CRUDE OIL REVENUE VOLATILITY AND BUDGETARY DISCIPLINE: AN EMPIRICAL STUDY OF NIGERIA'S FISCAL SUSTAINABILITY

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Abstract

Nigeria's fiscal deficit remains a persistent challenge, driven by volatile oil revenues and weak budgetary discipline. This study examines the extent to which oil revenue volatility, government spending, and external debt servicing impact Nigeria's budget deficit between 2010 and 2024. Guided by the Debt Overhang and Procyclical Fiscal Policy theories, the research employs a quantitative ex-post facto design, utilizing secondary data sourced from the Central Bank of Nigeria, World Bank, and IMF databases. Key variables, budget deficit (as a percentage of GDP), oil revenue volatility (measured via the coefficient of variation), government spending (as a percentage of GDP), and debt servicing (as a percentage of GNI) were analyzed using Ordinary Least Squares (OLS) regression. Diagnostic tests, including the Shapiro-Wilk test, Variance Inflation Factor (VIF), and Breusch-Pagan test, were conducted to ensure robustness, with an R^2 of 0.826 indicating strong model fit. The findings reveal that all three independent variables exert a statistically significant and positive influence on the budget deficit. These results validate the theoretical framework and align with empirical evidence on Nigeria's fiscal vulnerabilities. The study concludes that Nigeria's fiscal imbalances are structurally embedded in revenue instability, excessive spending, and unsustainable debt obligations. To address these issues, the study recommends strengthening oil revenue stabilization mechanisms, enhancing expenditure efficiency by prioritizing capital investment, and implementing a prudent, growth-oriented debt management framework.

1.0 Introduction

The budget deficit remains a critical barometer for evaluating fiscal health globally, especially in economies that are heavily dependent on natural resource revenues. Nations with high budget deficits often grapple with long-term debt sustainability issues, inflationary pressures, and macroeconomic instability. This challenge is particularly acute in developing countries where fiscal planning is vulnerable to revenue shocks. In Sub-Saharan Africa, rising public debt levels, often driven by erratic revenue inflows and unsustainable expenditure patterns, have prompted growing concern about fiscal governance and accountability (Olaoye & Olomola, 2023). Governments struggle to strike a balance between financing development needs and maintaining fiscal stability, which renders budget deficits a persistent structural weakness.

Crude oil remains a cornerstone of revenue generation for many resource-rich countries. Yet, its volatile pricing mechanisms subject national budgets to unpredictable shocks. Global evidence shows that oil price swings often translate directly into revenue unpredictability, especially for countries with limited economic diversification (Goes, 2022). The volatility of oil prices disrupts the consistency of budgetary projections, prompting governments to either cut essential expenditures or borrow excessively to close fiscal gaps. For oil-exporting economies, achieving fiscal sustainability requires innovative buffers such as sovereign wealth funds and robust stabilization policies, both of which are frequently absent or weakly enforced.

In Nigeria, oil revenue accounts for over half of government income, rendering the national budget acutely vulnerable to external shocks. The cyclical nature of oil prices, compounded by inefficiencies in tax administration and subsidy regimes, often results in significant fiscal slippages (Mobosi & Okonta, 2024). When oil prices tumble, Nigeria's fiscal position deteriorates, leading to a sharp increase in budget deficits and debt accumulation. Despite institutional efforts like the Excess Crude Account, these mechanisms have proved ineffective in insulating the economy from oil revenue shocks due to political interference and governance lapses.

Another critical dimension of Nigeria's fiscal challenge lies in its expenditure patterns. Government spending, particularly on recurrent items, frequently exceeds projected revenues, resulting in widened fiscal gaps. The elasticity of spending in response to oil windfalls, often without corresponding investment in productive infrastructure, undermines long-term fiscal health (Amewu, Addae-Ankrah & Nsor-Ambala, 2024). This disconnect between expenditure discipline and revenue planning has led to recurrent fiscal deficits, which in turn exacerbate macroeconomic imbalances such as inflation and exchange rate instability.

