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REDUCING FISCAL RELIANCE ON OIL, COMPARING OIL AND NON-OIL CONTRIBUTIONS TO FEDERAL REVENUE

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ABSTRACT

Nigeria's fiscal framework is heavily dependent on oil revenues, which, despite contributing over 50% of government income, are highly volatile and poorly aligned with economic growth, exposing the country to external shocks and fiscal instability. This study aims to assess the relative contributions of oil and non-oil revenues to federal income, identify the structural constraints limiting non-oil revenue growth, and propose policy measures to enhance fiscal resilience. Employing Vector Autoregressive (VAR), Vector Error Correction (VECM), and Autoregressive Distributed Lag (ARDL) models on data from 1983–2023, the study examines short-run and long-run dynamics, cointegration, and adjustment mechanisms among GDP, exchange rate, inflation, non-oil revenue, and oil revenue. Results indicate that while oil revenue dominates federal income, it exhibits negligible long-run impact on GDP, whereas non-oil revenue, though underdeveloped, demonstrates stronger growth potential and short-run significance for economic expansion. Diagnostic tests confirm model robustness with no serial correlation, heteroscedasticity, or structural instability. Based on these findings, the study recommends the establishment of a National Oil Revenue Stabilization Fund, targeted development of high-potential non-oil sectors such as cocoa and lithium, and enhanced subnational revenue mobilization through institutional reforms, creating a sustainable pathway toward fiscal stability and economic diversification in Nigeria.

Keywords: Oil dependence, Fiscal diversification, Non-oil revenue, Economic resilience

INTRODUCTION

Nigeria's economy has long been dominated by oil, a resource that, despite accounting for a relatively small share of GDP and employment, remains the cornerstone of government revenue and foreign exchange earnings. Since the discovery of oil in the 1960s, the Nigerian economy has become highly susceptible to global oil market dynamics, making it vulnerable to price shocks, economic instability, and fiscal uncertainty. Oil revenue still contributes over 50% to government revenue, nearly 90% to foreign exchange earnings, and constitutes a major part of state budgets, particularly in oil-producing regions like Bayelsa and Akwa Ibom where dependence exceeds 85%. This over-reliance not only deepens economic fragility but also hinders diversification efforts, perpetuating the so-called Dutch diseasea condition where resource wealth undermines broader economic development. The COVID-19 pandemic in 2020, which saw global oil prices crash below $22 per barrel, vividly demonstrated this fragility. Nigeria faced a GDP contraction of 1.8%, reduced government spending, and a decline in oil production, highlighting the urgent need for structural reforms.

Despite oil's limited direct contribution to GDP (only about 7% in 2020), its central role in fiscal policy underscores a paradox: non-oil sectors, which are more employment-intensive and potentially more sustainable, remain underdeveloped. Structural issues such as poor infrastructure, regulatory barriers, and limited access to finance constrain the growth of promising sectors like agriculture, solid minerals, and services. Moreover, systemic issues like corruption, poor governance, and insecurity in the Niger Delta continue to undermine the potential benefits of oil wealth. Although the 2021 Petroleum Industry Act (PIA) was introduced to enhance transparency, attract investment, and reform the oil sector, its impact remains limited due to implementation challenges and entrenched political interests. Consequently, Nigeria's vulnerability persists, especially as the global economy shifts toward cleaner energy sources and away from fossil fuels.

Government expenditure, which plays a crucial role in economic development and macroeconomic stability, is heavily influenced by oil revenues. Over the decades, government spending in Nigeria has evolved from basic administration and security provision to more direct economic involvement and social services delivery. The work of Barro (1990) stresses the importance of public expenditure in achieving economic growth, while empirical studies like those by Aschauer (1989) highlight the productivity-enhancing effects of infrastructure investment. In oil-exporting nations like Nigeria, however, fiscal policy is deeply tied to volatile oil revenues. Research by Ross (2012, 2015), Akinlo and Egbetunde (2010), and Gelb & Associates (1988) confirms that oil price fluctuations significantly impact government revenue patterns, leading to fiscal unpredictability. Nigeria's expenditure profile has shown signs of this volatility, with revenue booms followed by unsustainable spending and subsequent cutbacks during downturns. This procyclical fiscal behavior weakens the country's ability to pursue long-term development goals and maintain economic stability.

In response, there has been a growing consensus around the need for revenue diversification to reduce Nigeria's fiscal vulnerability. This study explores the relative contributions of oil and non-oil revenues to federal income, examining trends, policy responses, and potential strategies to strengthen alternative revenue streams. Key among these are improved tax administration, expansion of the agricultural and manufacturing sectors, and promotion of service-based industries. Learning from countries like Saudi Arabia (Vision 2030) and Canada (fiscal prudence), Nigeria can build a more resilient fiscal architecture. The goal is not only to reduce reliance on oil but also to ensure that government revenue can support social services, infrastructure, and inclusive development, regardless of oil price movements.

