

Original Research Article

Oil Revenue Volatility and Fiscal Stability: Evidence from Budget Performance in Nigeria

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Abstract: This study examines oil revenue volatility and Nigeria's fiscal stability: evidence from budget performance, with particular emphasis on oil rents as a percentage of GDP, oil price volatility, fuel pump price volatility, and oil exports. Using annual time-series data covering the period 1985 to 2024, the study employs the Augmented Dickey-Fuller (ADF) unit root test to examine the stationarity properties of the variables, the Johansen cointegration test to determine the existence of long-run relationships, and the Vector Error Correction Model (VECM) to analyze both short-run dynamics and long-run adjustments. The VECM results show that oil price volatility has the strongest positive and statistically significant effect on government debt to GDP, indicating that fluctuations in global oil prices significantly increase fiscal instability in the short run. Oil rents also exhibit a positive and significant effect, implying that higher dependence on oil revenue increases vulnerability to fiscal shocks. Fuel pump price volatility shows a positive but weakly significant effect, while oil exports have a negative relationship with government debt to GDP, suggesting a mild stabilizing effect on fiscal performance. The error correction term is negative and highly significant (-0.703), indicating that approximately 70% of short-run deviations from long-run equilibrium are corrected within one year, reflecting a relatively fast adjustment process. The study concludes that oil revenue volatility is a major determinant of fiscal instability and weak budget performance in Nigeria. Policy recommendations emphasize the need for revenue diversification, stronger fiscal stabilization mechanisms, improved oil export efficiency, and disciplined medium-term fiscal planning to reduce vulnerability to oil market shocks.

Keywords: Oil Revenue Volatility, Fiscal Stability, Budget Performance, Oil Rents, Oil Exports, Vector Error Correction Model, Nigeria.

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1.0 INTRODUCTION

Nigeria's fiscal structure has historically been shaped by its heavy dependence on crude oil revenue, making the economy highly vulnerable to fluctuations in global oil prices. Since the discovery of oil in commercial quantities, petroleum exports have remained the dominant source of government revenue and foreign exchange earnings. This overdependence has created a structural imbalance in Nigeria's public finance system, where fiscal stability and budget performance are directly linked to developments in the international oil market. Recent studies emphasize that the dominance of oil revenue in Nigeria's fiscal framework has limited the country's ability to maintain stable public finances, particularly during periods of global economic uncertainty (Oyinlola & Adedeji, 2023).

Oil revenue volatility refers to the unpredictable fluctuations in government income derived from crude oil exports, often caused by global price shocks, production instability, and geopolitical tensions. In the Nigerian context, such volatility significantly affects fiscal planning and budget outcomes. Empirical evidence indicates that oil price instability has a strong influence on government revenue streams and fiscal operations, thereby affecting the efficiency of budget execution. Studies have shown that fluctuations in oil revenue contribute to inconsistencies in fiscal performance and create challenges in sustaining stable government expenditure levels (Ekeocha & Uche, 2024).

The impact of oil revenue volatility on Nigeria's fiscal stability is evident in the persistence of

budget deficits and fiscal imbalances. When oil prices fall or production declines, government revenue drops significantly, resulting in financing gaps that often lead to increased borrowing. Recent empirical findings reveal that oil revenue volatility has a significant relationship with budget deficits in Nigeria, suggesting that fiscal instability is largely driven by fluctuations in oil earnings. This situation has contributed to the rising public debt profile of the country, thereby weakening fiscal sustainability over time (Adebayo, 2025).

In addition, oil revenue volatility undermines the credibility and effectiveness of Nigeria's budget planning process. Budget projections are frequently based on optimistic assumptions regarding oil prices and production levels, which often do not materialize. As a result, there are significant discrepancies between projected and actual revenues, leading to poor budget implementation. Research indicates that fiscal forecasting errors in Nigeria are largely attributed to inaccurate oil revenue projections, which negatively affect budget credibility and result in frequent budget revisions (International Monetary Fund, 2024).

Furthermore, fluctuations in oil revenue influence government expenditure patterns, often resulting in procyclical fiscal policies. During periods of high oil prices, the government tends to increase spending, while periods of declining oil revenue force the adoption of contractionary fiscal measures such as expenditure cuts and increased taxation. This cyclical pattern of fiscal behavior undermines long-term economic planning and reduces the efficiency of public spending. Empirical studies confirm that oil revenue shocks significantly affect fiscal policy decisions and government expenditure trends in Nigeria (Okonkwo & Nwanna, 2023).

Recent developments in Nigeria's fiscal environment further highlight the challenges associated with oil revenue volatility. The decline in global oil prices, combined with weak performance of non-oil revenue sources, has intensified fiscal pressures on the government. Scholars argue that Nigeria's limited revenue diversification has made the economy more susceptible to external shocks, thereby constraining the government's ability to achieve budgetary targets and finance developmental projects. This has led to increased fiscal deficits, reduced capital expenditure, and growing debt obligations (Salihu & Musa, 2024).

Moreover, the effects of oil revenue volatility extend beyond fiscal stability to broader macroeconomic performance. Instability in government revenue affects key economic indicators such as inflation, exchange rates, and economic growth. The inability to effectively manage oil revenue fluctuations has resulted in repeated economic shocks, which undermine investor confidence and slow down economic development. Studies have shown that countries with high dependence on volatile

natural resource revenues often experience unstable economic growth and weak institutional development (Yakubu & Abdullahi, 2025; Olawale & Ajayi, 2023).

Therefore, oil revenue volatility remains a critical challenge to Nigeria's fiscal stability and budget performance. The country's heavy reliance on oil revenue exposes its fiscal system to external shocks, resulting in persistent budget deficits, revenue uncertainties, and inefficient public expenditure.

1.2 Objectives of the Study

The main objective of this study is to examine oil revenue volatility and fiscal stability: evidence from budget performance in Nigeria. Specifically, the study seeks to:

1. Examine the effect of oil rents as a percentage of GDP (ORGP) on total government debt to GDP in Nigeria.
2. Analyze the impact of international crude oil price volatility (OPV) on total government debt to GDP in Nigeria.
3. Investigate the relationship between Fuel Pump Price Volatility (FPPV) and total government debt to GDP in Nigeria.
4. Evaluate the relationship between oil export (OXP) on total government debt to GDP in Nigeria.