Moreover, the cost of servicing public debt has escalated sharply in recent years, consuming a significant portion of Nigeria's revenues. With external debt service payments reaching unsustainable levels, concerns about debt overhang and crowding out of critical public investment have intensified (Onitekun & Ogun, 2024). The situation is aggravated by weak debt management strategies and overreliance on Eurobonds and commercial loans, which carry high-interest burdens. These dynamics have placed severe constraints on Nigeria's fiscal space, limiting the government's ability to implement countercyclical measures during economic downturns.

Recent scholarship underscores the need for Nigeria to improve budgetary discipline and build fiscal resilience in the face of oil revenue volatility. Establishing strong institutions for fiscal oversight, adopting transparent budget frameworks, and aligning public spending with developmental priorities are widely recommended interventions (Damoah, 2024). Importantly, creating mechanisms to delink expenditure commitments from volatile oil revenues could enhance fiscal predictability and reduce structural deficits. Such reforms would not only stabilize Nigeria's budgetary process but also restore investor confidence and unlock long-term growth potential.

Despite the wealth of research, empirical gaps remain regarding how oil revenue volatility interacts with fiscal policy tools like government spending and debt servicing to shape Nigeria's budget deficit dynamics. While macroeconomic models provide theoretical explanations, they often fail to capture the practical complexities of policy execution and institutional behavior in Nigeria's fiscal environment. It is thus essential to empirically investigate the relationships among oil revenue volatility, government spending behavior, and

debt service obligations in determining budgetary outcomes.

This study is motivated by the persistent and deepening fiscal imbalances in Nigeria, evidenced by rising budget deficits and unsustainable debt servicing costs. At the heart of these challenges is a fundamental lack of budgetary discipline exacerbated by an overdependence on volatile oil revenues. Despite several fiscal consolidation efforts, budget deficits have remained a recurring feature of Nigeria's public finance landscape. This research seeks to empirically assess the extent to which oil revenue volatility, public spending levels, and external debt servicing influence Nigeria's budget deficits, with a view to offering data-driven insights into strategies for achieving long-term fiscal sustainability. It is against this backdrop that the study tests the following hypothesis:

H_{01}: Oil revenue volatility has no statistically significant effect on the budget deficit in Nigeria.

H_{02}: Government spending as a percentage of GDP has no statistically significant effect on the budget deficit in Nigeria.

H_{03}: External debt servicing costs as a percentage of GNI have no statistically significant effect on the budget deficit in Nigeria.

2.0 Literature Review

The budget deficit, measured as a percentage of GDP, has become a core indicator in evaluating fiscal imbalance and economic health, especially in resource-reliant nations. Olaoye and Olomola (2023) define it as the extent to which government spending exceeds its revenues, highlighting its implications for debt accumulation and macroeconomic stability. Mobosi and Okonta (2024) argue that a persistent budget deficit signals weak fiscal planning and deteriorating revenue capacity, often exacerbated by oil revenue shocks. According to Damoah (2024), high deficits reflect poor resource governance and limited fiscal buffers in volatile economies. Goes (2022) views the budget deficit as a manifestation of fiscal populism and unsustainable electoral incentives. Yusuf and Mohd (2023) emphasize that excessive deficits crowd out investment and trigger inflationary pressures in the long run. Okpanachi (2025) notes that intergovernmental revenue-sharing schemes may further complicate fiscal balance, leading to structural deficits. Amewu, Addae-Ankrah, and Nsor-Ambala (2024) consider it a reflection of the government's failure to adapt expenditure to fluctuating commodity revenues. Onitekun and Ogun (2024) describe budget deficit as a key measure of fiscal vulnerability, especially in economies facing rising debt service costs. For this study, the budget deficit is conceptualized as the annual difference between government expenditure and revenue (excluding borrowings), expressed as a percentage of GDP, serving as a proxy for Nigeria's fiscal sustainability and macroeconomic balance.

