nigeria has the tendency of leading to an increased demand for all items which will make the federal government capital government to increase also. Government also need to provide public Infrastructure and this contributes to increase government expenditure in Nigeria. These infrastructures include road, dams, irrigation projects, communication networks, pipe borne water, electricity, etc; this will also lead to the federal government increasing its capital expenditure. Encouragement of Agricultural development is yet another reason for increased government expenditure and the need for food security is prioritized. The growing need to provide food to the Nigerian people and to support commercial commodity markets has led to federal government capital expenditure increase in investments in agriculture. The urgent need for Industrial Growth also spurs government expenditure. There is great need for industrialization in Nigeria, thus leading to higher federal government capital expenditures in those key sectors that stimulate the economic growth of the country. Government spending is typically divided into recurrent and capital expenditure. Modebe et al. (2012) and Olugbenga and Owoye (2017) provide classifications that include administrative costs, social services, economic services, and transfer payments such as debt servicing. Mohamed (2013) further notes that recurrent expenditure serves functions like policy planning, budgeting, performance evaluation, and institutional coordination

Public debt also known as government debt or national debt is debt owed by government or total debt of all governmental units, including state and local governments (Saungweme & Odhiambo, 2019). Public debt, also known as public interest, government debt, national debt and sovereign debt, (United States Department of the Treasury, 2020) contrasts to the annual government budget deficit, which is a flow variable that equals the difference between government receipts and spending in a single year. The public debt is a stock variable, measured at a specific point in time, and it is the accumulation of all prior deficits. Public debt is defined as the total financial responsibilities acquired by governmental bodies of a nation, which includes money that is owed to individuals, mutual funds, hedge funds, pension funds,

foreign governments and others. It considers government liabilities, future pension payments and payments for goods and services that the government contracted but not yet paid for (Mindaugas & Janina, 2018). Public debt are the financial obligations of government and government agencies to third parties. They are part of the capital receipts arising from loan liabilities repayable at a future date.

Borrowing may be considered as a second-best alternative to money creation during periods of unemployment. In this way, it is seen as an instrument of managing the economy. Domestic loan is also seen as a means of filling domestic savings gap especially in the face of dwindling government revenues from domestic sources. It is particularly so in the face of fluctuating prices of primary commodity exports and hence dwindling foreign exchange earnings. Governments with large recurrent budget deficits may be forced to close the budget gaps by tapping into domestic savings, including through issuance of domestic debt.

Domestic borrowing enables a developing country increase its rate of real investment just as it is seen as an 'engine of growth'. In this sense, it increases per capita GNP or its component measures. Thus, debt acts as a source of capital formation. Such resources can be diverted from unproductive channels (such as real estate, jewellery, etc.) to productive ventures such as agricultural production of goods for export, mineral exploration and extraction, industrialization, transport and communication, rural and urban development, raw materials development, technical education, health-care services, balance of payments adjustments, tourism, infrastructure development, etc. (Anyanwu, 2013).

Domestic debt instruments in issue in Nigeria usually consist of treasury bills (TBs), treasury certificates (TCs) Federal Government development stocks (DS), bonds and means advances. The TBs, TCs and DS are marketable and negotiable while bonds and ways and means advances are not but are rather held solely by the Central Bank of Nigeria (Adofu & Abula, 2017). Governments use the debt instruments to borrow in order to close the resource gap between savings and investment. Alison (2013) explained three theoretical reasons for government domestic debt. They are budget deficit financing, monetary policy implementation (i.e., buying and selling of treasury bills in the open market), and development of the financial instruments to deepen the financial market.

External debt is one of the sources of financing capital formation in any economy. Adepoju, Salau and Elijah (2017) noted that developing countries in Africa are characterized

by inadequate internal capital formation due to the vicious circle of low productivity, low income, and low savings. Therefore, this situation calls for technical, managerial, and financial support from Western countries to bridge the resource gap. On the other hand, external debt acts as a major constraint to capital formation in developing nations. The burden and dynamics of external debt show that they do not contribute significantly to financing economic development in developing countries. In most cases, debt accumulates because of the servicing requirements and the principal itself. In view of the above, external debt becomes a self-perpetuating mechanism of poverty aggravation, work overexploitation, and a constraint on development in developing economies (Nakatami & Herrera, 2007).