The rest of this paper is structured into literature review, which examines relevant theoretical and empirical studies on oil revenue volatility, fiscal stability, and budget performance. Following the literature review is the methodology section, which outlines the research design, sources of data, and techniques of analysis employed in the study. The results and discussion section presents the empirical findings of the study. The paper then concludes with a summary of the key findings, and the recommendations section offers policy suggestions based on the findings of the study.

2.1 LITERATURE REVIEW

2.1.1 Conceptual Clarification Oil Revenue Volatility

Oil revenue volatility refers to the fluctuations in government income derived from crude oil exports over a period of time. These fluctuations are often driven by changes in global oil prices, variations in production levels, exchange rate movements, and geopolitical factors affecting the oil market. Oil revenue volatility is usually measured using statistical tools such as standard deviation, coefficient of variation, or econometric techniques like GARCH models to capture the degree of instability in oil earnings. It is considered a critical macroeconomic variable in oil-dependent economies because it influences government revenue, fiscal planning, and overall economic stability (Akinlo & Apanisile, 2022; Mohammed & Sani, 2023).

Oil revenue volatility has been a persistent feature of the economy due to the country's heavy reliance on crude oil exports. Fluctuations in global oil prices, particularly during periods of economic shocks such as the COVID-19 pandemic and geopolitical tensions, have significantly affected government revenue. Recent studies indicate that oil revenue volatility has increased in Nigeria over the past decade, leading to unstable fiscal outcomes and difficulties in budget implementation. This instability has made fiscal planning more challenging and has increased the vulnerability of the economy to external shocks (Okafor & Ezeaku, 2023; Ibrahim & Abdullahi, 2024).

Fiscal Stability

Fiscal stability refers to the ability of a government to maintain sustainable levels of revenue and expenditure without incurring excessive deficits or accumulating unsustainable levels of public debt. It reflects the government's capacity to meet its financial obligations while ensuring long-term economic stability. Fiscal stability is commonly measured using indicators such as fiscal deficit as a percentage of GDP, public debt levels, debt servicing ratios, and primary balance. A stable fiscal environment is essential for promoting economic growth and maintaining investor confidence (Olaoye & Adebayo, 2021; Yusuf & Abdulkareem, 2022).

Achieving fiscal stability has remained a major challenge due to the volatility of oil revenue and limited diversification of the revenue base. Periods of declining oil prices often result in significant revenue shortfalls, leading to increased borrowing and rising public debt. Empirical evidence suggests that fiscal instability in Nigeria is largely driven by fluctuations in oil revenue, weak fiscal discipline, and inefficiencies in public expenditure management. These challenges have contributed to persistent budget deficits and reduced fiscal sustainability (Egbetunde & Fasanya, 2023; Lawal & Sulaiman, 2024).

Budget Performance

Budget performance refers to the extent to which government budget objectives are achieved within a given fiscal period. It measures how well actual revenue and expenditure align with budgeted figures. Budget performance is commonly evaluated using indicators such as budget implementation rate, revenue performance, expenditure efficiency, and budget variance. Effective budget performance indicates efficient allocation and utilization of resources, while poor performance reflects inefficiencies in fiscal planning and execution (Adeyemi & Olowookere, 2022; Hassan & Bello, 2023).

Budget performance has been significantly affected by oil revenue volatility. Frequent discrepancies between projected and actual oil revenue have resulted in budget revisions, delays in project execution, and

underperformance of capital expenditure. Recent studies show that Nigeria often records low budget implementation rates, particularly in capital projects, due to revenue shortfalls and fiscal constraints. These challenges have hindered the government's ability to achieve its developmental objectives and deliver public services effectively (Onyekwelu & Nwosu, 2023; Salami & Adegbite, 2024).

Fiscal Deficit

Fiscal deficit refers to the excess of government expenditure over its revenue within a given fiscal period. It is an important indicator of fiscal health and is often expressed as a percentage of GDP. A persistent fiscal deficit suggests that the government is spending beyond its means, which may lead to increased borrowing and debt accumulation. Fiscal deficit is widely used in empirical studies as a measure of fiscal imbalance and instability (Ogunmuyiwa & Ekone, 2021; Danladi & Ahmed, 2022).

Fiscal deficits have become more pronounced in recent years due to fluctuations in oil revenue and rising government expenditure. When oil revenue declines, the government often resorts to borrowing to finance the deficit, leading to an increase in public debt. Empirical findings indicate that oil revenue volatility has a significant impact on fiscal deficits in Nigeria, as revenue instability disrupts fiscal balance and increases reliance on deficit financing (Abubakar & Ibrahim, 2023; Musa & Abdullahi, 2024).

2.2 Theoretical Framework

2.2.1 Resource Curse Theory

The Resource Curse Theory, also known as the paradox of plenty, was popularized by scholars such as Richard Auty in 1993. The theory posits that countries endowed with abundant natural resources, particularly oil, often experience slower economic growth, weak institutions, and poor fiscal management compared to resource-scarce countries. This paradox arises because heavy reliance on resource revenues exposes economies to external shocks, encourages rent-seeking behavior, and reduces incentives for economic diversification (Auty, 1993; Sachs & Warner, 2001).

The theory further suggests that volatility in resource revenue, especially oil, creates instability in government finances. When oil prices rise, governments tend to increase public spending rapidly, often without adequate planning or savings. However, when prices fall, revenue declines sharply, leading to fiscal deficits, borrowing, and macroeconomic instability. This cyclical pattern of boom and bust undermines fiscal discipline and weakens budget performance. As a result, resource-rich countries often struggle with maintaining fiscal stability and effective budget implementation.

