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Petroleum Revenue Fluctuations and Public Budget Deficits: An Empirical Assessment of Nigeria's Fiscal Sustainability.

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ABSTRACT

The research was driven by Nigeria's ongoing fiscal instability, unstable budget outcomes, and a persistent structural dependence on crude oil revenues, factors that repeatedly left government spending exposed to shocks in global markets. This study evaluated the impact of petroleum revenue fluctuations on public budget deficits and fiscal sustainability in Nigeria from 1981 to 2024. The study employed quantitative longitudinal research design. Key variables included petroleum revenue as independent variable, with global oil prices and government expenditure growth as controls. The Autoregressive Distributed Lag (ARDL) model was employed to analyze both short-run and long-run dynamics after unit root tests (Augmented Dickey-Fuller and Philip-Perron) confirmed a mix of stationary variables. The empirical findings showed that petroleum revenue substantially weakened budget balances over the long term, thereby confirming the existence of the resource curse. By contrast, increases in global oil prices and government expenditure growth placed significant upward pressure on fiscal deficits, indicating that higher public spending intensified budgetary imbalances. In the short run, the dynamics revealed a statistically significant error-correction term of -0.427, which implies that 42.7% of short-run deviations from equilibrium revert toward long-run equilibrium each year. The study concluded that unhedged dependence on volatile petroleum revenues posed a fundamental threat to national budget execution and long-term fiscal sustainability. Consequently, it recommended aggressive revenue diversification into non-oil sectors, the enforcement of strict expenditure controls, and the institutionalization of robust fiscal buffers to decouple public spending from international oil price volatility.

Keywords: Petroleum revenue, public budget deficit, ARDL Model.

INTRODUCTION

Public budget deficit is central to Nigeria's financial management, fiscal well-being, and economic growth, because it determines how effectively government revenue is handled to finance public services and infrastructure (Olaoye & Akinola, 2019). Historically, Nigeria has experienced difficulties in revenue generation and budget execution, which have often led to budget imbalance, specifically a deficit, in which spending exceeds revenue (Michael et al., 2024). This deficit indicates a shortfall in government finances during a particular budget period (Momodu & Monogbe, 2017). The government's ability to generate revenue is the foundation of effective and efficient budget balances, supporting public finance management and macroeconomic stability (Olaoye & Alabadan, 2024).

In the 2024 and 2025 fiscal years, the budget deficits of the Federal Government of Nigeria were N9.18 trillion and N13.08 trillion, respectively. This amounts to a decrease of N4.6 trillion from the N11.60 trillion deficit registered in 2023. These figures correspond to roughly 50% of the aggregate revenue generated by the Federal

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Government of Nigeria and to 3.88% of the projected Gross Domestic Product (GDP). Accordingly, there is a 6.11% decline relative to the budgeted fiscal deficit for 2023, though the deficit still exceeds the 3% threshold set by the Fiscal Responsibility Act of 2007 (Olusegun et al., 2024). The question of budget deficits is therefore of utmost importance: for instance, the 2023 budget reflects 3.88% of the GDP, while total expenditure is nearly double the level of projected revenue. The factors driving this situation include inadequate revenue for the country, low compliance, fluctuations in oil prices, shortfalls in crude oil production, and a narrow tax base (Felix & Elisha, 2023).

Historically, actual revenue has usually been lower than 70% of the total budget. Likewise, the spending budget for 2024 is N28.78 trillion, comprising recurrent expenditure of N8.77 trillion and capital spending of N9.99 trillion. Expenditures have not, on average, exceeded 85% of the budgeted amount due to weak revenue realization. In Nigeria, government fiscal outlays have continued to exceed income for most years starting in 1980, except for 1995 and 1996, when the federal budget recorded a surplus (Amade & Oyigebe, 2024).