Like many developing nations, Nigeria has historically relied on external financing to fund its development initiatives—such as iron and steel industries, transportation infrastructure, and electricity generation projects. This external funding primarily takes the form of loans sourced bilaterally or multilaterally. In the immediate post-independence years (1960–1975), these loans were relatively modest, characterized by concessional interest rates, long-term maturities, and favorable repayment terms. Ayadi and Ayadi (2018), along with Ayadi et al. (2013), argue that the mounting burden of external debt has significantly constrained the ability of developing countries to participate fully in the global economy. The resultant debt servicing obligations continue to hinder economic progress and development potential.

A key consideration in evaluating public debt is its sustainability. According to Kaur and Mukherjee (2014), the sustainable threshold for public debt varies across countries based on their unique economic conditions. This subsection assesses public debt sustainability in Nigeria using analytical approaches drawn from their framework.

The analysis begins in 2006, shortly after Nigeria secured substantial debt relief from its international creditors in 2005—a period when the debt burden was notably reduced. One crucial benchmark for assessing sustainability is whether the growth rate of public debt is lower than that of nominal GDP. Despite the 2014 economic rebasing that repositioned Nigeria as Africa's largest economy, the growth rate of public debt has consistently outpaced GDP growth. Unfortunately, policymakers often justify increased borrowing on the perceived strength of the rebased GDP figures. However, empirical evidence reveals that the expansion in public debt has exceeded economic growth, thereby rendering Nigeria's public debt unsustainable under this metric.

The challenge with capital expenditure in Nigeria lies in the limited allocation and ineffective use of resources for infrastructure development. This shortfall has resulted in

poor public facilities and sluggish economic progress. Although the government has made attempts to boost capital investments, issues such as corruption, red tape, and weak oversight have consistently hindered the realization of meaningful and sustainable projects.

Nigeria has witnessed a sharp rise in public debt in recent years, largely due to the absence of a long-term, effective debt management strategy. A combination of a high debt-to-GDP ratio, limited revenue generation, and a heavy reliance on oil exports has left the economy susceptible to financial shocks and debt instability. To prevent a full-blown debt crisis, it is crucial for the government to formulate and enforce policies that tackle the fundamental causes of the debt burden and promote long-term sustainability (Osuka & Ezedike, 2019).

This study is grounded in multiple fiscal and macroeconomic theories that explain the relationship between public debt sustainability and capital expenditure. These theoretical models help contextualize borrowing behavior, fiscal strategy, and the developmental implications of public debt.

2.1 Keynesian Theory of Public Expenditure

John Maynard Keynes emphasized that government spending—especially on capital projects—can stimulate aggregate demand and reduce unemployment, particularly during economic downturns (Keynes, 1936). In this framework, public borrowing is considered justifiable if it finances infrastructure and investments that catalyze economic growth. This theory underpins the idea that debt-financed expenditure may be expansionary when properly deployed.

2.3 Debt Sustainability Theory

Debt Sustainability Theory posits that public debt must be maintained at levels that allow governments to fulfill present and future obligations without destabilizing the economy. Kaur and Mukherjee (2014) explain that the sustainable threshold varies across countries, depending on macroeconomic structure, revenue capacity, and debt servicing burdens. This theory is central to evaluating the balance between debt accumulation and fiscal space for public investment in the Nigerian context.

2.4 Public Choice Theory

Public Choice Theory, as articulated by Mueller (2003), examines how political motivations shape fiscal decisions. Borrowing may be influenced more by electoral cycles and political expediency than long-term economic planning, leading to inefficient resource allocation. This lens helps explain inconsistencies between borrowing levels and actual capital investment outcomes in Nigeria.

The study utilizes these theories to evaluate Nigeria’s borrowing practices and their implications for capital expenditure. The Keynesian model helps explain why borrowing may be justified for infrastructure growth, while Debt Sustainability Theory provides the benchmarks for assessing fiscal health. Public Choice Theory offer cautionary perspectives on the limitations and risks associated with excessive borrowing.

Together, these frameworks shape the analytical lens through which the study interprets statistical relationships between public debt indicators and capital expenditure.

3.0 Methodology

This study employed an ex-post facto research design to gather secondary data from the Central Bank of Nigeria’s (CBN) statistical bulletin, a method deemed appropriate for a study of this nature (Eyide & Nzewi, 2018).

This study relied on validated national accounts data of Nigeria over 33 years time frame. No no particular demographic or institutional subgroup was targeted. Thus, the population is the Aggregate National Economic Data of Nigeria from 1990 to 2022. This population draws from the body of official macroeconomic records—such as fiscal reports, capital expenditure figures, debt profiles, and other national account indicators—that represent the entire economic activity within the country during that period. Specifically, the population is the National fiscal data of Nigeria from 1990 to 2022 as published and validated by official government sources.