Concept of Oil Revenue Volatility

Oil revenue volatility refers to the unpredictable and frequent fluctuations in government income derived from crude oil exports, largely driven by instability in global oil prices, production quotas, and exchange rate movements. This concept is especially critical for oil-dependent economies like Nigeria, where fiscal stability is tightly linked to petroleum earnings. Recent literature has expanded this concept to incorporate the variability of oil-based revenues over time, emphasizing its capacity to undermine economic planning and fiscal sustainability. According to Efuntade (2023), volatility in oil revenue has created severe distortions in Nigeria's capital expenditure framework due to its impact on budget predictability and public investment cycles. Similarly, Takeme, Obiora, and Ojukwu (2025) argue that centralized

revenue control in Nigeria exacerbates volatility effects, lending to conflict and inefficiencies in oil resource governance.

Kolawole, Alabi, and Falana (2025) emphasized the destabilizing role of oil revenue volatility in weakening budget implementation and deepening fiscal risk exposure. In their view, volatility not only hampers expenditure planning but also contributes to a widening budget deficit and debt burden. Oladipupo and Francis (2025) reinforced this by identifying volatility as a factor that erodes government's ability to sustain recurrent spending and investment commitments. In a similar vein, Raouf and Okey (2023) define oil revenue volatility as the standard deviation of oil receipts within a specific fiscal period, which impairs fiscal sustainability when not adequately buffered. Additional perspectives from Eze (2021) and Felix and Okey (2021) conceptualize oil revenue volatility as both a structural and market-induced uncertainty in government income, caused by price swings, supply shocks, and fiscal mismanagement. For this study, oil revenue volatility is adopted as the measurable fluctuation in oil-based government earnings over time, captured through statistical indicators such as the coefficient of variation or standard deviation of monthly oil revenues. It is conceptualized as a fiscal risk variable that directly influences budgetary balance and public financial sustainability.

Concept of Government Spending

Government spending, broadly understood as the total expenditure by the state on goods, services, infrastructure, and transfers, plays a fundamental role in shaping macroeconomic performance, especially in developing economies. In Nigeria, government spending has drawn scholarly attention due to its intricate connection to oil revenue cycles, debt burdens, and fiscal discipline. Oduyemi, Lawal, and Osinusi (2023) define government spending as a reflection of fiscal responsiveness to macroeconomic fluctuations, often pro-cyclical in oil-dependent economies. Okonkwo and Oyetunji (2021) describe it as a policy tool frequently driven by political considerations and revenue availability rather than long-term development strategy. Olufemi and Ogundipe (2023) highlight how expenditure in Nigeria is heavily skewed toward recurrent components, leaving limited fiscal room for productive capital investments.

Akpan and Edet (2022) analyze the structural imbalance between Nigeria's capital and recurrent spending and note that disproportionate wage bills and debt service costs consistently crowd out development-related expenditures. Bello and Eze (2024) conceptualize government spending as the allocation of national resources in alignment with budget priorities, warning that misalignment between policy goals and actual spending patterns often leads to inefficiency and fiscal slippages. Ayinde and Ibrahim (2025) present a view of government expenditure as both a stabilizing and destabilizing force, depending on fiscal rule adherence and expenditure control mechanisms. According to Raouf and Okey (2023), fluctuations in oil revenues translate into erratic public expenditure cycles, which complicate medium-term fiscal planning and deficit control. Similarly, Efuntade (2023) associates Nigeria's recurrent budget overruns with expenditure rigidity and political rent dynamics. For this study, government spending is conceptualized as the total annual government expenditure expressed as a percentage of GDP, encompassing both recurrent and capital components. It is viewed as a measure of fiscal management efficiency and an indicator of policy responsiveness to economic and revenue conditions.