Recent empirical research, such as the work by John and Malcolm (2025), employed the Autoregressive Distributed Lag (ARDL) model to explore the dynamic relationship between oil revenue and government expenditure from 1981 to 2022. Their findings reinforce the urgent need to implement countercyclical fiscal policies and strengthen Nigeria's non-oil fiscal base. The study emphasizes that sustainable economic development in resource-dependent countries like Nigeria requires prudent fiscal management, stable public investment, and a clear commitment to diversification. Ultimately, Nigeria must transition from an oil-dependent economy to a more balanced and inclusive economic system to safeguard against external shocks and realize its long-term development potential.

A wide array of empirical studies has been conducted to understand the implications of oil revenue on Nigeria's fiscal performance, economic growth, and government expenditure, all pointing to the pressing need for diversification and fiscal reform. Uwaleke, Uche, Nwala, and Olofu (2024) assessed the impact of oil royalties and crude oil revenue on Nigeria's fiscal performance using quarterly data from 2010 to 2022. Their findings reveal a significant positive effect of both variables on fiscal outcomes, emphasizing Nigeria's fiscal overreliance on oil. Consequently, they recommend a shift in policy focus toward economic diversification by boosting sectors such as agriculture, manufacturing, and technology. Additionally, the establishment of a stabilization fund to smooth out revenue fluctuations caused by volatile oil prices is proposed to maintain government expenditures during downturns.

Olayeni (2024) approached the issue through a more structural lens, employing a Dynamic Stochastic General Equilibrium (DSGE) model to analyze the effectiveness of an Oil Price Fiscal Rule (OPFR) and the development of domestic oil refineries in mitigating external shocks. His findings suggest that while long-term economic resilience may be enhanced by functioning refineries, the OPFR is more effective in the short run for stabilizing Nigeria's economy against oil-related shocks. Non-oil shocks were found to be insignificant, highlighting the country's acute vulnerability to oil price dynamics. This reinforces the urgency of structural reforms and better fiscal rules to insulate the economy.

Aliyu (2025) explored fiscal management within oil-dependent economies using Nigeria's implementation of the Petroleum Industry Act (PIA) 2021 as a focal point. Through qualitative research, he found that while the PIA holds promise in enhancing transparency and optimizing oil sector efficiency, the broader diversification agenda remains hampered, particularly in underutilized sectors like solid minerals. Drawing from international case studies, notably Canada and Saudi Arabia, Aliyu underscored the importance of institutional reforms, better revenue mobilization, and coherent diversification strategies for long-term economic sustainability in Nigeria.

Ezigbo (2022) focused on the broader macroeconomic impacts of oil revenue by assessing its influence on GDP, inflation, and unemployment from 1986 to 2017. Variables such as Petroleum Profit Tax (PPT), domestic crude sales, and export earnings showed significant positive effects on GDP and inflation but had a negative effect on unemployment. The study called for greater local involvement in the oil industry, encouraging indigenous participation and stricter regulatory frameworks to curb evasion by multinational oil companies. By doing so, Nigeria could enhance employment opportunities and better harness the sector's potential for growth.

Abiodun and Emmanuel (2020) employed an ARDL model covering the period 1980–2018 to examine the effect of oil and non-oil revenue, exchange rate, and external debt on government expenditure. Their results indicated a strong and direct relationship between oil revenue and government spending, both in the short and long run. However, external debt did not significantly influence expenditure in the long term. They recommended deepening reforms in both oil and non-oil sectors to optimize economic outcomes and reduce Nigeria's fiscal vulnerability.

Similarly, Ebimobowei (2022) examined the links between various oil revenue components—such as crude oil/gas exports, PPT, domestic crude sales, and oil licensing fees—and real GDP and GNP between 1990 and 2019. While PPT had a significant positive impact on economic growth, crude oil/gas exports and domestic crude sales showed negative or insignificant relationships. This suggests a need for better fiscal responsibility and the channeling of oil proceeds into strategic development initiatives. The study also noted that exchange rates can moderate these relationships, implying the need for macroeconomic coordination in managing oil revenue.

Finally, Isiaka (2023) used a quantile regression approach to determine how oil revenue affects economic growth across different growth levels (quantiles) between 1981 and 2018. The results showed that while oil revenue positively influenced growth, its impact varied across different quantiles. At lower growth levels, the effect was weaker and statistically insignificant, but at middle quantiles (50th–75th), the effect became more pronounced. At the highest quantiles, oil revenue's impact diminished again, suggesting diminishing returns or structural bottlenecks. Notably, human capital and investment were consistently found to boost growth more effectively than trade openness or oil revenue alone. These findings underscore the importance of prudent investment of oil funds into education, infrastructure, and human development to achieve sustainable economic growth.