Key Characteristics of this Population are as follows:

- Scope: It covers comprehensive data representing the country’s economy (e.g., GDP, public debt, revenue, and expenditure).
- Source Validity: Data are derived from official and professionally validated repositories like the Central Bank, national statistical bureaus, or finance ministries.
- Temporal Boundaries: Defined strictly by the study’s time frame (e.g., 1990–2022).
- Non-segmented: The study does not isolate individuals, groups, or regions but treats the national data as a holistic population.

Moreover, these data sources have consistently been used in earlier studies, yielding credible and dependable results.

3.1 Model specifications

The purpose of this study is to examine the effect of public debt sustainability and capital expenditure in Nigeria. To achieve this, three variables were identified in the study, these are: independent and dependent variables. The following models were adopted.

$$CPEX = \beta_0 + \beta_1(PTGB) + \beta_2(PGDP) + \beta_3(PGRN) + \beta_3(DSOR) + e$$

Where; CPEX= Capital Expenditure

PTGB = Public Debt to Total Government Budget

PGDP = Public Debt to Gross Domestic Product

PGRN = Public Debt to Government Revenue

DSOR = Debt Service Obligation/Government Revenue

β_0 = is the intercept

$\beta_1 - \beta_3$ = are the coefficients to be estimated in the equation

e = Error Term

3.2 Method of data analysis

To test statistical adequacy assumption, series of test like the test for normality, for static and dynamic heteroscedasticity, stationarity tests using unit root test were employed. A number of post estimation tests to ascertain the reliability of the results obtained were conducted, these are the normality and serial tests. The normality test is used to examine whether the disturbances are normally distributed or not while the serial correlation test examines whether the present value of the residuals depends on its past value. It is worth emphasizing that if the disturbances are either not normally distributed or serially correlated or even both, the results obtained from the estimation proves will be spurious and policy implication drawn from such results will be misleading and invalid. The estimation of the model was carried out with the E-views (10) econometrics package.

In estimating the model, we relied on the developments in the co-integration theory, otherwise referred to as the “error correction mechanism”. This was developed to overcome the problems of spurious regression often associated with the non-stationary time series and to generate valuable long-run relationships simultaneously (Engle & Granger, 1991).

3.3 Data Presentation

This section covers the presentation of data on government expenditure, government revenue, Government Budget, Debt Servicing and Gross Domestic Product in Nigeria. Table 1 in the Appendix shows the data collected from the Central Bank of Nigeria Statistical Bulletins for 1990 to 2022.

3.3.1 Descriptive Analysis

The analysis of descriptive statistics has been performed to find out the properties of the data. The descriptive statistics measures the central tendency and dispersion.

Table 2: Descriptive Analysis

Variable	Description	Min – Max	Mean	Standard Deviation
CPEX	Capital Expenditure	24.05 – 24,431.21	1,423.89	4,177.00

Variable	Description	Min – Max	Mean	Standard Deviation
PTGB	Public Debt to Total Government Budget	36.22 – 11,002.31	2,558.10	2,892.02
PGDP	Public Debt to Gross Domestic Product	489.77 – 199,336.04	52,098.99	57,551.22
PGRN	Public Debt to Government Revenue	98.10 – 12,586.53	5,072.41	4,144.54
DSOR	Debt Servicing Obligation to Government Revenue	0.64 – 9.08	2.96	1.99

Each variable represents a financial or economic indicator over 33 observations. Here's what the stats tell us.

Comprehensive Interpretation

- Sample Size: Each variable has 33 valid data points (N = 33), ensuring consistency across all measures.
- Capital Expenditure (CPEX):
 - Exhibits significant variation, with values ranging from ₦24.05 to ₦24,431.21.
 - The mean of ₦1,423.89 is substantially lower than the maximum, indicating possible skewness or outliers.
 - The high standard deviation (₦4,177.00) confirms wide fluctuations in capital expenditure levels.
- Public Debt to Total Government Budget (PTGB):
 - Ranges widely from ₦36.22 to ₦11,002.31, showing dynamic borrowing activity.
 - With a mean of ₦2,558.10 and a relatively high standard deviation (₦2,892.02), the data suggest variability in borrowing trends across the years.
- Public Debt to GDP (PGDP):
 - The broadest range in the dataset: ₦489.77 to ₦199,336.04.
 - Extremely high mean (₦52,098.99) and standard deviation (₦57,551.22) indicate significant economic growth differences across the time period analyzed.
- Public Debt to Government Revenue (PGRN):
 - Fluctuates between ₦98.10 and ₦12,586.53, with a mean of ₦5,072.41.