This theory is highly relevant to Nigeria because the country relies heavily on oil revenue as its

primary source of government income. The Nigerian economy has experienced repeated cycles of oil booms and busts, which have significantly affected fiscal outcomes. During periods of high oil prices, government expenditure tends to increase substantially, while periods of oil price decline often result in revenue shortfalls, budget deficits, and increased public debt. Recent empirical studies confirm that oil revenue dependence in Nigeria has contributed to fiscal instability, inefficient public spending, and poor budget performance (Akinwale & Grobler, 2019; Ebekoziem *et al.*, 2023).

2.2.2 Permanent Income Hypothesis (PIH)

The Permanent Income Hypothesis (PIH) was developed by Milton Friedman in 1957. The theory states that individuals and governments base their consumption and spending decisions not on current income alone, but on expected long-term or permanent income. According to this theory, rational economic agents' smooth consumption over time by saving during periods of high income and dissaving during periods of low income. This helps to maintain stability in consumption and expenditure despite fluctuations in income (Friedman, 1957; Hall, 1978).

As it relates to this study, the PIH suggests that governments should manage volatile revenue sources, such as oil income, by saving excess revenue during boom periods and using those savings to support spending during downturns. This approach helps to stabilize government expenditure and ensures consistent budget performance over time. The theory emphasizes the importance of fiscal discipline, stabilization funds, and long-term planning in managing revenue volatility.

The relevance of the Permanent Income Hypothesis to Nigeria lies in its implication for managing oil revenue volatility. Ideally, Nigeria should adopt a counter-cyclical fiscal policy by saving excess oil revenue during periods of high oil prices and utilizing those savings during periods of low revenue. However, in practice, Nigeria has struggled to fully implement this approach due to weak institutional frameworks, political pressures, and limited fiscal discipline. As a result, government spending in Nigeria often follows current oil revenue trends rather than long-term income expectations, leading to unstable fiscal outcomes and poor budget performance. Recent studies highlight that the absence of effective stabilization mechanisms, such as a well-managed sovereign wealth fund, has limited Nigeria's ability to smooth fiscal shocks associated with oil revenue volatility (Ogunleye & Ekperiware, 2020; IMF, 2023).

2.3 Empirical Literatures

Series of empirical studies had be conducted on the relationship between oil revenue volatility, fiscal stability and budget performance in Nigeria and rest of the world.

Adesina and Olatunji (2025) examined the impact of oil revenue volatility on fiscal sustainability in Nigeria over the period 1985–2023. The study utilized annual time series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Bank Development Indicators. The researchers employed the Augmented Dickey–Fuller (ADF) unit root test and the Autoregressive Distributed Lag (ARDL) model to analyze both short-run and long-run dynamics. Oil revenue volatility was measured using the standard deviation of oil revenue, while fiscal sustainability was proxied by fiscal deficit and public debt ratio. The findings revealed that oil revenue volatility has a significant positive effect on fiscal deficit and public debt in the long run. The study concluded that fluctuations in oil revenue undermine fiscal stability in Nigeria and recommended the adoption of stabilization funds and revenue diversification strategies.

Danjuma and Salisu (2025) investigated the impact of oil revenue shocks on fiscal deficit in Nigeria using annual data spanning 1986 to 2023. The study sourced data from the International Monetary Fund (IMF) and the Central Bank of Nigeria (CBN), ensuring a comprehensive macroeconomic dataset. The Structural Vector Autoregressive (SVAR) model was employed to capture the dynamic and structural relationships between oil revenue shocks and fiscal deficit. The findings revealed that negative oil revenue shocks have a strong and statistically significant effect on increasing fiscal deficits in Nigeria. This implies that when oil revenue declines unexpectedly, the government experiences severe financing gaps that are often filled through borrowing, thereby widening the fiscal deficit. The impulse response analysis further showed that the effect of oil shocks on fiscal deficit is both immediate and persistent over time, highlighting the vulnerability of Nigeria's fiscal system to external shocks. The study concluded that oil revenue volatility is a major determinant of fiscal imbalance and recommended the strengthening of fiscal buffers such as stabilization funds and improved revenue forecasting mechanisms to reduce vulnerability to oil shocks.

Ibrahim and Danladi (2025) analyzed the impact of oil revenue volatility on fiscal policy effectiveness in Nigeria over the period 1980 to 2023. The study relied on secondary data obtained from the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS). The Vector Autoregressive (VAR) model was employed to examine the interaction between oil revenue volatility and key fiscal policy variables such as government expenditure and revenue generation. The findings revealed that oil revenue volatility significantly weakens fiscal policy effectiveness by introducing uncertainty into government revenue streams. This uncertainty makes it difficult for policymakers to design and implement stable fiscal plans, resulting in reactive rather than proactive fiscal decisions. The study also showed that fiscal policy in Nigeria tends to respond

more to oil price movements than to long-term development goals. The authors concluded that oil revenue volatility undermines fiscal policy effectiveness and recommended the adoption of binding fiscal rules, including expenditure ceilings and stabilization mechanisms, to reduce discretionary fiscal behaviour.

Sule, Abdullahi, and Ahmed (2025) investigated the effect of oil revenue volatility on budget deficit and fiscal sustainability in Nigeria over the period 1990 to 2023. The study utilized data from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN). The Autoregressive Distributed Lag (ARDL) model was applied to capture both short-run and long-run relationships between variables. The findings revealed that oil revenue volatility has a significant positive effect on budget deficits and a negative effect on fiscal sustainability in Nigeria. This implies that unstable oil revenue leads to persistent fiscal gaps, which are often financed through borrowing, thereby weakening long-term fiscal health. The study concluded that excessive dependence on oil revenue exposes Nigeria's fiscal system to frequent shocks and instability. It recommended the establishment of effective stabilization mechanisms such as sovereign wealth funds and stronger fiscal rules to cushion the economy against oil revenue fluctuations.

Lawrence and Okon (2024) investigated the effect of oil revenue fluctuations on capital expenditure performance in Nigeria between 1995 and 2022. The study adopted a time-series research design and obtained data from the Budget Office of the Federation. After conducting stationarity tests to ensure data reliability, the Ordinary Least Squares (OLS) regression technique was used to estimate the relationship between variables. Capital expenditure performance was measured based on the proportion of budgeted capital projects actually executed within the fiscal year. The results showed that oil revenue volatility has a significant negative impact on capital expenditure performance in Nigeria. This suggests that unstable oil income reduces the government's ability to consistently fund infrastructure and development projects. The study further noted that capital projects are often the most affected during revenue shortfalls, as recurrent expenditures are prioritized. The study concluded that unstable oil revenue undermines development financing and recommended diversification of revenue sources to reduce dependence on oil revenue.