Nigeria has been ranked 191st out of 193 countries worldwide, with general government revenue amounting to 7.3 percent of its Gross Domestic Product (GDP) in 2023, a figure far below fifty percent of the average revenue reported across member states of the Economic Community of West African States (ECOWAS) and roughly one-third of the average revenue observed in countries located in Sub-Saharan Africa (SSA). Nigeria's fiscal system is highly vulnerable to external shocks, since it has one of the lowest revenue-to-GDP ratios globally (Jung, 2023). By implementing a targeted revenue expansion initiative, the Nigerian government aims to raise this ratio to 15% by 2027, seeking to strengthen fiscal sustainability and reduce reliance on volatile petroleum revenue streams (Kolawole, 2021). In addition, Nigeria's fiscal revenue has declined over time, largely due to the drop in oil revenue during the previous decade (Jung, 2023).

Petroleum earnings are fundamental to Nigeria's fiscal well-being, accounting for more than 60% of government revenue and shaping budget outcomes directly. Variations in international oil prices substantially affect fiscal stability, since declines in prices contribute to budget deficits and lower funding for public projects (EIA, 2020). Even so, despite their significance, inefficiencies such as corruption, oil theft, and weak administrative practices obstruct this revenue stream, intensifying fiscal gaps and underscoring the dangers of petroleum dependence for sustainable budget performance (Nwuke, 2021).

Nigeria's budget balances is undermined by its dependence on volatile petroleum revenues, which have been affected by crude oil theft and pipeline vandalism, as well as by sluggish non-oil revenue sources (Jung, 2023). Although petroleum revenue inflows have been substantial, budget balances has been marked by the effective execution of capital and recurrent expenditures, which nonetheless remain constrained by manual inefficiencies, limited transparency, and continuing fiscal deficits. In addition, petroleum revenue targets were exceeded in 2024; however, the built-in volatility of global oil prices and ongoing production constraints make future budget planning more difficult. Collectively, these problems generate significant revenue shortfalls, thereby weakening fiscal sustainability and the financing of public services (Sowande, 2024). All shortcomings in the public sector must be carefully addressed to close off the pathways through which corruption can spread (Isgogo & Abdullahi, 2024). This study evaluated the effects of petroleum revenue on Nigeria's public budget deficits.

Conceptual Review

A budget is a strategic financial framework outlining projected income and spending (CBN, 2017). It captures how effectively a government meets its fiscal objectives, such as revenue targets and debt sustainability. Nigeria encounters difficulties including inadequate allocation of resources and corruption, even as better transparency and accountability could support sustainable development (Osadola et al., 2023).

A public budget deficit was defined as a fiscal condition where a government's total expenditure exceeded its generated revenue over a specific fiscal period, excluding borrowing (Musgrave & Musgrave, 1989). It reflected a shortfall in financial resources that required the state to bridge the gap through public debt accumulation, currency emission, or asset drawdown (Stiglitz & Rosengard, 2015). Budget balances (performance) refer to the extent to which a public organization attains its financial goals by implementing its fiscal plan. This concept

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

serves as a vital indicator of economic governance, embodying the efficiency, effectiveness, and accountability that guide the management of public resources (Osadume, 2020). Budget performance, also called fiscal performance, describes the extent to which a government's fiscal policies achieve their intended outcomes (Uwaleke et al., 2024).

Contemporary public financial reporting, under the IPSAS 24 framework, requires comparing actual figures with budgeted amounts to improve both allocation and implementation (Ibrahim et al., 2021; Dominic & Ubong, 2018). Although performance is frequently measured through indicators such as GDP growth or capital expenditure, these measures can fail to capture fiscal discipline (Akano & Salawu, 2024; Okoye et al., 2021). Accordingly, this study uses the budget balance-to-GDP ratio, a widely accepted measure of fiscal soundness and adherence to the Fiscal Responsibility Act (A. Arif & U. Arif, 2023; Ehizuelen & Bassey, 2025; Vasilev, 2023).