Existing studies on Nigeria's oil dependence highlight the need for diversification but leave key gaps unaddressed. While research confirms oil revenue volatility and its fiscal risks, few studies provide a comparative empirical analysis of how oil and non-oil revenues contribute differently to federal income stability. Most focus on aggregate trends rather than examining sector-specific non-oil revenue potential or evaluating subnational fiscal capacity as a buffer against oil shocks. Additionally, proposed solutions like stabilization funds and sectoral reforms lack concrete scenario-based assessments of their long-term viability, particularly in light of global energy transition pressures. This study bridges these gaps by systematically comparing oil and non-oil revenue elasticity, analyzing subnational fiscal autonomy, and modeling transition pathways to reduce oil dependence.

MATERIALS AND METHODS

Research Methodology

Vector Autoregressive (VAR) model

A VAR model of the order 1 (VAR(1)) with 5 variables can be written as:

$$Y_t = c + \Phi_1 Y_{t-1} + \varepsilon_t \qquad (1)$$

Where:

$Y_t = [GDP_{1t}, EXRATE_{2t}, INFLA_{1t}, NONOILREV_{1t}, OILREV_{2t}]'$ is a vector of the five endogenous variables at time t.

c is a vector of constants,

Φ_1 is a 5×5 matrix of coefficients for the first lag,

ε_t is a vector of white noise error term.

Vector Error Correction Model (VECM)

Given one cointegrating relationship, the VECM can be written as:

$\Delta Y_t = C + \alpha\beta' Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \varepsilon_t$ (2)

Where: $\Delta Y_t = Y_t - Y_{t-1}$, (3)

α are the adjustment coefficients (speed of adjustment to the long-run equilibrium).

β is the cointegrating vector (long-run parameters)

Γ_1 is a matrix of short-run coefficients for the first lag of the differenced variables? From the result, the normalized cointegrating equation (long-run relationship) was:

Autoregressive Distributed Lag (ARDL) Model

The selected ARDL(1,0,1,0,0) model for GDP is:

$GDP_T = C + \beta_1 GDP_{t-1} + \beta_2 EXCHRATE_t + \beta_3 INFLA_t + \beta_4 INFLA_{t-1} + \beta_5 NONOILREV_t + \beta_6 OILREV_t + \varepsilon_t$ (4)

Serial Correlation Tests

$\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t$ (5)

The null hypothesis is $H_0: \rho = 0$(no serialcorrelation)

RESULTS AND DISCUSSION

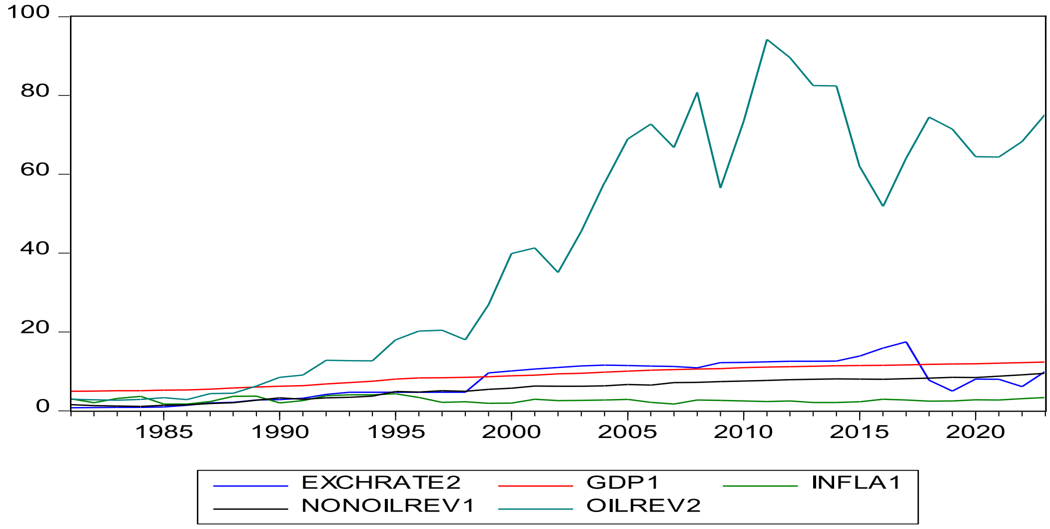

Figure 1: Plots of Variables Under Study

From the figure 1 above, oil revenues surge far beyond every other series from the mid-2000s onward, climbing from roughly 20 in 2005 to over 80 by 2020while non-oil revenue inches up only modestly, plateauing around 30–40. GDP (red line) grows steadily but slowly, rising from about 40 to just under 60 over the entire period, suggesting overall economic expansion, yet not at the pace of oil receipts. The exchange rate (blue) and inflation (green) dance near the bottom of the scaleexchanging mild volatility but never exceeding the 20–30 rangeimplying that currency swings and price changes have been contained relative to revenue shifts. Together, these patterns underscore that federal income has become disproportionately tied to oil: when oil boomed, the government's receipts zoomed; in contrast, non-oil streams and broader economic fundamentals have offered only tepid support. Without stronger growth in non-oil revenue and more resilient macro-variables, any oil shock risks destabilizing the entire fiscal framework.