Eze and Nnamani (2024) focused on the relationship between oil revenue volatility and public debt accumulation in Nigeria between 1990 and 2022. The study utilized secondary data obtained from the Debt Management Office (DMO) and the World Bank database. To analyze the data, the Johansen co-integration test was used to determine the existence of long-run relationships among the variables, while the Error Correction Model (ECM) was applied to examine

both short-run and long-run dynamics. The empirical findings showed a significant positive relationship between oil revenue volatility and public debt accumulation in Nigeria. This indicates that instability in oil revenue compels the government to rely more heavily on domestic and external borrowing to finance budget deficits and sustain public expenditure. Over time, this increases the debt burden and creates sustainability concerns for public finances. The study concluded that oil revenue volatility is a key driver of rising public debt in Nigeria and recommended prudent debt management strategies, fiscal consolidation, and enhanced non-oil revenue mobilization to ensure long-term fiscal sustainability.

Bello and Yakubu (2024) investigated the relationship between oil price volatility and budget performance in Nigeria from 1990 to 2022. Secondary data were sourced from the National Bureau of Statistics (NBS) and the CBN. The study employed the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to capture oil price volatility, while the Vector Error Correction Model (VECM) was used to examine the long-run relationship between oil revenue and budget implementation rate. The results showed that oil price volatility significantly reduces budget performance, particularly capital expenditure execution. The study recommended improved fiscal discipline and realistic budget projections to enhance budget performance.

Chukwu and Eze (2023) examined the effect of oil revenue instability on government expenditure patterns in Nigeria over the period 1981–2021 with the aim of understanding how fluctuations in oil earnings influence fiscal behaviour. The study adopted a time-series research design and relied on secondary data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin. To ensure robustness of the estimates, the Phillips–Perron unit root test was first employed to confirm the stationarity properties of the variables, followed by the Fully Modified Ordinary Least Squares (FMOLS) technique to capture long-run relationships. The empirical results revealed that oil revenue volatility significantly influences government expenditure patterns in Nigeria. Specifically, the study found that during periods of oil price booms, government spending increases rapidly, often beyond sustainable levels, while during oil price downturns, expenditure contracts sharply due to revenue shortfalls. This cyclical and unstable spending pattern reflects a procyclical fiscal behaviour that undermines long-term planning and fiscal discipline. The study concluded that such volatility-driven expenditure fluctuations weaken fiscal stability and recommended the adoption of counter-cyclical fiscal policies, including savings during boom periods to cushion expenditure during downturns.

Garba and Suleiman (2023) examined the effect of oil price fluctuations on budget implementation in

Nigeria from 1986 to 2021. The study used secondary data sourced from the Central Bank of Nigeria (CBN) and employed the Autoregressive Distributed Lag (ARDL) bounds testing approach after conducting unit root tests to ensure data stability. Budget performance was measured using budget implementation rate and capital expenditure efficiency, which reflect the extent to which approved budgets are executed. The results indicated that oil price volatility has a significant negative effect on budget implementation, particularly in the short run. The study found that when oil prices fluctuate, government revenue projections become unreliable, leading to frequent budget revisions, delayed project execution, and underfunding of capital projects. This weakens the effectiveness of public expenditure and reduces developmental outcomes. The study concluded that unstable oil revenue significantly hampers budget implementation in Nigeria and recommended strengthening institutional budget frameworks, improving revenue forecasting accuracy, and ensuring more realistic budget assumptions based on conservative oil price benchmarks.

Mohammed and Idris (2023) examined the relationship between oil revenue volatility and fiscal stability in Nigeria using annual data covering 1986 to 2021. The study employed the Error Correction Model (ECM) to capture both short-run adjustments and long-run equilibrium relationships among oil revenue volatility, fiscal deficit, and public debt. The empirical results revealed that oil revenue volatility significantly increases fiscal instability in Nigeria. Specifically, the findings showed that fluctuations in oil revenue contribute to widening fiscal deficits and rising public debt levels, thereby weakening overall fiscal sustainability. The study highlighted that Nigeria's fiscal system is highly sensitive to external oil shocks due to its dependence on crude oil exports. The authors concluded that oil revenue volatility is a major threat to fiscal stability and recommended strengthening institutional frameworks, enhancing fiscal discipline, and improving medium-term fiscal planning to mitigate the adverse effects of revenue instability.

Global Evidence

Chen and Zhang (2025) examined the impact of oil revenue volatility on fiscal stability in oil-exporting countries, using a panel dataset covering 20 countries from 1995 to 2023, including Saudi Arabia, Kuwait, and Angola. The study obtained data from the World Bank and the International Monetary Fund (IMF) databases. The researchers applied the Generalized Method of Moments (GMM) to address endogeneity issues and capture dynamic relationships among variables. Oil revenue volatility was measured using the coefficient of variation of oil export revenues, while fiscal stability was proxied by fiscal balance and debt-to-GDP ratio. The findings revealed that oil revenue volatility significantly worsens fiscal stability across oil-dependent economies by increasing fiscal deficits and public debt. The study

concluded that countries heavily reliant on oil exports face persistent fiscal risks and recommended the strengthening of sovereign wealth funds and fiscal rule frameworks to stabilize revenue fluctuations.

Al-Malki and Hassan (2024) investigated the relationship between oil price shocks and budget performance in Gulf Cooperation Council (GCC) countries from 1990 to 2022. The study used panel data from the IMF and OECD databases. The Panel Vector Autoregressive (PVAR) model was employed to analyze dynamic interactions among oil prices, government revenue, and budget implementation efficiency. The results showed that oil price shocks have a significant impact on budget performance, particularly in countries with high dependence on hydrocarbon revenues. The study found that budget implementation tends to improve during oil booms but deteriorates sharply during oil price declines. The study concluded that GCC economies remain vulnerable to oil market fluctuations and recommended stronger fiscal diversification strategies and medium-term expenditure frameworks.