The Petroleum Industry Act (PIA) 2021 defines petroleum as hydrocarbons, including crude oil and natural gas, while excluding bitumen (Section 318). In addition to petroleum profit tax (PPT), hydrocarbon tax (HT), and royalty, petroleum revenue comprises a range of income streams, including crude oil export and domestic sales. These also include signature bonuses, rents, and dividends arising from NNPC Limited's equity interests (Nyemachi & Dike, 2022; Ekiran, 2024). Notably, crude oil exports and domestic sales continue to be Nigeria's largest revenue sources, financing more than 70% of federal operations (Dominic, 2018; Ekiran, 2024). Although prior studies often concentrate narrowly on oil revenue (Abiodun and Emmanuel, 2020; Rotimi et al., 2021; Maikano, 2022), this research applies a comprehensive petroleum revenue index that incorporates crude oil export, domestic sales, and other non-tax oil revenue, such as signature bonuses and rents, to reflect the sector's overall fiscal impact (Nyemachi & Dike, 2022).

Empirical Review

Nigeria's budget performance is characterized by a duality of structural potential and persistent gaps, often falling below international credibility benchmarks (Osadola et al., 2023; Nwaorgu & Alozie, 2017). Sub-Saharan trends reflect deteriorating fiscal balances and an increasing reliance on high-cost borrowing (Emenike & Edirin, 2017). Sule and Mulyanto (2024) used a survey approach to highlight persistent budget underperformance exacerbated by oil theft and debt. Utilizing multiple regression (1981–2016), Okoye et al. (2021) found significant links between oil revenue, government expenditure, and GDP. Conversely, Babatayo and Audu (2023) employed an ex-post facto design (2005–2018), discovering that illicit financial flows negatively impacted oil revenue but positively affected non-oil sectors. Analyzing 2000–2019 data via ordinary least square regression, Maikano (2022) identified significant positive relationships between total revenue components and GDP. Ebimobowei (2022) utilized ex-post facto methods and multiple regression, finding that while petroleum profit taxes positively influenced growth, crude oil exports and domestic sales exhibited significant negative or insignificant relationship.

Empirical research across countries has shown that volatility in petroleum revenues directly worsened public budget deficits in economies that depend on natural resources (El-Anshasy et al., 2017; Wijnbergen & Budina, 2011). Global cross-sectional studies also confirmed that unhedged commodity price shocks led to pro-cyclical public spending during expansionary periods, which then quickly evolved into severe structural budget deficits when markets declined (Goes, 2022). Accordingly, international evidence indicates that, in the absence of strong counter-cyclical buffers, fluctuations in external petroleum revenues significantly undermine long-term fiscal sustainability.

Methodological variations significantly influence findings. Ebieri (2022) applied the ARDL Bounds test (1986–2018), revealing that while aggregate revenue substantially impacts performance, individual oil and non-oil revenues often show insignificant long-term effects. This aligns with Rotimi et al. (2021), whose regression results indicated that non-oil revenue promotes growth while oil revenue hinders it. Collectively, these studies emphasize the need for diversification and robust fiscal reforms to mitigate oil-dependency risks and enhance budgetary endurance.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

Theoretical Review

Resource Curse Theory

Resource Curse Theory, first coined by Richard Auty in 1993, explains the paradox that countries endowed with abundant natural resources, particularly non-renewable resources such as oil which often record slower economic growth and less favorable development outcomes than countries with limited resources. The theory draws attention to the ways in which resource wealth can produce economic distortions, governance difficulties, and institutional deficiencies, thereby weakening sustainable development (Auty, 1993). In Nigeria, the relevance of Resource Curse Theory is especially strong because the country depends heavily on petroleum revenue, which forms a substantial share of government income and export earnings. Despite its significant oil wealth, Nigeria has continued to confront economic challenges including poverty, corruption, political instability, and weak budget balances (Chairul et al., 2025; Idemudia, 2014).

The theory accounts for Nigeria's fiscal and economic challenges by highlighting the way petroleum income fosters rent-seeking, undermines institutional strength, and generates macroeconomic instability—factors that obstruct effective public financial management and the execution of budgets (Ologunla et al., 2014). Resource Curse Theory also offers a vital framework for examining how Nigeria's budget outcomes are shaped by petroleum revenue, stressing the importance of governance arrangements in converting resource wealth into sustainable fiscal and economic results.