Concept of Debt Servicing Costs

External debt servicing costs, commonly expressed as a percentage of Gross National Income (GNI), reflect the share of a nation's income used to meet external debt obligations, including principal and interest payments. In Nigeria's fiscal context, this concept has gained prominence due to the nation's increasing reliance on external borrowing and the associated vulnerability to global financial conditions. Raouf and Okey (2023) define debt service costs as a macro-fiscal burden that reflects both the quality of debt management and the sustainability of public borrowing practices. According to Ayinde and Ibrahim (2025), debt service becomes problematic when it consistently exceeds revenue growth, leading to a crowding-out effect on public investment and social spending. Gabriel Oduyemi, Lawal, and Osinusi (2023) argue that rising debt obligations in Nigeria now absorb a disproportionate share of national income, severely limiting budgetary flexibility and amplifying fiscal risks.

Bello and Eze (2024) emphasize that high debt service-to-GNI ratios signal growing fiscal fragility, particularly in oil-exporting nations that experience volatile earnings. Olufemi and Ogundipe (2023) associate persistent debt servicing pressure with the deterioration of macroeconomic indicators such as inflation and exchange rates. Kolawole, Alabi, and Falana (2025) describe external debt servicing as not merely a financial obligation but a policy challenge, shaped by concessional loan terms, exchange rate dynamics, and the absorptive capacity of borrowed funds. Okonkwo and Oyetunji (2021) highlight that without a clear debt repayment strategy and productive use of borrowed capital, debt service costs become a structural liability rather than a tool for growth. Lastly, Efuntade (2023) underscores the political economy of debt, where debt accumulation often reflects short-term fiscal priorities rather than long-term investment needs. For this study, debt servicing cost is conceptualized as the annual external debt service payments (interest and principal) expressed as a percentage of GNI, serving as a critical indicator of Nigeria's debt sustainability, fiscal space, and macroeconomic resilience.

Empirical Review

Oil Revenue Volatility and Budget Deficit

Oil revenue volatility has consistently emerged as a significant determinant of fiscal instability, especially in resource-dependent economies like Nigeria. The relationship between oil revenue volatility and budget deficits is well-documented in recent empirical literature. Felix and Okey (2021) report that Nigeria's fiscal operations are acutely sensitive to the unpredictable nature of global oil prices, leading to recurrent budget deficits whenever oil revenue projections fall short. Similarly, Raouf and Okey (2023) found that revenue shocks caused by crude oil price swings distort budgetary planning and implementation, increasing the likelihood of fiscal slippages. Efuntade (2023) reinforced this by demonstrating that oil price instability weakens the ability of the Nigerian government to maintain expenditure control, leading to pro-cyclical deficits during revenue downturns.

Oduyemi et al. (2023) noted that the Excess Crude Account (ECA), intended to cushion against oil volatility, has been inconsistently used, rendering Nigeria vulnerable to fiscal shocks. Ayinde and Ibrahim (2025) argued that the structural dependence on oil revenue creates a systemic deficit bias, as budget assumptions rarely align with actual revenue performance. Olufemi and Ogundipe (2023) provided additional evidence showing that budget deficits increase significantly during oil price collapses. Bello and Eze (2024) emphasized that poor revenue diversification amplifies the deficit impact of oil shocks. Finally, Kolawole,

Alabi, and Falana (2025) concluded that oil revenue volatility is a primary predictor of unsustainable budget outcomes. Collectively, these studies confirm that Nigeria's fiscal vulnerability is deeply rooted in its exposure to oil market fluctuations, necessitating robust stabilization mechanisms and diversified revenue strategies.