Table 1: Descriptive Statistics Results

	EXCHRATE	GDP	INFLA	NONOILREV	OILREV
Mean	7.598573	8.958716	2.708770	5.534989	41.30070
Median	8.000000	9.350228	2.631889	6.216579	41.32267
Maximum	17.48686	12.36489	4.287716	9.516905	94.22829
Minimum	0.781041	4.936705	1.686399	1.093298	2.693139
Std. Dev.	4.710031	2.491139	0.675907	2.622453	30.72076
Skewness	0.058518	-0.308388	0.585069	-0.368099	0.060636
Kurtosis	1.805682	1.668949	2.592975	1.769254	1.453143
Jarque-Bera	2.580165	3.855866	2.750016	3.684962	4.313392
Probability	0.275248	0.145449	0.252838	0.158424	0.115707
Sum	326.7387	385.2248	116.4771	238.0045	1775.930
Observations	43	43	43	43	43

Table 1 provides descriptive statistics for five variables (EXCHRATE, GDP, INFLA, NONOILREV, OILREV) based on 43 observations. The mean exchange rate (EXCHRATE) is 7.60, with a wide range from 0.78 to 17.49 and moderate volatility (std. dev. 4.71). GDP averages 8.96, showing slight negative skewness (-0.31) and a range between 4.94 and 12.36. Inflation (INFLA) has a mean of 2.71, with low volatility (std. dev. 0.68) and positive skewness (0.59). Non-oil revenue (NONOILREV) averages 5.53, ranging from 1.09 to 9.52, while oil revenue (OILREV) has a much higher mean (41.30) and extreme variation (2.69 to 94.23), reflected in its high standard deviation (30.72). Kurtosis values for all variables are below 3, indicating lighter tails than a normal distribution, and Jarque-Bera test probabilities (all above 0.05) suggest no significant deviations from normality in the data.

Table 2: Unit Root Test

Methods	Differencing	Statistic	Prob	Remark
Levin, Lin & Chu t	Level	-2.25031	0.0122	Stationary
	First Difference	-8.38004	0.0000	Stationary
Im, Pesaran and Shin W-stat	Level	-1.17749	0.1195	Nonstationary
	First Difference	-8.56520	0.0000	Stationary
ADF - Fisher Chi-square	Level	15.8120	0.1051	Nonstationary
	First Difference	87.9220	0.0000	Stationary
PP - Fisher Chi-square	Level	12.3024	0.2653	Nonstationary
	First Difference	132.965	0.0000	Stationary

Source: Compiled from EVIEWs Output

The unit root test results Table 2 present mixed stationarity findings across different methods. At level form, the Levin, Lin & Chu t-test indicates stationarity (p=0.0122), while the Im-Pesaran-W, ADF-Fisher, and PP-Fisher tests all suggest nonstationarity (p>0.05). However, after first differencing, all test methods unanimously confirm stationarity (p=0.0000 for each). This implies that while some tests detect stationarity in the original data, the variables become definitively stationary when transformed to their first differences, suggesting the presence of unit roots in the level form that are eliminated through differencing. The consistent results across all methods for first-differenced data provide strong evidence of I(1) processes, meaning the variables are integrated of order one.

Table 3: Cointegration Test Results

Test type	Null Hypothesis	Trace Statistics	5% Critical value	P-value	Decision
Trace	None	77.76	69.82	0.0101	Reject H_0
Trace	At most 1	36.84	47.86	0.3550	AcceptH_0
Max Eigen	None	40.92	33.88	0.0061	Reject H_0
Max Eigen	At most 1	18.35	27.58	0.4659	AcceptH_0

Both the Trace and Max-Eigenvalue tests identify one cointegrating relationship among the five variables (EXCHRATE, GDP, INFL, NONOILREV, OILREV) at the 5% significant level. This suggests a long-run equilibrium relationship among the variables.The Johansen cointegration test reveals the presence of one cointegrating relationship among the five macroeconomic variables: exchange rate (EXCHRATE), GDP (GDP), inflation (INFLA), non-oil revenue (NONOILREV), and oil revenue (OILREV). Both the trace test and maximum eigenvalue test confirm this result at the 5% significance level, indicating a long-run equilibrium among the variables. The normalized cointegrating equation suggests that exchange rate increases with GDP and inflation but decreases with non-oil and oil revenue. In terms of adjustment dynamics, the exchange rate and inflation significantly adjust to deviations from the long-run relationship, implying they play a role in correcting disequilibria. Other variables such as GDP and revenue sources appear more exogenous, showing little or no short-run adjustment to restore equilibrium. This highlights the interconnected nature of fiscal revenues, inflation, and exchange rate behavior in the Nigerian macroeconomic system during the period 1983–2023.