- The standard deviation of ₦4,144.54 reflects the inconsistent revenue performance over time.
- Debt Servicing Obligation to Government Revenue (DSOR):
 - Ranges from 0.64 to 9.08, suggesting variability in how much of public resources are committed to debt repayment.
 - A mean ratio of 2.96 and a standard deviation of 1.99 indicate moderate fluctuations, though the upper range (9.08) shows some periods of high debt servicing burden.

Table 2 presents the descriptive statistics of all the variables. N represents the number of paired observations and therefore the number of paired observations for the study is 33. From the table capital expenditure has a mean of 1423.89 and a standard deviation of 4177. Total government budget has a mean of 2557.10 and a standard deviation of 2892.02, the study also discovers the mean value of gross domestic product cost to be 52098.99 and a standard deviation of 5751.22 government revenue has a mean of 5072.41 and a standard deviation of 4144.54 and finally the mean of Debt servicing is 2.9585 and a standard deviation 1.99370

3.3.2 Correlation Analysis

This section of the chapter presents in the table below the result of the correlation analysis between the independent variables.

Table 3 Correlation Analysis

		CPEX	PTGB	PGDP	PGRN	DSOR
Pearson Correlation	CPEX	1.000	.638	.576	.438	-.241
	PTGB	.638	1.000	.988	.846	-.648
	PGDP	.576	.988	1.000	.861	-.691
	PGRN	.438	.846	.861	1.000	-.772
	DSOR	-.241	-.648	-.691	-.772	1.000
Sig. (1-tailed)	CPEX	.	.000	.000	.005	.089
	PTGB	.000	.	.000	.000	.000
	PGDP	.000	.000	.	.000	.000
	PGRN	.005	.000	.000	.	.000
	DSOR	.089	.000	.000	.000	.
N	CPEX	33	33	33	33	33
	PTGB	33	33	33	33	33
	PGDP	33	33	33	33	33
	PGRN	33	33	33	33	33
	DSOR	33	33	33	33	33

Source: Authors Computation in SPSS version 23

Table 3 shows the Pearson product movement correlation for all the variables. Correlations consider two variables at a time to determine how they relate to each other. These types

of checks are necessary because high correlation cause problems about the relative contribution of each predictor to the success of the model (Guajariti, 2007). The correlation matrix above shows the absence of multicollinearity among the explanatory variables as all the variables are positively correlated and very low with the highest correlation estimated at 638. This is less than -0.214 which is considered acceptable for the purpose of analysis (see Gujarati & Sangeeta, 2007, Berenson & Levine, 1999)

This correlation matrix uses Pearson correlation coefficients to measure the strength and direction of linear relationships between five variables:

- CPEX: Capital Expenditure
- PTGB: Public Debt to Total Government Borrowing Ratio
- PGDP: Public Debt to GDP Ratio
- PGRN: Public Debt to Government Revenue Ratio
- DSOR: Debt Servicing Obligation to Government Revenue Ratio

The table also includes significance values (1-tailed) and shows that the sample size (N) is 33 for all variables. Significance Level: Typically, a p-value ≤ 0.05 indicates that the correlation is statistically significant.

Table 4: Variable Relationship Interpretations

Variable Pair	Correlation (r)	Direction	Strength	Significance (p)	Interpretation
CPEX & PTGB	0.638	Positive	Moderate-Strong	0.000	As ratio of Public Debt to Government Budget increases, capital expenditure tends to increase.
CPEX & PGDP	0.576	Positive	Moderate	0.000	Higher Public Debt to GDP ratio is moderately linked to higher capital expenditure.
CPEX & PGRN	0.438	Positive	Moderate	0.005	Public Debt to Government revenue moderately supports capital expenditure.
CPEX & DSOR	-0.241	Negative	Weak	0.089	No statistically significant link; weak inverse relationship.
PTGB & PGDP	0.988	Positive	Very Strong	0.000	Extremely strong relationship, government budget closely tracks Public Debt to GDP growth.
PTGB & PGRN	0.846	Positive	Very Strong	0.000	Higher revenue is strongly associated with higher Public Debt to Government Revenue
PTGB & DSOR	-0.648	Negative	Moderate-Strong	0.000	When ratio of Public Debt to Government Budget rises, the ratio of debt servicing obligations to Government Revenue decrease—possibly due to delayed repayments or rescheduling.
PGDP & PGRN	0.861	Positive	Very Strong	0.000	Public Debts to GDP growth strongly correlates with increased ratio of Public Debt to government revenue.
PGDP & DSOR	-0.691	Negative	Moderate-Strong	0.000	As the ratio of Public Debt to GDP increases, the relative ratio of debt service obligations to government revenue decreases
PGRN & DSOR	-0.772	Negative	Strong	0.000	Higher ratio of public debt to government revenue is associated with lower ratio of debt servicing obligation to government revenue.