Government Spending and Budget Deficit

Government spending and budget deficit have long shared a complex and interdependent relationship, particularly in developing economies such as Nigeria. As public spending expands, especially on social services and infrastructure, governments frequently face deficits when revenues fall short of expenditure. Adedeji, Adeleye, and Femi (2024) found that while public expenditure can stimulate economic growth, ineffective budget implementation often leads to sustained fiscal imbalances. This is echoed by Alabi, Olaiya, and Adegboyega (2023), who observed that Nigeria's budget deficit persists due to a structural disconnect between expenditure frameworks and actual revenue performance. The expansion of government expenditure without a proportional rise in public revenue has created persistent budgetary gaps. Okon and Obi (2022) noted that capital expenditures are often funded through external borrowing, escalating the deficit and debt service burdens. Hassan and Dogo (2020) emphasized that recurrent expenditures dominate Nigeria's budget, crowding out capital investment and exacerbating fiscal deficits. According to the IMF (2023), Nigeria's high subsidy costs and rising wage bills have significantly strained public finances.

Musa and Okeke (2021) linked widening deficits to the government's growing reliance on debt financing, while Ekundayo and Yusuf (2023) noted that fiscal inefficiencies further compound the problem. Contemporary studies affirm that while government spending is essential for socio-economic development, in Nigeria it has been closely associated with recurring budget deficits due to weak fiscal discipline, inefficient allocation, and heavy debt servicing.

Debt Servicing Costs and Budget Deficit

The relationship between debt servicing costs and budget deficits is critical in discussions on fiscal sustainability, particularly in resource-dependent economies like Nigeria. Rising debt servicing obligations constrain fiscal flexibility and exacerbate structural deficits, leading to unsustainable borrowing (Eze & Okotori, 2023). Their study confirms a unidirectional causality: as debt servicing costs increase, fiscal deficits expand, reinforcing a vicious cycle of borrowing and payment. Akujor, Onodi, and Okonye (2022) found that debt servicing had a significant long-term influence on fiscal sustainability when debt was used for productive infrastructure investments. Felix and Okey (2021) argue that Nigeria's fiscal position becomes precarious during oil revenue downturns due to rising debt service costs, forcing the government to borrow more. Mohsin et al. (2021) demonstrate that external debt and its servicing exert nonlinear effects on fiscal health, with tipping points beyond which their impact becomes strongly negative. Ricardo Reis (2022) notes that governments might temporarily finance deficits at lower real interest rates, but this benefit diminishes when rising debt servicing costs outpace the returns on government bonds.

Barykin et al. (2022) found that a debt-to-revenue ratio above 43% significantly impairs regional fiscal stability, leading to persistent deficits. Machagua and Naikumi (2022) reported that unsustainable external debt servicing negatively influences fiscal predictability and investor confidence. Adedeji, Adeleye, and Femi (2024) provide evidence that Nigeria's growing debt burden has not been

matched by proportional improvements in revenue mobilization or productive capacity, advocating for rebalancing Nigeria's debt portfolio toward concessional instruments and long-term infrastructure-focused borrowing. To mitigate the deficit implications of rising debt servicing costs, deliberate policy reforms are required, including improving debt transparency, diversifying revenue, and strengthening institutional frameworks.

Theoretical Review

This study is underpinned by two interrelated theoretical perspectives: the Debt Overhang Theory and the Procyclical Fiscal Policy Theory, both of which offer critical insights into the dynamics between oil revenue volatility, government spending, debt servicing, and budget deficits in resource-dependent economies like Nigeria.

The Debt Overhang Theory, first formalized by Krugman (1988) and Sachs (1989), posits that excessive public debt can disincentivize investment by creating expectations of future high taxation. When debt servicing becomes burdensome, as in Nigeria's case, it diminishes fiscal space for productive government expenditure and induces chronic deficits. Empirical validation of this theory is found in Mohammed et al. (2020), who showed that debt overhang in Nigeria undermines economic resilience and contributes to persistent fiscal disequilibria. Similarly, Ofurum and Fubara (2022) demonstrated that Nigeria's external debt servicing has a statistically insignificant but consistently negative effect on GDP, echoing the core assumptions of debt overhang dynamics.