Rentier State Theory

Rentier State Theory (RST), introduced by Hossein Mahdavy (1970) and later developed by Hazem Beblawi and Giacomo Luciani (1987), argued that states whose primary income comes from external resource rents function as allocation states, thereby breaking the conventional tax-accountability link. Subsequent scholarship applied RST to account for fiscal instability in petrostates such as Nigeria, showing how heavy dependence on volatile oil revenues encouraged institutional rent-seeking and increased baseline public expenditure during boom periods (Aliyu, 2016; Chenge & Oshinfowokan, 2023). Since state institutions largely circumvented domestic tax collection, fiscal arrangements failed to develop revenue diversification capable of cushioning external shocks (Ouche, 2021). As a result, global oil price declines led to enduring public budget deficits, because structural spending inflexibilities prevented reductions in fiscal outlays.

GAPS IN LITERATURE

A large body of empirical research has generated mixed findings. For example, Muhammad (2025) and Maikano (2022) observe a positive relationship between petroleum revenue and growth, whereas Ebimobowei (2022) and Ebieri (2022) report negative or insignificant long-run effects. Regression analyses (Okoye et al., 2021) and ex-post facto designs (Babatayo & Audu, 2023; Ebimobowei, 2022) indicate that the effects of oil and non-oil revenues on growth are inconsistent, yielding conflicting conclusions that stem from methodological differences. This study addressed the research gap by using an ARDL model to assess the long-run and short-run effects of petroleum revenue on budget performance, with the aim of strengthening fiscal accountability and management in Nigeria.

METHODOLOGY

This study used a quantitative longitudinal research design (Craig et al., 2020; Muhammad, 2025) to examine Nigeria's fiscal data spanning 1981 to 2024. Consistent with the approaches of Okegbe and Osisioma (2019) and Oladejo (2024), the study population was fully covered without employing sampling methods. Secondary data obtained from the Central Bank of Nigeria statistical bulletins, along with information from the Organization of Petroleum Exporting Countries (OPEC), supported both descriptive and inferential statistical analyses. The research therefore spanned 44 years (1981 to 2024). Using EViews 12, the Autoregressive Distributed Lag (ARDL) framework estimated both short-run and long-run relationships under conditions of mixed-order stationarity (Kolawole, 2023; Kripfganz & Schneider, 2023), while Principal Component Analysis was applied

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

to construct the petroleum revenue index, thereby strengthening the econometric assessment of Nigeria's fiscal performance.

Table 1.1

Summary of Variables, Acronyms, Measurements, and Sources

Variable	Symbol	Description & Measurement	Sourced
Budget	BD	Measured as overall budget balance (deficit) expressed as a percentage of Gross Domestic Product (GDP) over time.	Ehizuelen Deficit Bassy (2025)
Petroleum Revenue	PR	Measured as absolute value of annual petroleum revenue for the period.	Ebimobowei (2022)
Global Oil Price	GOP	Measured as log of oil price (OPEC Reference Basket) for the period.	Muhammad (2025)
Government Expenditure	GE	Measured as log of government expenditure as a percentage of GDP in Nigeria for the period.	Gombe et a

Source: Author's Compilation, 2026

Model Specifications

The study used the ARDL multiple regression model to investigate the association between petroleum revenue and public budget deficits. ARDL enables valid estimation regardless of a mixed order of integration up to I(1) (Umaru et al., 2021) and also supports the assessment of temporal effects through a current analytical framework (Aboudi et al., 2023).

The generalized ARDL (p, q) model is specified as:

$$\mathbf{Y}_t = g_{0i} + \sum_{i=1}^{p} d_i \, \mathbf{Y}_{t-i} + \sum_{i=1}^{q} b'_i \mathbf{X}_{t-i} + \mathbf{e}_t \quad \text{..... (1)}$$

Where Y'_t is a vector and the variable in (X'_t) are allowed to be purely I(0) or I(1) or cointegrated; d and b are the coefficients; γ is the constant; i =1..k; p, q are optimal lag orders; ε_t is a vector of the error terms – unobserved zero mean white noise vector process (serial uncorrelated or independent).