Summary of finding

- There is a strong and statistically significant linkage between borrowing, GDP, and government revenue, indicating synchronized fiscal behavior.

- Capital expenditure is positively influenced by PublicDebt/Government Budget, Public Debt/GDP, and Public Debt/Government Revenue—but less strongly than those variables influence each other.
- The debt servicing obligation/Government revenue has a negative relationship with all key fiscal indicators, particularly PGRN and PGDP—suggesting that as government resources grow, the strain of debt repayments becomes lighter.
- The correlation between CPEX and DSOR is not statistically significant, implying limited predictive power of debt burden on capital spending decisions.

3.3.3 Regression Analysis

The relationship between the dependent and the independent variables which were formulation as null hypotheses were further subjected to regression analysis using ordinary least square (OLS) regression with the aid of Statistical Package for the Social Sciences (SPSS version 23), a widely used software suite for statistical analysis in social sciences, economics, health, education, and many other fields.

Table 5 Regression Analysis

Model	Coefficients ^a										
	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	95.0% Confidence Interval for B		Correlations		
	B	Std. Error	Beta				Lower Bound	Upper Bound	Zero-order	Partial	Part
(Constant)	-1018.195	2323.729			-.438	.665	-5778.139	3741.748			
PTGB: Public Debt to Total Government Borrowing Ratio	4.055	1.287	.2808	3.150	.004	1.418	6.692	.638	.511	.403	
PGDP: Public Debt to GDP Ratio	-.149	.068	-.2048	-2.183	.038	-.288	-.009	.576	-.381	-.279	
PGRN: Public Debt to Government Revenue Ratio	-.121	.290	-.120	-.417	.680	-.716	.474	.438	-.079	-.053	
DSOR: Debt Servicing Obligation to Government Revenue Ratio	144.192	448.843	.069	.321	.750	-775.222	1063.606	-.241	.061	.041	

a. Dependent Variable: Capital Expenditure

Interpretation of Result

This regression model explores how four predictors—PTGB, PGDP, PGRN, and DSOR—influence Capital Expenditure. While PTGB and DSOR are the main variables in the model, PGDP and PGRN served as moderating variables.

PTGB (Public Debt to Total Gov. Budget Ratio) showed a Strong positive and significant influence. A unit increase in PTGB is associated with an increase of ₦4.055 million in CPEX.

PGDP (Public Debt to GDP Ratio) revealed a significant negative impact. An increase in the ratio of Public debt to GDP reduces capital expenditure by a factor of 14.9%.

PGRN (Public Debt to Government Revenue Ratio) though Not statistically significant. Its effect on capital spending is minimal and inconsistent.

DSOR (Debt Servicing Obligation to Revenue Ratio) also not significant. Though the coefficient is large, it lacks predictive power due to high uncertainty (wide confidence interval).

Constant (Intercept): -1018.195 ($p = 0.665$) — Not statistically significant. This value represents the expected CPEX when all predictors are zero, but it's not meaningful due to its insignificance. It however points to the decreasing effect of predictors on capital expenditures

- Correlations:
 - Strong zero-order correlations between PTGB (.638) and PGDP (.576) with CPEX confirm their foundational influence.
 - Partial and part correlations for PTGB are the highest (.511 and .403), meaning it makes the strongest unique contribution.

3.4 Test of Hypotheses

To evaluate the impact of public debt sustainability on capital expenditure in Nigeria, the study employed the Ordinary Least Squares (OLS) method. This approach was used to assess the statistical significance of the regression coefficients (β), the intercept (α), and each predictor in the model. The core objective was to test the null hypothesis, which posits that the coefficients are equal to zero. The resulting estimates formed the basis for the hypothesis test.

H₀₁: Public debt relative to the government budget has no significant effect on capital expenditure in Nigeria.

The study tested the first hypothesis above using the Ordinary Least Squares (OLS) method, and the regression results show that the variable representing Public Debt to Total Government Budget (PTGB) has a positive and statistically significant effect on capital expenditure. The regression coefficient for PTGB is 4.055, with a t-value of 3.150 and a p-value of 0.004, which is well below the 0.05 significance level. This confirms that the null hypothesis should be rejected.