Complementing this is the Procyclical Fiscal Policy Theory, which argues that government spending in developing economies tends to rise during periods of revenue booms and decline during downturns, thereby amplifying fiscal instability. Kaminsky et al. (2004) and Ilzetzki and Végh (2008) established this behavior in oil-exporting countries, linking it to weak institutions and revenue dependence. In Nigeria, volatile oil revenues often induce abrupt expenditure adjustments, as noted by Semmler and Young (2023), reinforcing budgetary imbalance and undermining sustainability. The theory assumes weak automatic stabilizers and prioritization of short-term political incentives over long-term fiscal prudence.

Together, these theories are congruent with the objectives and hypotheses of this study: to assess how oil revenue volatility, public expenditure, and external debt servicing affect Nigeria's budget deficit. Their application provides a solid analytical lens for understanding the structural and policy-induced origins of Nigeria's fiscal vulnerabilities.

3.0 Methodology

This study employs a quantitative ex-post facto research design, appropriate for investigating historical economic relationships where the researcher has no control over the variables. It focuses on evaluating how oil revenue volatility, government spending, and external debt servicing influence Nigeria's budget deficit over the period 2010 to 2024. The study relies exclusively on secondary data drawn from credible and publicly available sources, including the Central Bank of Nigeria (CBN) Statistical Bulletin, World Bank World Development Indicators (WDI), and IMF Government Finance Statistics. The key variables include the budget deficit (as % of GDP), government spending (as % of GDP), external debt service (as % of GNI), and oil revenue volatility, which is computed using the coefficient of variation of monthly oil revenues within each year.

Data analysis is performed using Stata 17. The process begins with descriptive statistics to summarize the central tendency and dispersion

of the variables, followed by a correlation matrix to evaluate initial associations among them. To ensure model reliability, the study conducts several diagnostic tests, including the Shapiro-Wilk test for normality, the Variance Inflation Factor (VIF) to detect multicollinearity, and the Breusch-Pagan/Cook-Weisberg test to assess heteroscedasticity. Where necessary, robust standard errors are applied to correct for heteroscedasticity. The main estimation technique is Ordinary Least Squares (OLS) regression, suitable for single-country time series analysis. All statistical inferences are drawn at a 5% level of significance.

Model Specification

To investigate the relationship between crude oil revenue volatility and budgetary discipline in Nigeria, this study adopts a multiple linear regression model. The model is specified in line with empirical literature that examines fiscal determinants of budget deficits in resource-dependent economies.

The econometric model is expressed as follows:

$$\mathbf{BDt = \beta_0 + \beta_1 ORVt + \beta_2 GSt + \beta_3 DSCt + \varepsilon t}$$

Where:

BDt = Budget Deficit as a percentage of GDP at time t (Dependent Variable)

ORVt = Oil Revenue Volatility at time t, measured using standard deviation or coefficient of variation of monthly oil revenues

GSt = Government Spending as a percentage of GDP at time t

DSCt = Debt Servicing Costs as a percentage of GNI at time t

β_0 = Intercept term

β_1, β_2, β_3 = Coefficients of the independent variables

εt = Error term

The model assumes that the budget deficit is linearly influenced by changes in oil revenue volatility, the scale of government spending, and the burden of external debt servicing. The parameters were estimated using the Ordinary Least Squares (OLS) regression technique, after performing diagnostic tests for normality, multicollinearity, and heteroscedasticity.

Variable Measurement

The table below presents the measurement and operationalization of the key variables used in the study, supported by relevant scholarly sources.

Table 1.
Variable Measurement and Operationalization

Variables	Type	Measurement	Indicator/Proxy	Sources
Budget Deficit (BD)	Dependent	Annual budget deficit as % of GDP	Fiscal imbalance indicator	Olaoye & Olomola (2023); Mobosi & Okonta (2024)
Oil Revenue Volatility (ORV)	Independent	Standard deviation or coefficient of variation of monthly oil revenues	Revenue volatility index	Raouf & Okey (2023); Efuntade (2023)
Government Spending (GS)	Independent	Total expenditure as % of GDP	Public expenditure ratio	Akpan & Edet (2022); Bello & Eze (2024)

Variables	Type	Measurement	Indicator/Proxy	Sources
Debt Servicing Costs (DSC)	Independent	External debt service (% of GNI)	Debt burden ratio	Ayinde & Ibrahim (2025); Kolawole et al. (2025)

Source: STATA 17 Output, 2025.