Model: The effect of petroleum revenue on public budget deficits in Nigeria.

$$BD_t = \beta_0 + \beta_1 PRI_t + \beta_2 lnGOP_t + \beta_3 lnInGE_t + \varepsilon_t \text{ ----------(2)}$$

Where:

BD = Public Budget deficit proxied as Budget balances (% GDP)

β_0 = The constant term represents the expected value of the budget deficit when all independent variables are zero.

PRI = Petroleum revenue index

lnGOP = Natural log of global oil price.

lnGE = Natural log of government expenditure growth (%GDP)

$\beta_{1-3,}$ = The coefficients of direct relationship that represent the impact of each petroleum revenue and control variable on the budget balances.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

ε_t = Error term.

The ARDL model is specified as follows:

$\Delta BD_t = \beta_0 + \sum_{t=1}^{p} \phi i \, \Delta BD_{t-i} + \sum_{t=1}^{q} \alpha_1 \Delta PRI_{t-i} + \sum_{t=1}^{q} \alpha_2 \Delta lnGOP_{t-i} + \sum_{t=1}^{q} \alpha_3 \Delta lnGE_{t-i} + \beta_1 BD_{t-1} + \beta_2 PRI_{t-1} + \beta_3 lnGOP_{t-1} + \beta_4 lnGE_{t-1} + \varepsilon_t$ ----------(3)

Cointegration was established, therefore, the Error Correction Model (ECM) model for BD_t was estimated as:

$\Delta BD_t = \beta_0 + \sum_{t=1}^{p} \phi_1 \Delta BD_{t-i} + \sum_{t=1}^{q} \alpha_1 \Delta PRI_{t-i} + \sum_{t=1}^{q} \alpha_2 \Delta lnGOP_{t-I} + \sum_{t=1}^{q} \alpha_3 \Delta lnGE_{t-I} + lECT_{t-1} + \varepsilon_t$ ---------- (4)

Where:

p = lag is the lag length associated with the dependent variable

q = lags are the lags length associated with the exogenous variables

t=1 = are the optimal lag orders.

t-1 = are the lag values.

ϕ, α = short term dynamics. Captures the shock and instability of the oil market.

β = long term dynamics. Captures the structural dependency of Nigeria on oil.

p = the maximum number of lags for independent variable in the study. It represents fiscal inertia. The parameter p tells us how many previous periods of Budget Deficit (BD_{t-1}, $BD_{t-2,}$ …) affect the current budget deficit.

q = The lag of the independent and control variables (PRI, GOP and GE). It represents the transmission delay (or time lag). The parameter q tells us how many previous periods of the petroleum revenue, global oil price, and expenditure growth affect the current budget. When the global oil price (lnGOP) drops today, the Nigerian budget might not feel the full impact immediately. There might be a delay due to existing oil contracts, foreign reserve buffers and administrative delays in revenue collection. The lag length for p, q, may not necessarily be the same.

ε_t = Error term.

Δ = is the difference operator (compute the difference between consecutive observations). Useful to transform non-stationary data into stationary data. Long run models do not have a difference operator, only the short run model.

λ = $(1 - \sum_{i=1}^{p} d_i)$, speed of adjustment (speed limit of the recovery) parameter back to equilibrium, with a negative sign and statistically significant. Tells us how resilient the Nigerian fiscal system is in returning to normal after a crisis.

ECT_{t-1} = $(BD_{t-I} - \theta X_t)$, the error correction term which is the extracted residuals from the regressions of the long-run equation. This is the most critical part

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

of the model. It represents the gap or error from the previous period. The ECT calculates how much of that gap needs to be closed

$\theta = \frac{\sum_{i=0}^{q} b_i}{a}$, is the long-run parameters

RESULTS AND DISCUSSIONS

Descriptive Statistics

Raw data was used for descriptive statistics to ensure precision, support the identification of outliers, and provide a robust basis for econometric modeling (Asuquo, 2021).

Descriptive statistics in table 1.2 indicated a mean budget balance (BD) of 2.71%, which remained within the 3% Fiscal Responsibility Act threshold despite non-compliant spikes reaching 8.57%. BP has an almost normal distribution, characterized by positive skewness and a leptokurtic kurtosis (3.7576).