These findings suggest that public borrowing is a key determinant of capital spending in Nigeria. The significant positive relationship implies that as borrowing increases, capital expenditure also tends to

rise, possibly reflecting the government's dependence on debt financing to support infrastructure and development programs.

In contrast, other variables such as PGRN and DSOR did not exhibit statistically significant effects, as indicated by their high p-values (0.680 and 0.750, respectively). While PGDP had a significant negative impact ($p = 0.038$), the specific focus of the hypothesis was on government budget-related debt, reinforcing PTGB as the relevant indicator for the test.

Summary of Finding:

- The regression results provide sufficient statistical evidence to reject H₀₁.
- Public debt relative to government borrowing does have a significant impact on capital expenditure in Nigeria.

The second hypothesis of the study states:

H₀₂: Debt service obligation relative to government revenue has no significant effect on capital expenditure in Nigeria.

To test this hypothesis, the study relied on the regression coefficient for the variable Debt Servicing Obligation to Government Revenue Ratio (DSOR). The regression analysis produced the following result:

- Unstandardized Coefficient (B): 144.192
- t-value: 0.321
- p-value (Sig.): 0.750
- Confidence Interval: [-775.222, 1063.606]

Despite the relatively high coefficient, the p-value of 0.750 exceeds the conventional significance threshold of 0.05, indicating that the effect of DSOR on capital expenditure is not statistically significant. Additionally, the wide confidence interval further suggests uncertainty about the accuracy and direction of this estimate.

The standardized Beta coefficient (0.069) and very low partial and part correlations (0.061 and 0.041) reinforce the limited predictive contribution of DSOR to the model.

Summary of Findings:

- The analysis provides insufficient statistical evidence to reject H₀₂.
- Therefore, the hypothesis is accepted: debt service obligation relative to government revenue does not have a significant effect on capital expenditure in Nigeria within the scope of this study.

3.5 Analysis of Variance

Analysis of Variance (ANOVA) is a statistical technique used to determine whether there are significant differences between the means of three or more groups or variables. While a t-test compares the means of two groups, ANOVA handles multiple groups or predictors simultaneously, making it ideal for assessing the joint influence of several factors on a dependent variable. Whether the combined impact of PTGB, PGDP, PGRN, and DSOR significantly affects capital expenditure.

Table 6 Analysis of Variance (ANOVA)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	302362338.211	4	75590584.553	8.269	.000 ^b
	Residual	255953275.788	28	9141188.421		
	Total	558315613.999	32			

a. Dependent Variable: Capital Expenditure

b. Predictors: (Constant), PTGB (Public Debt/Total Government Budget), PGRN (Public Debt/Government Revenue), PGDP (Public Debt/Gross Domestic Product) and DSOR (Debt Service Obligation/Government Revenue).

Source: SPSS version 23

ANOVA Summary and Interpretation

Table 6 presents the results of the ANOVA test assessing the combined influence of selected public debt sustainability indicators—namely, PTGB, PGDP, PGRN, and DSOR—on capital expenditure in Nigeria.

The F-statistic is 8.269, with a corresponding p-value of 0.000, indicating that the overall regression model is statistically significant at the 5% level. This result confirms that, when considered jointly, the independent variables significantly explain variations in capital expenditure over the period examined.

Summary of Finding

The ANOVA results validate the robustness of the regression model and affirm that the indicators of public debt sustainability, taken together, exert a significant effect on Nigeria’s capital expenditure. This reinforces the earlier findings that PTGB and PGDP are particularly influential, while PGRN and DSOR contribute less meaningfully.

Overall Regression Model Summary

Table 6 presents the regression model summary, highlighting the collective explanatory power of the selected

fiscal indicators—PTGB, PGRN, PGDP, and DSOR—on capital expenditure in Nigeria.

Table 7: Model Regression Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.736 ^a	.542	.476	3023.43983	.542	8.269	4	28	.000

a. Dependent Variable: Capital Expenditure

b. Predictors: (Constant), PTGB (Public Debt/Total Government Budget), PGRN (Public Debt/Government Revenue), PGDP (Public Debt/Gross Domestic Product) and DSOR (Debt Service Obligation/Government Revenue).

Source: SPSS version 23

The coefficient of determination (R^2) is 0.542, indicating that approximately 54.2% of the variation in capital expenditure is explained by the independent variables included in the model. The remaining 45.8% is attributed to other factors outside the model’s scope.