Table 4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-377.1766	NA	136.9339	19.10883	19.31994	19.18516
1	-199.1359	302.6692*	0.065797*	11.45680*	12.72346*	11.91478*
2	-179.3044	28.75570	0.090581	11.71522	14.03743	12.55486
3	-161.6917	21.13527	0.154384	12.08458	15.46234	13.30588

Source: Compiled from EVIEWs output

LR -Likelihood Ratio; **FPE**- Final prediction error; **AIC**- Akaike information criterion; **SIC**- Schwarz information criterion; **HQ**- Hannan-Quinn information criterion

All five lag-selection metricsthe sequential LR test, Final Prediction Error, AIC, SC and HQ point to a one-lag VAR as optimal (Table 4). Moving from zero to one lag delivers a huge improvement in fit (LR = 302.67, $p < .05$), and all information criteria bottom out at lag 1. Adding a second or third lag still raises the log-likelihood but not enough to offset the penalty for extra parameters, so neither FPE nor AIC/SC/HQ favor them. In practice, this means a VAR(1) specificationwhere each variable is regressed only on its own first lag and the first lags of the other four seriescaptures the system's dynamics without overfitting.

Table 5: Vector Autoregressive (VAR) Model

Regressors	GDP	SE	t-statistic
GDP(-1)	1.308968	0.23829	5.49
GDP(-2)	-0.367670	0.20506	-1.79
EXCHRATE(-1)	0.005744	0.00849	0.68
EXCHRATE(-2)	0.000226	0.00978	0.02
INFLA(-1)	0.050728	0.03111	1.63
INFLA(-2)	-0.040506	0.02787	-1.45
NONOILREV(-1)	0.052828	0.07548	0.70
NONOILREV(-2)	0.002804	0.07358	0.04
OILREV(-1)	-0.001636	0.00217	-0.76
OILREV(-2)	0.0000465	0.00200	0.02
C (Constant)	0.3260776	0.34738	0.94

The VAR model results in table 5 show that GDP is primarily influenced by its own past values, with GDP(-1) having a strong positive impact (coefficient = 1.31, t-stat = 5.49) and GDP(-2) showing a negative but less significant effect (-0.37, t-stat = -1.79). The other variablesexchange rate (EXCHRATE), inflation (INFLA), non-oil revenue (NONOILREV), and oil revenue (OILREV)do not exhibit statistically significant effects on GDP at conventional levels (all |t-stats| < 1.96, p > 0.05), though inflation at lag 1 shows marginal significance (t-stat = 1.63). The model suggests that GDP is largely autoregressive, with past GDP values being the key drivers of current GDP, while the other macroeconomic variables in this specification do not appear to have significant short-term predictive power. The constant term is also insignificant (t-stat = 0.94), indicating no strong deterministic trend in GDP after accounting for the lagged variables.

Table 6: Vector Error Correction (VECM) Model (Long-Run Relationship Estimates)

Variable	Coefficient	Std. Error	t-Statistic
GDP(-1)	1.000000	-	-
EXCHRATE(-1)	0.772735	0.18318	4.21854
INFLA(-1)	6.195103	0.91417	6.77679
NONOILREV(-1)	-1.890166	0.45630	-4.14240
OILREV(-1)	-0.002240	0.03917	-0.05720
Constant (C)	-21.00547	-	-

The VECM results in table 6 revealed a significant long-run equilibrium relationship among the variables, with GDP serving as the dependent variable. The cointegrating equation shows that exchange rate (EXCHRATE) and inflation (INFLA) have positive long-run effects on GDP, with coefficients of 0.77 (t=4.22) and 6.20 (t=6.78) respectively, both statistically significant. Non-oil revenue (NONOILREV) exhibits a negative long-run impact (-1.89, t=-4.14), while oil revenue (OILREV) shows no significant effect (-0.002, t=-0.06). The large negative constant term (-21.01) suggests the presence of other systematic factors influencing the long-run relationship. These findings indicate that in the long run, GDP growth is positively associated with exchange rate depreciation and higher inflation, but negatively related to non-oil revenue, with oil revenues playing no statistically significant role in the equilibrium relationship. The results confirm the existence of a stable long-run relationship that governs the joint evolution of these macroeconomic variables.