Petroleum revenue (PR) and volatile global oil prices (GOP) exhibit strong positive skewness, which contributes to erratic government expenditure (GE) (mean: 8.3114, kurtosis: 6.1894).

Table 1.2

Descriptive Statistics

Variable	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque - Bera	Probability	Obs.
BD	2.7098	2.6136	8.5696	0.0322	1.8733	0.7844	3.7576	5.5646	0.0618	44
PR	1366.5	1067.4	4902.7	2.2400	1354.8	0.6829	2.3870	4.1095	0.1281	44
GOP	45.804	35.310	109.45	12.280	30.255	0.7514	2.2706	5.1161	0.0774	44
GE	8.3114	8.0117	17.286	5.0893	2.4816	1.5935	6.1894	37.273	0.0000	44

Source: Researcher Computation Using Eviews12 Output, 2026.

Principal Component Analysis

Principal component analysis (PCA) was used to develop a dependable petroleum revenue composite index, thereby reducing multicollinearity and addressing discrepancies among proxies (Adedokun & Ukafor, 2024; Otekunrin et al., 2023).

Through PCA, diverse revenue streams were converted into orthogonal components, and the first two factors together accounted for more than 90% of the total variance. Component 1 (crude oil and gas exports) captures the largest portion of the variance, whereas Component 2 (domestic sales) contributes the next most, followed by the third component (other non-tax oil revenues).

The constructed index yields a more trustworthy measure for fiscal analysis by reflecting the maximum shared variance across Nigeria's oil revenues (Ramesh et al., 2025; Ebimobowei, 2022). This dimensionality reduction offers a streamlined representation of the principal determinants of Nigeria's fiscal stance.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

Table 1.3

Principal Component Analysis of Petroleum Revenue Components

Component	Eigenvalues	Difference	Proportion	Cumulative Value	Cumulative Proportion
Included Observations	44				
COGE	1.675785	0.637559	0.5586	1.675785	0.5586
DSCOG	1.038225	0.752235	0.3461	2.714010	0.9047
ONTOR	0.285990	----------	0.0953	3.000000	1.0000

Source: Researcher Computation Using Eviews12 Output, 2026.

Correlation Analysis

The pairwise correlation matrix was used as a diagnostic instrument to detect multicollinearity and assess how variables interact (Kyriazos & Poga, 2023). The findings shown in table 1.4 indicate that petroleum revenue (PR) is significantly and negatively correlated with budget deficit (BD) (-0.390), implying that oil windfalls commonly aggravate fiscal shortfalls when debt servicing is given priority (Azu & Agbobu, 2023). By contrast, government expenditure (lnGE) shows a positive relationship with BD (0.400), which lends support to the "spend-and-revenue" hypothesis that higher expenditures expand deficits (Kaka, 2020). Importantly, the matrix also verifies that there are no significant multicollinearity concerns, thereby safeguarding the regression model's predictive validity.

Table 1.4

Correlation Analysis of Petroleum Revenue and Public Budget Deficits in Nigeria

Variable	BD	PRI	lnGOP	lnGE	
BD	1.000				
PRI	-0.390	1.000			
lnGOP	-0.260	0.814	1.000		
lnGE	0.400	-0.460	-0.640	1.000	

Source: Researcher Computation Using Eviews12 Output, 2026.

Pre-test Analysis of the Data

Stationarity Test

Unit root tests were performed using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches under both intercept and trend specifications to determine variable stationarity over the period from 1981 to 2024. The findings indicated a mixed integration order: budget balances (BD) was stationary at level, I(0), while

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

petroleum revenue, global oil prices, and government expenditure became stationary after taking first differences, I(1). The results from the PP test were consistent with the ADF outcomes. Since the dataset included both I(0) and I(1) variables, the Autoregressive Distributed Lag (ARDL) bounds testing procedure was used, because it can accommodate mixed orders of integration without requiring all variables to be integrated to the same order.