Furthermore, the adjusted R^2 value of 0.476 suggests a moderate predictive capability, especially when accounting for the number of predictors and sample size. The standard error of the estimate (₦3,023.44) reflects the average deviation between observed and predicted values of capital expenditure.

The model’s statistical significance is further reinforced by the F-change value of 8.269 and a p-value of 0.000, confirming that the regression model as a whole is highly significant and offers meaningful insight into the relationship between public debt sustainability indicators and capital expenditure.

4.0 Results and Discussion

The regression analysis examined the extent to which selected fiscal indicators—Public Debt to Total Government Borrowing (PTGB), Public Debt to GDP (PGDP), Public Debt to Government Revenue (PGRN), and Debt Servicing Obligation to Government Revenue (DSOR)—influence capital expenditure in Nigeria.

The model revealed two statistically significant predictors of capital expenditure:

- PTGB recorded a positive unstandardized coefficient of 4.055 with a p-value of 0.004, indicating a significant and positive relationship. This suggests that increases in public borrowing tend to drive up capital expenditure, aligning with theoretical expectations that borrowing can be used to finance infrastructure investments and development projects.

- PGDP displayed a negative unstandardized coefficient of -0.149 with a p-value of 0.038, denoting a statistically significant inverse relationship. This implies that as public debt grows relative to GDP, the government faces constraints in allocating resources to capital projects—reflecting concerns about debt sustainability and macroeconomic pressure.

In contrast, PGRN and DSOR did not show statistically significant effects on capital expenditure. PGRN, with a coefficient of **-0.121** and p-value of 0.680, and DSOR, with a coefficient of 144.192 and p-value of **0.750**, suggest limited predictive relevance in this context. Their wide confidence intervals further indicate uncertainty about the strength and direction of these relationships.

Moreover, the strongest unique contribution to capital expenditure was made by PTGB, as reflected in its standardized Beta coefficient of 2.808 and a part correlation value of 0.403. PGDP, while negatively associated, also displayed a moderate effect size.

These findings support the hypothesis that public borrowing is a critical driver of capital expenditure in Nigeria. However, rising debt relative to GDP presents a counterpressure, limiting the fiscal space available for investment. The insignificance of PGRN and DSOR may reflect structural inefficiencies in revenue generation and debt management practices, suggesting the need for fiscal reforms.

4.1 Summary of Findings

Based on the statistical analyses conducted, the study arrived at the following key findings:

1. Public Debt to Government Budget Ratio (PTGB) has a strong and statistically significant positive impact on capital expenditure in Nigeria. Increased borrowing appears to stimulate capital investment activities.
2. Public Debt to GDP Ratio (PGDP) shows a negative and significant effect, indicating that rising debt relative to national output constrains fiscal capacity for capital spending.
3. Public Debt to Government Revenue Ratio (PGRN) and Debt Servicing Obligation Ratio (DSOR) did not exert statistically significant influence on capital expenditure. Their effects were weak, suggesting that revenue pressure and debt repayments may not directly guide spending decisions in the Nigerian context.
4. The correlation analysis revealed strong interdependence among fiscal indicators such as GDP, revenue, and borrowing—while also exposing the inverse relationship between debt servicing burden and government fiscal health.

5. The overall regression model was statistically significant ($F = 8.269$, $p = 0.000$), with an R^2 of 0.542, showing that 54.2% of the variation in capital expenditure can be explained by the included indicators.

4.2 Conclusions

The findings of the study shed light on the intricate relationships between government spending, economic growth, and public debt management within the Nigerian context.

Public borrowing plays a vital role in driving capital expenditure, reaffirming the strategic importance of debt financing in Nigeria's economic development agenda.

The sustainability of debt, especially when measured against GDP, is crucial. Excessive debt accumulation relative to economic growth undermines government capacity to invest in capital infrastructure.

Fiscal health indicators such as revenue ratios and debt servicing obligations, while conceptually relevant, appear less impactful on capital expenditure within the time frame and scope of the study.

The predictive power of the model is moderate, implying that while public debt metrics are essential, other unexamined factors also influence capital investment outcomes.

4.3 Recommendations

Based on the findings and conclusions, the study recommends the following:

Strategic Debt Management: The Nigerian government should adopt a debt strategy that balances short-term borrowing needs with long-term fiscal sustainability, especially considering GDP dynamics. This will minimize the risk of financial mismatch.

Improve Revenue Generation: Enhancing non-oil revenue sources and strengthening tax systems will reduce dependence on debt and ensure consistent funding for capital projects. Borrowed funds should be channelled primarily into infrastructure and development projects that directly contribute to economic expansion and revenue growth.