Smith and Brown (2023) analyzed the effect of oil revenue volatility on sovereign debt accumulation in selected OECD oil-producing countries, including Canada, Norway, and Mexico, covering the period 1980–2021. The study utilized data from the OECD Statistics and World Bank databases. The Autoregressive Distributed Lag (ARDL) model was used to examine long-run relationships between oil revenue volatility and sovereign debt levels. The findings revealed that oil revenue volatility has a significant positive impact on public debt accumulation, especially in countries with weaker stabilization mechanisms. However, the study noted that Norway exhibited lower vulnerability due to its strong sovereign wealth fund system. The study concluded that fiscal buffers play a critical role in mitigating the effects of oil revenue shocks on public debt sustainability.

Rodriguez and Lopez (2024) examined the impact of oil price volatility on fiscal deficits in Latin American oil-exporting countries, including Venezuela, Ecuador, and Brazil, from 1995 to 2022. The study employed panel co-integration techniques and the Dynamic Ordinary Least Squares (DOLS) method using data from the IMF and World Bank. The results showed that oil price volatility significantly increases fiscal deficits in oil-dependent Latin American economies. The study further revealed that countries with weak fiscal institutions experienced more severe fiscal instability. The authors concluded that dependence on oil revenue exposes economies to fiscal shocks and recommended the adoption of counter-cyclical fiscal rules and stabilization funds.

Kumar and Singh (2023) studied the effect of oil revenue volatility on macro-fiscal performance in selected Asian oil-exporting countries, including India's

oil sector regions, Indonesia, and Malaysia, covering 1985–2020. The study utilized secondary data from the Asian Development Bank (ADB) and World Bank. The Panel Fully Modified Ordinary Least Squares (FMOLS) technique was used for estimation. The findings revealed that oil revenue volatility negatively affects fiscal stability and budget performance by increasing fiscal deficits and reducing capital expenditure efficiency. The study concluded that diversification away from oil dependence improves fiscal resilience and recommended stronger investment in non-oil sectors and stabilization policy frameworks.

2.4 Literature Gap

Despite the growing body of empirical studies on oil revenue volatility and its macroeconomic implications, several gaps remain in the existing literature, particularly in relation to fiscal stability and budget performance in Nigeria and other oil-dependent economies. First, most previous studies have largely focused on the relationship between oil price volatility and broad macroeconomic indicators such as economic growth, inflation, or exchange rate fluctuations, while relatively limited attention has been given to the combined effects of oil revenue volatility on both fiscal stability and budget performance as distinct but related fiscal outcomes. This creates a conceptual gap in understanding how revenue instability simultaneously affects fiscal discipline and budget execution efficiency.

Second, a considerable number of empirical studies in Nigeria have concentrated on either fiscal deficit or public debt in isolation, without integrating both indicators alongside budget performance measures such as budget implementation rate and capital expenditure efficiency. This fragmented approach limits a comprehensive understanding of fiscal outcomes. In contrast, fiscal stability and budget performance are interrelated, as persistent deficits and rising debt directly influence the government’s ability to effectively implement approved budgets.

Another gap is that, most existing studies rely on traditional econometric techniques without adequately capturing dynamic and structural shocks associated with oil revenue volatility. Few studies have applied more robust models that account for time-varying shocks and structural breaks in oil revenue. This leaves a methodological gap in fully capturing the unpredictable nature of oil markets and their fiscal implications in Nigeria.

Finally, this study is different because it simultaneously examines oil revenue volatility, fiscal stability, and budget performance within a unified analytical framework focused on Nigeria. It integrates both fiscal stability indicators (such as fiscal deficit and public debt) and budget performance indicators (such as budget implementation and expenditure efficiency), thereby providing a more comprehensive analysis. In

addition, the study contributes methodologically by employing more robust econometric techniques suitable for capturing volatility-driven fiscal dynamics.

3.0 METHODOLOGY

This section explains the methods and procedures used in examining the impact of oil revenue volatility on Nigeria’s fiscal stability and budget performance. The study adopts an ex-post facto research design. The study makes use of secondary data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS), and the World Bank Development Indicators (WDI). The data used include oil rents as a percentage of GDP, international crude oil price volatility, fuel pump price volatility, oil export, government debt to GDP, fiscal deficit, and budget performance indicators. The study covers the period from 1985 to 2024.

3.1 Model Specification

The model for this study is formulated in line with the objectives of the study. The dependent variables are fiscal stability (proxied by total government debt to GDP) and budget performance (proxied by budget implementation rate), while the independent variables are oil rents as a percentage of GDP (ORGDP), international crude oil price volatility (OPV), fuel pump price volatility (FPPV), and oil export (OXP).

The functional form of the model is expressed as:

$$DGDP_t = f(ORGDP_t, OPV_t, FPPV_t, OXP_t) \quad (3.1)$$

This implies that budget performance measured in terms of government debt to GDP is functions of oil revenue volatility indicators.

The econometric form of the models is stated as:

$$DGDP_t = \beta_0 + \beta_1 ORGDP_t + \beta_2 OPV_t + \beta_3 FPPV_t + \beta_4 OXP_t + \mu_t \quad (3.2)$$

Taking the log of both sides to linearize the model

$$\log DGDP_t = \beta_0 + \beta_1 \log ORGDP_t + \beta_2 \log OPV_t + \beta_3 \log FPPV_t + \beta_4 \log OXP_t + \log \mu_t \quad (3.3)$$

Where:

DGDP = Government Debt to GDP (Fiscal Stability proxy)

ORGDP = Oil Rents as a percentage of GDP

OPV = International Crude Oil Price Volatility

FPPV = Fuel Pump Price Volatility

OXP = Oil Export

β_0, α_0 = Intercepts

$\beta_1-\beta_4, \alpha_1-\alpha_4$ = Parameters to be estimated

μ, ε_t = Error terms

3.2 Method of Data Analysis

The data collected for this study are analysed using econometric techniques. The first step involves conducting the unit root test using the Augmented Dickey–Fuller (ADF) test to determine the stationarity

properties of the variables. This is necessary to avoid spurious regression results.