Table 1.5

Stationarity test using Augmented Dickey-Fuller (ADF) and Philip Perron (PP)Unit Root Test

Augmented Dickey-Fuller (ADF)						
	Level			First Difference		
Variables	t-statistic	Critical Value	I(d)	t-statistic	Critical Value	I(d)
BP	-3.285[a]	-2.931[**]	I(0)	----------	----------	--------
PRI	--------	----------	--------	-6.681[b]	-4.198[***]	I(1)
lnGOP	--------	----------	--------	-5.633[b]	-4.198[***]	I(1)
lnGE	--------	----------	--------	-9.375[b]	-4.192[***]	I(1)
Philip Perron (PP)						
BP	-3.273[a]	-2.931[**]	I(0)	----------	----------	------
PRI	--------	----------	-------	-8.216[b]	-4.192[***]	I(1)
lnGOP	--------	----------	-------	-6.313[b]	-4.192[***]	I(1)
lnGE	--------	----------	-------	-9.367[b]	-4.192[***]	I(1)

Note: The [a] indicates constant without deterministic trend; [b] is the model with constant and deterministic trend as exogenous lags are selected based on Schwarz info criteria. *, **, *** imply that the series is stationary at 10%, 5%, and 1% respectively. ADF and PP denote Augmented Dickey-Fuller and Phillip-Perron Unit Root tests. Source: Researcher Computation Using Eviews12 Output, 2026.

Optimal Lag Length Selection

An unrestricted Vector Autoregression (VAR) framework was used to evaluate optimal lag structures using standard information criteria, assuming no prior cointegration. Lag inclusion was essential to address serial correlation and establish an accurate functional representation of the equation. Based on the Akaike Information Criterion (AIC), which identified the lowest values, an optimal lag length of 1(referred to appendix 1) was selected through an automatic selection procedure. This approach penalized over-parameterization while ensuring accurate goodness-of-fit, statistical consistency, and econometric robustness for the estimated models.

ARDL Bounds Test

The ARDL bounds testing methodology (Pesaran, Shin and Smith, 2001) assesses whether a long-run relationship (cointegration) exists among the variables (Oladipupo, 2023). Cointegration implies that, although the variables may deviate in the short term, they return and align with a long-run equilibrium over time.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

Table 1.6

ARDL Bounds Cointegration Test Results

	Models				
Model	F-Stat.	Lower Bound I(0) at 5%	Upper Bound I(1) at 5%	Cointegration	Remark
1	4.71	3.23**	4.35**	Yes	ECM

Note: *, ** and *** imply cointegration at 10%, 5% and 1* level of significance, respectively. Researcher Computation Using Eviews12 Output, 2026.

The co-integration bounds test results for the model (Table 1.6) indicate that the reported statistical values are higher than the I(1) critical bound at the 5% level of significance. This finding validates the presence of a long-run relationship among the variables. Accordingly, the study advances to examine both short-run dynamics and long-run relationships by employing the Autoregressive Distributed Lag (ARDL) framework and the Error Correction Model (ECM).

Regression Results

This section presents the ARDL analyses of the variables used in the regression analyses.

Effect of Petroleum Revenue on Public Budget Deficit in Nigeria

The long-run ARDL findings (table 1.7) indicate that petroleum revenue significantly undermines budget balances (coefficient: -1.763), thereby supporting the "resource curse" hypothesis in Nigeria (Chairul et al., 2025; Usman et al., 2024). By contrast, global oil prices and government expenditure growth are significantly and positively associated with fiscal gaps, since higher spending is linked to ongoing deficits (Umaru et al., 2021).

Short-run dynamics point to a substantial error-correction component (-0.427), reflecting a 42.7% yearly reversion toward equilibrium (Bawa et al., 2025). The estimated model is statistically reliable, yielding an Adjusted R-squared of 0.657 and an F-statistic of 12.502. Diagnostic procedures (Durbin-Watson, LM, ARCH, and Ramsey RESET) support the lack of serial correlation, heteroscedasticity, or model misspecification. Accordingly, the null hypothesis is rejected, confirming that petroleum revenue has a significant effect on Nigeria's budget deficits.