Strengthen Institutional Oversight: Improve transparency and accountability in debt servicing and capital expenditure allocation to prevent inefficiencies and misuse of borrowed funds. Such allocation of funds should take into consideration the institutional management and

administration capacity and fiscal responsibility towards the debt. Loan beneficiaries agencies should in some manner contribute towards debt servicing obligations.

4.4 Limitations of the Study

Despite the relevance and analytical strength of this study, a few limitations should be acknowledged. The analysis was limited to macroeconomic indicators derived solely from the Central Bank of Nigeria's statistical bulletins. Other influential variables—such as inflation rates, exchange rates, political stability, or global economic shocks—were excluded. Consequently, we note the limitation that the model may have captured some essential economic variables. Although the regression model explained 54.2% of the variation in capital expenditure, nearly half remains unexplained, suggesting that key predictive variables were not included. Finally, the study did not incorporate stakeholder perspectives (e.g. policymakers, economists, auditors) that could contextualize the quantitative findings.

4.5 Suggestions for Future Studies

To deepen the understanding of public debt sustainability and capital expenditure, future research should consider including economic indicators such as inflation, exchange rate volatility, oil prices, and foreign direct investment to enrich the model's explanatory power. Furthermore, to gain better insight it may be necessary to segment capital spending by sectors—such as health, education, infrastructure— as this could reveal where debt influences investment the most.

A cross-country study among West African nations could help benchmark Nigeria's debt sustainability practices and highlight regional fiscal dynamics. Combining quantitative analysis with qualitative frameworks like thematic content analysis or case studies would produce a more holistic narrative. Interviews, policy reviews, and expert consultations could provide context-specific insights into borrowing decisions and expenditure priorities.

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Appendix

Table 1: Show Data for CPEX, PTGB, PGDP, PGRN, and DSOR

YEAR	CPEX (in Millions)	PTGB (in Millions)	PGDP (in Millions)	PGRN (in Millions)	DSOR(in Millions)
1990	24.0486	36.2196	489.7664799	98.1024	3.62
1991	28.3409	38.2435	584.2498386	100.9916	4.86
1992	39.7633	53.0341	897.1173113	190.4532	4.8
1993	54.5018	136.7271	1244.798931	192.7694	4.39
1994	70.9183	89.9749	1751.279915	201.9108	4.34
1995	121.1383	127.6298	3069.431764	459.9873	4.01
1996	212.9263	124.2913	4045.321615	523.597	3.91
1997	269.6517	158.5635	4374.49647	582.8111	5.21
1998	309.0156	178.0978	4756.705704	463.6088	6.1
1999	498.0276	449.6624	5426.470655	949.1879	6.43
2000	239.4509	461.6	6990.619157	1906.1597	9.08
2001	438.6965	579.3	8150.016062	2231.6	3.39
2002	321.3781	696.8	11383.65856	1731.8375	5.33
2003	241.6883	984.3	13418.0129	2575.0959	2.79
2004	351.3	1110.8	17938.38118	3920.5	1.78
2005	519.5	1321.3	22884.89639	5547.5	1.94
2006	552.4	1390.2	30063.9624	5965.1019	2.25
2007	759.323	1589.2698	34318.66573	5727.51	1.82
2008	960.8901	2117.362001	39542.42756	7866.6	2.19
2009	1152.7965	2127.966372	43012.50743	4844.592342	2.4
2010	883.8745	3109.437113	54612.26418	7303.67155	2.65
2011	918.5489	3314.513334	62980.39722	11116.84696	1.59
2012	874.7	3325.1565	71713.93506	10654.74719	1.44
2013	1108.3864	3689.1	80092.56338	9759.793815	1.2
2014	783.122402	3426.94084	89043.61526	10068.852	1.37
2015	818.365	3831.947789	94144.96045	6912.501551	0.87
2016	653.609	4160.105738	101489.4922	5616.4	0.86
2017	1242.296	4779.988766	113711.6346	7444.822448	0.64
2018	1682.099	5675.200686	127736.8278	9551.669069	1.08
2019	2288.996	6997.196471	144210.4921	10262.32467	1.3
2020	1614.889	8188.811549	152324.0706	9276.065617	1.57
2021	2522.468	9145.156881	173527.6623	10755.41365	1.1475
2022	24,431.21	11,002.31	199,336.04	12,586.53	1.274375

Source: CBN Statistical Bulletin of Various Years.