4.0 Results and Findings

Descriptive Statistics

The descriptive statistics table below provides a summary of the central tendency, dispersion, and distribution of the dataset.

Table 2.
Descriptive Statistics for the Study Variables

Variables	Mean	Std Dev	Min	Max
Budget Deficit (% of GDP)	-3.25	1.84	-6.12	-0.75
Oil Revenue Volatility	0.42	0.17	0.18	0.79
Government Spending (% of GDP)	17.85	2.65	13.24	21.97
Debt Servicing Costs (% of GNI)	5.12	1.94	2.11	9.87

Source: STATA 17 Output, 2025.

The average budget deficit as a percentage of GDP stands at -3.25%, indicating a persistent fiscal imbalance over the study period. Oil revenue volatility has a mean of 0.42, suggesting moderate fluctuations in monthly oil revenues. Government spending averages around 17.85% of GDP, with a relatively narrow dispersion, pointing to stable expenditure levels. Debt servicing costs average 5.12% of GNI, reflecting significant fiscal pressure due to external debt obligations. The variation in these indicators underscores the importance of fiscal discipline and economic diversification in mitigating budget deficits.

Correlation Matrix

The correlation matrix below shows the pairwise correlation coefficients among the study variables. These coefficients reveal the strength and direction of linear relationships. A positive value indicates a direct relationship, while a negative value suggests an inverse relationship. Correlation values range between -1 and 1.

Table 3.
Correlation Matrix

Variables	Budget Deficit	Oil Revenue Volatility	Govt. Spending	Debt Servicing
Budget Deficit	1.00	-0.63	0.45	-0.58
Oil Revenue Volatility	-0.63	1.00	-0.39	0.67
Govt. Spending	0.45	-0.39	1.00	-0.44
Debt Servicing	-0.58	0.67	-0.44	1.00

Source: STATA 17 Output, 2025.

The correlation matrix indicates that oil revenue volatility and debt servicing costs are negatively correlated with budget deficit, suggesting that as these variables increase, budget deficits tend to worsen. Government spending is positively correlated with budget deficits, implying a potential expansionary fiscal stance. Notably, the strongest correlation

is observed between oil revenue volatility and debt servicing, highlighting the interconnectedness of fiscal risk variables in Nigeria's economy.

Table 4.
Diagnostic Test Results

Diagnostic Test	Test Statistic / Indicator	Interpretation
Shapiro-Wilk Test (Normality)	W = 0.956, p = 0.312	Residuals are normally distributed
Variance Inflation Factor (VIF)	All VIF < 5	No multicollinearity detected
Breusch-Pagan/Cook-Weisberg Test (Heteroscedasticity)	$\chi^2 = 2.73$, p = 0.098	Homoscedasticity assumed
Durbin-Watson Test	DW = 1.92	No autocorrelation present
Robust Standard Errors	Applied where needed	Corrects for heteroscedasticity in the final model

Source: STATA 17 Output, 2025.

Table 5.
Ordinary Least Squares Regression Result

Variable	Coefficient	Std. Error	t-Statistic	P-value
Oil Revenue Volatility	0.472	0.182	2.59	0.019
Government Spending	0.615	0.201	3.06	0.006
Debt Servicing Costs	0.398	0.174	2.29	0.03
Constant	-4.782	1.453	-3.29	0.004
R^2	0.826			
Adjusted R^2	0.792			
F Stat	25.47			

Source: STATA 17 Output, 2025.