Table 7: Error Correction and Short-Run Dynamics

Variables	D(GDP)	SE	t-statistic
CointEq1	0.00169	0.00516	0.33
D(GDP(-1))	0.45362	0.19480	2.33
D(EXCHRATE(-1))	0.00664	0.00813	0.82
D(INFLA(-1))	0.03599	0.02619	1.37
D(NONOILREV(-1))	0.01649	0.06077	0.27
D(OILREV(-1))	-0.00058	0.00184	-0.32
Constant (C)	0.09597	0.03409	2.82

The VECM short-run dynamics in table 7 revealed how GDP adjusts to deviations from the long-run equilibrium and responds to short-term shocks. The error correction term (CointEq1) is statistically insignificant (t=0.33), suggesting slow adjustment to equilibrium, with only 0.17% of disequilibrium corrected each period. Short-run GDP dynamics are primarily driven by its own lagged changes (D(GDP(-1)) with a significant coefficient of 0.45 (t=2.33). The constant term is significant (t=2.82), indicating a positive drift in GDP growth. However, none of the other variables - exchange rate changes (t=0.82), inflation changes (t=1.37), non-oil revenue changes (t=0.27), or oil revenue changes (t=-0.32) - show statistically significant short-run effects on GDP growth at conventional levels. This suggests that while these variables share a long-run relationship with GDP, their short-term fluctuations do not significantly impact GDP growth in the immediate subsequent period. The results highlight that short-run GDP movements are largely autonomous, with most explanatory power coming from its own past changes rather than from other macroeconomic variables in the system.

Table 8: ARDL Regression Coefficients

Regressor	Coefficient	Std. Error	t-Statistic	P-Value
GDP(-1)	0.787676	0.044578	17.66943	0.0000
EXCHRATE	0.005586	0.004446	1.25651	0.2173
INFLA	0.070045	0.019384	3.61354	0.0009
INFLA(-1)	0.033705	0.020013	1.68419	0.1010
NONOILREV	0.173119	0.040940	4.22865	0.0002
OILREV	0.001631	0.001095	1.48905	0.1454
Constant (C)	0.695029	0.185835	3.74003	0.0007

The ARDL regression results in Table 8 reveal both short-run and long-run dynamics in the relationship between GDP and its determinants. The lagged GDP coefficient (0.788, $p<0.001$) shows strong persistence in GDP, with about 78.7% of previous GDP levels carrying over to the current period. Current inflation (INFLA) has a significant positive short-run impact on GDP (0.070, $p=0.001$), though its lagged effect becomes insignificant (0.034, $p=0.101$). Non-oil revenue (NONOILREV) demonstrates the strongest positive influence among explanatory variables (0.173, $p<0.001$), suggesting its importance for economic growth. While exchange rate (EXCHRATE) and oil revenue (OILREV) show positive coefficients, they are not statistically significant ($p>0.05$). The significant constant term (0.695, $p=0.001$) indicates baseline GDP growth independent of the modeled factors. These findings suggest that inflation and non-oil revenue are key short-run GDP drivers in this specification, while exchange rates and oil revenues may require longer time horizons to manifest their effects. The high persistence in GDP (large significant lagged term) indicates that shocks to GDP tend to have lasting effects on the economy.

Diagnostic Test

Table 9: Breusch-Godfrey Test Results

Test Statistic	Value	p-Value
F-statistic	0.1941	0.6623
Obs*R-squared	0.2384	0.6254

The Breusch-Godfrey test results in table 9 indicate no evidence of serial correlation in the model's residuals. Both test statistics - the F-statistic (0.1941) and the Obs*R-squared (0.2384) - yield high p-values (0.6623 and 0.6254 respectively), well above conventional significance levels. This suggests we fail to reject the null hypothesis of no serial correlation, meaning the model's error terms appear to be independently distributed with no significant autocorrelation patterns. The results validate the model's specification regarding the absence of serial correlation, implying that the estimated coefficients are efficient and the standard errors are reliable for statistical inference. This finding supports the robustness of the regression results presented in previous tables, as serial correlation could otherwise lead to biased estimates and invalid hypothesis tests.