Table 1.7

Regression Analysis: ARDL long run and short run results for model 1: BD=F(PRI, lnGOP, lnGE) – (1,1,1,1)

Estimated ARDL Long Run Results					
Variable	Coefficient (β)	Std. Error	t-Statistics	p-value	VIF
PRI	-1.763	0.642	-2.746	0.009	NA
lnGOP	4.812	1.645	2.925	0.006	NA
lnGE	7.680	2.264	2.778	0.008	NA
Estimated ARDL Short Run Results					

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VII, July 2026

Variable	Coefficient (β)	Std. Error	t-Statistics	p-Value	VIF
Constant	-13.041	4.170	-3.126	0.003	NA
BD(-1)*	-0.427	0.116	-3.670	0.000	1.64
PRI(-1)	-0.754	0.311	-2.425	0.020	5.16
lnGOP(-1)	2.059	0.674	3.054	0.004	9.23
lnGE(-1)	3.286	1.092	3.008	0.004	2.80
D(PRI)	0.152	0.293	0.519	0.606	5.24
D((lnGOP)	-1.400	0.772	-1.812	0.078	9.88
D(lnGE)	5.620	1.023	5.492	0.000	2.70
CointEq(-1)	-0.427829	0.094	-4.523	0.000	NA
Mean VIF					5.83

R-squared	0.714
Adjusted R-squared	0.657
Durbin Watson Stat	1.981
F-Statistic	12.50
Prob(F-statistic)	0.000

Diagnostics tests

Tests:	F-Statistics	P-value	Decision (H_0)
B-G LM test	0.241	0.626	Accept
B.P.G Test	1.218	0.319	Accept
ARCH test	1.937	0.171	Accept
J-B test	0.198	0.905	Accept
RESET test	1.524	0.225	Accept
CUSUM	----------	----------	Stable
CUSUMSQ	----------	----------	Stable

Note: The test includes only constant and is at 5% level of significance. * p-value incompatible with t-bounds distribution () ** variables interpret as Z = Z(-1) + D(Z) – this indicates a dynamic regressor with an optimal lag of zero, as such Eviews does not include lags and difference of such variables but estimates them contemporaneously. Source: Researcher Computation Using Eviews12 Output, 2026.

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SUMMARY OF FINDINGS

The findings showed that petroleum revenue had substantial negative effects on budget balances , thereby confirming a "resource curse," in which dependence on oil weakens long-term fiscal stability. In contrast, global oil prices and the growth of government expenditure produced significant positive effects. In the short run, the dynamics aligned with these results: moderately significant error-correction terms (-0.427) indicated stable long-run equilibria and rapid adjustment following fiscal shocks.

CONCLUSION

The study concludes that petroleum revenue substantially weakened budget balances in Nigeria over the long term, thereby validating the existence of the resource curse. In contrast, rising global oil prices and faster growth in government expenditure widened fiscal deficits. While short-run adjustments exhibited swift 42.7% annual convergence to equilibrium, revenue volatility continued to undermine fiscal planning. Diagnostic tests verified the model's statistical robustness and stability, ultimately showing that dependence on petroleum revenue created a core constraint on national budget execution and long-term fiscal stability.

Recommendations

The study recommended that policymakers reduce Nigeria's reliance on crude oil by broadening the national revenue base, specifically through enhancing tax collection and advancing non-oil sectors. It further instructed government officials to enforce rigorous expenditure controls and to create a strong fiscal buffer capable of absorbing global oil price shocks. In addition, authorities were urged to delink the growth of public spending from volatile petroleum revenues in order to support more consistent budget implementation, improve the stability of fiscal planning, and lessen the negative effects of the resource curse on long-term economic development.

Contributions to Knowledge

The study strengthened the body of empirical research by establishing that the resource curse exists within Nigeria's fiscal structure using ARDL bounds testing. It measured the exact long-run destabilizing effect of petroleum revenue on public budget deficits, controlling for expenditure growth and global oil price movements. In addition, the results identified a key speed of adjustment process, showing that fiscal deficits took almost two and a half years to correct through natural adjustment.

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