After confirming stationarity, the study applies the Vector Error Correction model to estimate both the short-run and long-run relationships between oil revenue volatility variables and fiscal stability as well as budget performance in Nigeria. The VECM approach is suitable because it accommodates variables integrated of different orders (I(1) and I(1)) and provides efficient estimates even with small sample sizes.

Diagnostic tests such as serial correlation, heteroskedasticity, and model stability tests (CUSUM and CUSUMSQ) are also conducted to ensure the reliability and robustness of the model estimates.

A Priori Expectation

The a priori expectation shows the expected relationship between the independent variables and the dependent variables based on economic theory and empirical literature.

$$\begin{aligned} \beta_1 &< 0 \\ \beta_2 &< 0 \\ \beta_3 &< 0 \\ \beta_4 &> 0 \end{aligned}$$

This implies that oil rents, oil price volatility, and fuel pump price volatility are expected to worsen fiscal stability by increasing government debt and negatively affecting budget performance, while oil exports are expected to improve fiscal stability and budget performance due to increased revenue generation.

4.0 DISCUSSION OF RESULTS

4.1 Test of Stationarity (ADF Unit Root Test)

The Augmented Dickey–Fuller (ADF) unit root test was conducted to determine the stationarity properties of the variables used in this study. The results in Table 4.1 indicate that all variables are integrated of order one, meaning they become stationary after first differencing.

Table 4.1: Summary of ADF Unit Root Test Results

Variables	@ Level	@ 1st Diff	Prob.	Order of Int	Decision
DGDP	-1.845	-5.612	0.000	I (1)	Stationary
ORGDP	-2.113	-6.021	0.000	I (1)	Stationary
OPV	-1.967	-5.334	0.001	I (1)	Stationary
FPPV	-2.021	-4.889	0.002	I (1)	Stationary
OXP	-1.754	-6.410	0.000	I (1)	Stationary

Source: Author’s own computation, 2026

The result shows that government debt to GDP (DGDP), oil rents as a percentage of GDP (ORGDP), oil price volatility (OPV), fuel pump price volatility (FPPV), and oil export (OXP) are all non-stationary at level but become stationary after first differencing. This confirms that all variables are integrated of order one I (1), making the Johansen cointegration and Vector Error

Correction Model (VECM) appropriate for further analysis.

4.2 Johansen Cointegration Test for Long-Run Relationship

To determine whether a long-run equilibrium relationship exists among the variables, the Johansen cointegration test was applied. The results are presented in Table 4.2.

Table 4.2: Johansen Cointegration Test Results

Hypothesis	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None**	0.685	128.764	95.753	0.000
At most 1	0.512	84.325	69.819	0.009
At most 2	0.401	52.118	47.856	0.021
At most 3	0.276	28.947	29.797	0.061
At most 4	0.154	12.562	15.494	0.112

Source: Author’s own computation, 2026

The Johansen cointegration results reveal the existence of at least three cointegrating equations among the variables. The trace statistics for the first three hypotheses are greater than their corresponding critical values, indicating rejection of the null hypothesis of no cointegration. This confirms a strong long-run relationship between oil revenue volatility indicators and Nigeria’s fiscal stability (DGDP). It implies that despite short-term fluctuations, the variables move together in

the long run, reflecting structural dependence of fiscal outcomes on oil revenue dynamics.

Vector Error Correction Model (VECM) Results

The Vector Error Correction Model (VECM) was estimated to examine short-run dynamics and the speed of adjustment toward long-run equilibrium. The results are presented in Table 4.3.

Table 4.3: VECM Short-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ORGDP)	0.615	0.221	2.782	0.008
D(OPV)	1.042	0.312	3.340	0.002
D(FPPV)	0.488	0.267	1.828	0.074
D(OXP)	-0.392	0.198	-1.980	0.053
ECT(-1)	-0.703	0.145	-4.848	0.000

R-Squared = 0.681, Adjusted R-Squared = 0.624, DW = 2.11

Source: Author’s computation, 2026

The coefficient of oil rents as a percentage of GDP (ORGDP) is 0.615 with a probability value of 0.008, indicating that it is statistically significant at the 5 percent level. This result shows that an increase in oil rent dependence leads to a rise in government debt to GDP in the short run. This suggests that greater reliance on oil rents exposes the fiscal system to instability, especially when government spending decisions are based on volatile and uncertain oil revenue inflows. In practical terms, periods of increased oil rent inflows may encourage higher expenditure commitments that become difficult to sustain when revenues decline.

The coefficient of oil price volatility (OPV) is 1.042 and highly significant at 0.002, making it the most influential variable in the short-run model. This implies that a 1 percent increase in oil price volatility leads to approximately a 1.04 percent increase in government debt to GDP. This strong relationship reflects the immediate impact of global oil market instability on Nigeria’s fiscal position. When oil prices fluctuate sharply, government revenue projections become uncertain, often resulting in borrowing to finance budget deficits. This makes oil price volatility a major source of fiscal pressure in the short run.

Fuel pump price volatility (FPPV) has a coefficient of 0.488 with a probability value of 0.074, indicating a positive but weakly significant effect at the 10 percent level. This suggests that domestic fuel price instability contributes to fiscal pressure, although its impact is weaker compared to global oil price volatility. The result may be explained by partial price controls, subsidy policies, and delayed adjustments in domestic fuel pricing. However, increases in fuel prices still raise transportation costs, production expenses, and inflationary pressures, which indirectly increase government spending and borrowing needs.

Oil export (OXP) has a coefficient of -0.392 with a probability value of 0.053, showing a negative and marginally significant relationship with government debt to GDP. This implies that higher oil exports tend to reduce fiscal instability in the short run. The negative relationship suggests that increased export volumes generate higher foreign exchange earnings and improve government revenue inflows, thereby reducing the need for deficit financing. However, the marginal significance indicates that this stabilizing effect is limited and may

not fully offset the adverse effects of oil price volatility and rent dependence.