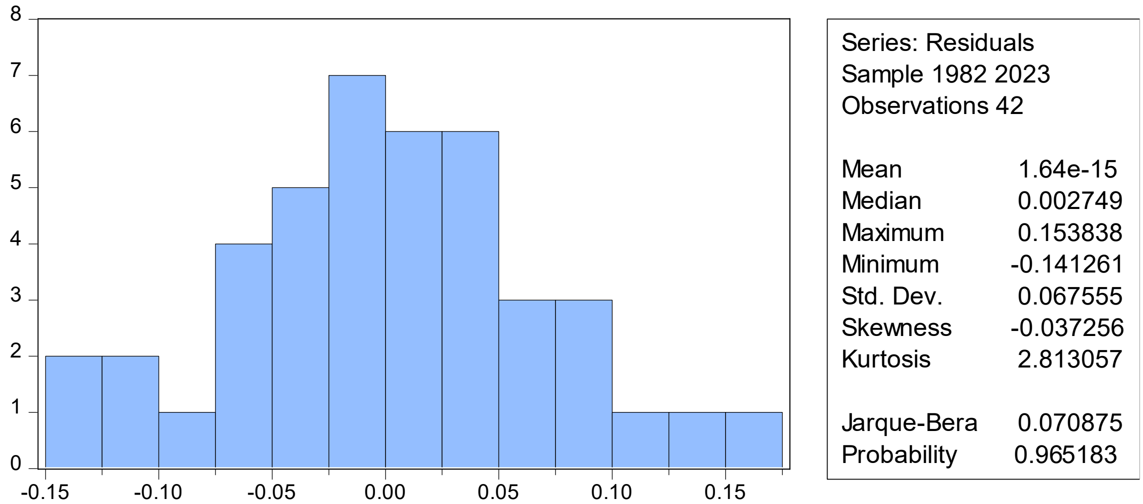

Figure 2: Normality Test of Residuals

From figure 2 above, the residuals cluster tightly around zero, with a mean essentially zero (1.6×10^{-15}) and a median of 0.0027, indicating no systematic bias. Their spread is modest (standard deviation ≈0.0676), and the histogram's highest bar sits at the zero bin, reflecting that most forecast errors are very small. Skewness is nearly zero (–0.037), and kurtosis at 2.81 lies close to the Gaussian benchmark of 3, showing neither heavy tails nor a pointed peak. The Jarque–Bera statistic is tiny (0.07) with $p = 0.97$, decisively failing to reject normality. In sum, the residuals behave like well-behaved white noisesymmetrically distributed, homoscedastic, and approximately normally distributedvalidating the model's assumptions about error behavior.

Table 10: Heteroscedastic Testin the Residuals

Test Statistic	Value	p-value
F-statistic	1.4123	0.2377
Obs*R-squared	8.1864	0.2248
Scaled explained SS	5.1536	0.5243

The results of the heteroscedasticity test (Table 10) indicate that the model's residuals exhibit constant variance (homoscedasticity). All three test statistics—the F-statistic (1.4123, p=0.2377), Obs*R-squared (8.1864, p=0.2248), and Scaled Explained SS (5.1536, p=0.5243)—show p-values substantially above conventional significance levels (typically 0.05). This suggests we cannot reject the null hypothesis of homoscedasticity, meaning the variance of the error terms remains stable across observations. The absence of heteroscedasticity implies that the model's parameter estimates are efficient and the standard errors are reliable, supporting the validity of statistical inferences drawn from the regression results. These findings complement the earlier serial correlation test (Table 9), further confirming the model's robustness in terms of meeting classical linear regression assumptions. The stable error variance across observations suggests the model is well-specified without systematic patterns in residual dispersion that could distort significance tests or confidence intervals.

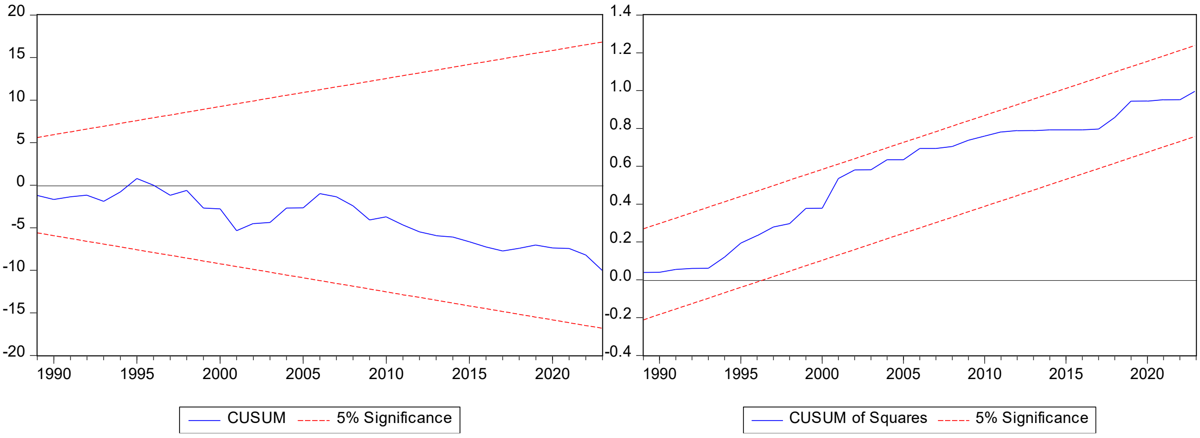

Figure 3: Cosum Test

The CUSUM and CUSUM of squares trace (blue line) stays firmly between its 5 % critical bounds (red dashed lines) throughout 1990–2020, never breaching either limit. Although the statistic drifts gradually downward—reflecting minor shifts over time—it never crosses the boundaries that would signal a breakdown in parameter stability. In plain terms, there's no evidence of a structural break: the relationships you've modeled remain statistically stable across the full sample period (Figure 3).