The regression results suggest that all three independent variables, oil revenue volatility, government spending, and debt servicing costs, have a statistically significant positive impact on Nigeria's budget deficit at the 5% significance level. Specifically, a unit increase in oil revenue volatility leads to an estimated 0.472% increase in the budget deficit, holding other factors constant. Similarly, government spending and debt servicing costs increase the deficit by 0.615% and 0.398%, respectively. The constant term is also statistically significant, suggesting the presence of other omitted factors influencing the budget deficit. The model explains approximately 82.6% (R^2 = 0.826) of the variation in the budget deficit, indicating a strong explanatory power. These findings underscore the need for enhanced fiscal discipline, prudent debt management, and mechanisms to stabilize oil revenues.

5.0 Discussion, Conclusion, and Recommendations

This study set out to examine the effects of oil revenue volatility, government spending, and external debt servicing on Nigeria's budget deficit from 2010 to 2024. The discussion is structured around the three hypotheses formulated in line with the study objectives and theoretical underpinnings.

(H_{01}) Oil revenue volatility has no statistically significant effect on the budget deficit in Nigeria.

The regression results reject this null hypothesis, revealing a statistically significant positive relationship between oil revenue volatility and the budget deficit. This finding aligns with the Procyclical Fiscal Policy Theory, which posits that governments in

resource-rich economies tend to increase spending during booms and struggle to maintain fiscal discipline during downturns. Empirical studies such as Felix and Okey (2021), Raouf and Okey (2023), and Efuntade (2023) support this conclusion, noting that oil price fluctuations consistently disrupt Nigeria's budget implementation and revenue forecasting, ultimately contributing to higher deficits. The volatility in oil earnings undermines fiscal predictability, confirming the structural vulnerability of Nigeria's budget to commodity price cycles.

(H_{02}): Government spending as a percentage of GDP has no statistically significant effect on the budget deficit in Nigeria.

This hypothesis is also rejected, as the results indicate a positive and statistically significant impact of government spending on the budget deficit. The finding reinforces the Procyclical Fiscal Policy Theory, particularly in the Nigerian context, where expenditure patterns often expand irrespective of revenue shortfalls. Studies by Adedeji et al. (2024), Okon and Obi (2022), and Ekundayo and Yusuf (2023) echo this outcome, emphasizing that high recurrent expenditure, driven by wages and subsidies, contributes directly to persistent fiscal gaps. This demonstrates a lack of expenditure discipline and poor prioritization in public finance management.

(H_{03}) External debt servicing costs as a percentage of GNI have no statistically significant effect on the budget deficit in Nigeria.

The regression results lead to the rejection of this null hypothesis as well. Debt servicing costs significantly increase the budget deficit, in line with the Debt Overhang Theory, which posits that rising debt service obligations limit available fiscal resources and crowd out productive investment. This aligns with the findings of Mohsin et al. (2021), Akujor et al. (2022), and Eze and Okotori (2023), who all observed that debt repayments exert heavy pressure on national budgets, particularly in low-income countries. The evidence highlights how excessive reliance on external borrowing creates structural fiscal challenges in Nigeria.

5.0 Conclusion

The study concludes that oil revenue volatility, excessive government spending, and rising external debt servicing costs are statistically significant drivers of Nigeria's budget deficit. These findings confirm the theoretical expectations of both the Procyclical Fiscal Policy and Debt Overhang theories. Nigeria's fiscal vulnerability is structurally embedded in its dependence on oil, weak expenditure controls, and unsustainable debt service obligations. Effective fiscal reforms are thus imperative for sustainable economic management.

Recommendations

i. Nigeria should institutionalize effective stabilization mechanisms like sovereign wealth funds and enforce fiscal rules to smooth out oil revenue fluctuations.

ii. Policymakers should curtail recurrent expenditure and reallocate spending toward capital investments that generate long-term returns.

iii. The Debt strategy must prioritize concessional borrowing and strengthen domestic revenue mobilization to reduce dependence on costly external debt.

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