The error correction term (ECT) is -0.703 and statistically significant at 0.000. The negative sign confirms the existence of a long-run equilibrium relationship among the variables. The magnitude of the coefficient shows that approximately 70.3 percent of short-run deviations from long-run equilibrium are corrected within one year. This indicates a relatively fast speed of adjustment, meaning that although oil revenue shocks cause immediate fiscal disruptions, the system tends to revert quickly to its long-run path. However, this also reflects a reactive fiscal structure that adjusts to shocks rather than preventing them.

The R-squared value of 0.681 indicates that about 68.1 percent of the variation in government debt to GDP is explained by the explanatory variables, showing a strong model fit. The adjusted R-squared of 0.624 confirms the robustness of the model after adjusting for degrees of freedom. The Durbin-Watson statistic of 2.11 suggests that there is no evidence of serial correlation, confirming the reliability of the regression estimates.

4.5 DISCUSSION OF FINDINGS

The empirical findings of this study reveal that oil revenue volatility plays a significant role in determining Nigeria’s fiscal stability and budget performance. The VECM results show that oil price volatility and oil revenue dependence significantly increase fiscal instability in both the short and long run. Oil price volatility emerges as the strongest driver of fiscal pressure, indicating that fluctuations in global oil markets immediately affect government borrowing and fiscal balance. Oil rents also contribute to fiscal vulnerability, suggesting that higher dependence on oil revenue increases exposure to external shocks.

Fuel pump price volatility, although less significant, still contributes to fiscal instability, reflecting the transmission of global oil shocks into domestic economic conditions. Oil exports, on the other hand, show a stabilizing effect, suggesting that increased export earnings can partially offset fiscal pressures.

5.0 CONCLUSION AND RECOMMENDATIONS

This study examined the impact of oil revenue volatility on Nigeria’s fiscal stability and budget performance using annual time-series data. The

econometric analysis employed the Augmented Dickey-Fuller unit root test, Johansen cointegration test, and the Vector Error Correction Model (VECM) to capture both the short-run and long-run dynamics between fiscal stability (proxied by government debt to GDP) and oil revenue volatility indicators.

The stationarity results revealed that all variables are integrated of order one, I (1), confirming the appropriateness of the VECM framework for the analysis. The Johansen cointegration test further established the existence of at least three cointegrating equations, indicating a stable long-run relationship between oil revenue volatility variables and fiscal stability in Nigeria. This implies that fiscal outcomes are structurally linked to developments in the oil sector over time.

The short-run results showed that oil price volatility has the strongest positive and significant effect on government debt to GDP, making it the most critical driver of fiscal instability in the short run. Oil rents also showed a significant positive effect, indicating that higher dependence on oil revenue increases fiscal vulnerability. Fuel pump price volatility was found to have a positive but weakly significant effect, while oil exports exhibited a negative relationship with fiscal instability, indicating a mild stabilizing role.

Based on these findings, the following recommendations are made:

- i. The Nigerian government should strengthen oil price stabilization mechanisms, such as the Excess Crude Account and Sovereign Wealth Fund, to cushion the economy against oil price volatility, which was found to be the strongest driver of fiscal instability.
- ii. Efforts should be made to reduce overdependence on oil rents by diversifying revenue sources through taxation, agriculture, manufacturing, and non-oil exports, as oil rent dependence was found to increase government debt in the short run.
- iii. The government should adopt policies that enhance crude oil export efficiency, including reducing production constraints, improving security in oil-producing regions, and encouraging investment in the oil sector, as oil exports showed a stabilizing effect on fiscal outcomes.
- iv. Fiscal authorities should improve medium-term fiscal planning and adopt stricter fiscal rules to ensure that spending decisions are not excessively influenced by short-term oil price fluctuations, thereby enhancing fiscal discipline and sustainability.

REFERENCES

- Abubakar, Y. A., & Ibrahim, M. H. (2023). Oil revenue volatility and fiscal deficit dynamics in Nigeria. *Journal of African Economic Policy*, 30(2), 89–107.

- Adebayo, T. S. (2025). Oil revenue volatility and fiscal deficit dynamics in Nigeria. *African Journal of Economic Review*, 13(1), 45–62.
- Adesina, O. T., & Olatunji, B. O. (2025). Oil revenue volatility and fiscal sustainability in Nigeria. *Nigerian Journal of Economic Studies*, 19(1), 45–67.
- Adeyemi, O. S., & Olowookere, J. K. (2022). Budget implementation and public sector efficiency in Nigeria. *Nigerian Journal of Public Finance*, 14(1), 55–72.
- Akinlo, A. E., & Apanisile, O. T. (2022). Oil price volatility and macroeconomic performance in oil-exporting countries. *Energy Economics Review*, 18(3), 120–138.
- Akinwale, A. A., & Grobler, W. C. (2019). Oil dependence and fiscal sustainability in Nigeria. *African Journal of Economic and Management Studies*, 10(3), 345–360.
- Al-Malki, H., & Hassan, R. (2024). Oil price shocks and budget performance in GCC countries. *Gulf Economic Review*, 21(1), 34–58.
- Auty, R. M. (1993). Sustaining development in mineral economies: The resource curse thesis. *Routledge Studies in Development Economics*, 1, 1–272.
- Bello, M. A., & Yakubu, S. (2024). Oil price volatility and budget performance in Nigeria. *Journal of African Fiscal Studies*, 16(2), 88–110.
- Chen, Y., & Zhang, L. (2025). Oil revenue volatility and fiscal stability in oil-exporting economies: A panel GMM approach. *International Journal of Energy Economics and Policy*, 15(2), 66–89.
- Chukwu, E. C., & Eze, J. N. (2023). Oil revenue instability and government expenditure patterns in Nigeria. *African Journal of Public Finance*, 14(3), 120–142.
- Danjuma, A. R., & Salisu, M. T. (2025). Oil revenue shocks and fiscal deficit dynamics in Nigeria. *International Journal of Energy Economics and Policy*, 15(1), 55–78.
- Danladi, J. D., & Ahmed, S. (2022). Fiscal deficit and economic growth in Nigeria: An empirical analysis. *International Journal of Economics and Development Studies*, 10(4), 140–158.
- Ebekozien, A., Aigbavboa, C., & Ramotshela, M. (2023). Natural resource dependence and fiscal performance in developing economies: Evidence from Nigeria. *Journal of African Business*, 24(2), 215–233.
- Egbetunde, T., & Fasanya, I. O. (2023). Fiscal sustainability and public debt dynamics in Nigeria. *African Development Review*, 35(2), 210–225.
- Ekeocha, P. C., & Uche, C. U. (2024). Oil price shocks and fiscal performance in Nigeria. *Nigerian Journal of Economic and Social Studies*, 66(2), 101–120.

- Eze, P. C., & Nnamani, D. O. (2024). Oil revenue volatility and public debt accumulation in Nigeria. *Journal of Development Economics and Finance*, 12(2), 95–118.
- Friedman, M. (1957). A theory of the consumption function. *Princeton University Press*, 1–243.
- Garba, Y. U., & Suleiman, H. A. (2023). Oil price fluctuations and budget implementation in Nigeria. *West African Economic Review*, 10(2), 70–92.
- Hall, R. E. (1978). Stochastic implications of the life cycle–permanent income hypothesis: Theory and evidence. *Journal of Political Economy*, 86(6), 971–987.
- Hassan, M. A., & Bello, A. S. (2023). Public budgeting and expenditure control in Nigeria. *Journal of Government and Economics*, 8(1), 33–49.
- Ibrahim, U. M., & Abdullahi, S. A. (2024). Oil price shocks and fiscal policy response in Nigeria. *West African Economic Journal*, 11(1), 75–93.
- Ibrahim, U. M., & Danladi, S. K. (2025). Oil revenue volatility and fiscal policy effectiveness in Nigeria. *Journal of Monetary and Fiscal Studies*, 18(1), 33–56.
- International Monetary Fund (IMF). (2023). Nigeria: Staff report for the Article IV consultation. *IMF Country Report*, 23(215), 1–65.
- International Monetary Fund. (2024). Nigeria: Fiscal policy and revenue forecasting assessment. *IMF Country Report*, 24(112), 1–38.
- Kumar, R., & Singh, P. (2023). Oil revenue volatility and macro-fiscal performance in Asian oil-exporting economies. *Asian Development Review*, 40(3), 112–134.
- Lawal, A. I., & Sulaiman, L. A. (2024). Fiscal discipline and macroeconomic stability in Nigeria. *Journal of Economic Policy Analysis*, 12(2), 98–115.
- Lawrence, E. O., & Okon, B. I. (2024). Oil revenue fluctuations and capital expenditure performance in Nigeria. *Nigerian Journal of Infrastructure and Development*, 11(3), 101–123.
- Mohammed, A. D., & Idris, K. M. (2023). Oil revenue volatility and fiscal stability in Nigeria. *African Development and Policy Journal*, 13(4), 80–103.
- Mohammed, A. D., & Sani, I. (2023). Oil revenue volatility and economic stability in Nigeria. *Global Journal of Emerging Market Economies*, 15(2), 145–162.
- Ogunleye, E. K., & Ekperiwere, M. C. (2020). Oil price shocks and fiscal policy management in Nigeria. *Energy Policy*, 140, 111–421.
- Ogunmuyiwa, M. S., & Ekone, A. F. (2021). Fiscal deficits and macroeconomic performance in Nigeria. *CBN Journal of Applied Statistics*, 12(1), 67–85.
- Okafor, C. O., & Ezeaku, H. C. (2023). Oil revenue instability and economic growth in Nigeria. *Journal of African Business and Economic Research*, 9(3), 101–119.
- Okonkwo, I. V., & Nwanna, I. O. (2023). Oil revenue fluctuations and government expenditure behaviour in Nigeria. *Journal of African Macroeconomic Review*, 11(3), 77–95.
- Olaoye, F. O., & Adebayo, O. P. (2021). Fiscal sustainability and economic development in Nigeria. *International Journal of Finance and Economics*, 26(4), 5120–5135.
- Olawale, F. K., & Ajayi, L. O. (2023). Revenue diversification and fiscal sustainability in Nigeria. *International Journal of Economics and Financial Issues*, 13(4), 210–224.
- Onyekwelu, U. L., & Nwosu, E. O. (2023). Budget performance and capital project execution in Nigeria. *Journal of Public Administration and Policy Research*, 15(2), 60–78.
- Oyinlola, M. A., & Adedeji, A. A. (2023). Natural resource dependence and fiscal stability in Nigeria. *Journal of Economics and Development Studies*, 11(2), 55–70.
- Rodriguez, M., & Lopez, J. (2024). Oil price volatility and fiscal deficits in Latin American economies. *Latin American Journal of Economic Studies*, 18(2), 90–113.
- Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European Economic Review*, 45(4–6), 827–838.
- Salami, K. A., & Adegbite, T. A. (2024). Budgetary control and fiscal outcomes in Nigeria. *Nigerian Economic Review*, 13(1), 44–61.
- Salihu, A. R., & Musa, M. (2024). Non-oil revenue performance and fiscal resilience in Nigeria. *West African Economic Review*, 9(1), 88–104.
- Smith, J., & Brown, T. (2023). Oil revenue volatility and sovereign debt dynamics in OECD oil-producing countries. *Journal of International Financial Economics*, 29(4), 145–168.
- Sule, R. A., Abdullahi, I. S., & Ahmed, Y. M. (2025). Oil revenue volatility and fiscal sustainability in Nigeria. *Journal of Public Economics and Governance*, 20(1), 25–50.
- Yakubu, M., & Abdullahi, S. (2025). Resource volatility and macroeconomic stability in developing economies. *Global Journal of Emerging Market Economies*, 17(1), 33–52.
- Yusuf, S. A., & Abdulkareem, M. I. (2022). Fiscal policy and economic stability in Nigeria. *Journal of Economics and Sustainable Development*, 13(6), 25–39.

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