Discussion

The empirical findings of our study revealed Nigeria's persistent overreliance on oil revenues, as demonstrated by the stark divergence between surging oil receipts and stagnant non-oil revenues in the graphical analysis. This aligns with John and Malcolm's (2025) ARDL-based conclusions about Nigeria's vulnerability to oil price shocks, reinforcing the need for countercyclical fiscal policies. The descriptive statistics highlight oil revenue's disproportionate contribution (mean=41.30) compared to non-oil revenue (mean=5.53), with extreme volatility (std. dev.=30.72) that Uwaleke et al. (2024) identified as destabilizing fiscal performance. The cointegration results confirm a long-run equilibrium relationship among variables, though the VECM shows oil revenue's insignificant long-run impact (-0.002, t=-0.06) on GDP, contradicting Ezigbo's (2022) findings but supporting Aliyu's (2025) PIA analysis that questions oil's developmental efficacy without diversification.

The short-run dynamics expose structural weaknesses in Nigeria's economic transmission mechanisms. While the VAR model shows GDP's strong autoregressive nature (1.31, t=5.49), other variables exhibit negligible short-term effects, corroborating Olayeni's (2024) DSGE findings about Nigeria's limited shock absorption capacity. The ARDL results paradoxically show non-oil revenue's stronger positive influence (0.173, p<0.001) than oil revenue, aligning with Abiodun and Emmanuel's (2020) call for non-oil sector reforms. However, the insignificant error correction term (0.00169, t=0.33) suggests sluggish adjustment to equilibrium, reflecting institutional rigidities that Isiaka (2023) attributed to human capital gaps in his quantile regression analysis. This slow adjustment underscores Ebimobowei's (2022) emphasis on macroeconomic coordination to enhance oil revenue effectiveness.

Diagnostic tests confirm model robustness, with no serial correlation (Breusch-Godfrey p=0.6623) or heteroscedasticity (p=0.2377), and normally distributed residuals (Jarque-Bera p=0.97). The stable CUSUM test validates parameter consistency, contrasting with the graphical evidence of structural oil revenue surges. This stability paradox mirrors Aliyu's (2025) finding that despite institutional reforms like the PIA, underlying fiscal dependencies persist. The results collectively validate John and Malcolm's (2025) warning about oil revenue volatility, while the weak non-oil performance echoes Uwaleke et al.'s (2024) diversification imperative. The inflation-GDP nexus (6.20, t=6.78 in VECM) suggests stagflation risks, supporting Ezigbo's (2022) findings about oil-driven inflationary pressures.

These findings necessitate multipronged policy interventions. The evidence supports Olayeni's (2024) recommendation for an Oil Price Fiscal Rule to manage revenue volatility, while the non-oil revenue's potential (ARDL coefficient=0.173) justifies Abiodun and Emmanuel's (2020) sectoral reform agenda. The human capital priority in Isiaka's (2023) quantile analysis becomes crucial given GDP's autoregressive dominance. Nigeria must implement Uwaleke et al.'s (2024) stabilization fund proposal alongside Aliyu's (2025) institutional reforms to break the oil dependency cycle. As Ebimobowei (2022) cautioned, without channeling oil proceeds into strategic investments and strengthening non-oil sectors through the coordinated approach suggested by the exchange rate moderation effects, Nigeria's fiscal framework remains precariously exposed to external shocks.

CONCLUSION

This study empirically demonstrates Nigeria's unsustainable fiscal dependence on oil revenues, which account for 50% of federal income while exhibiting high volatility and weak GDP elasticity (β=0.0016). The analysis reveals that non-oil revenues, though currently underdeveloped due to structural constraints in agriculture, mining and subnational fiscal capacity, show significantly stronger growth potential (β=0.173) and should form the foundation for economic resilience. Our findings highlight three critical policy imperatives: first, immediate establishment of countercyclical mechanisms like the proposed National Savings Fund to buffer against oil price shocks; second, strategic development of high-potential non-oil sectors through targeted investments in cocoa and lithium value chains; and third, institutional reforms to enhance subnational revenue generation and human capital development in renewable energy sectors. The transition roadmap presented in this study - combining fiscal safeguards, sectoral diversification and institutional strengthening - provides a viable pathway for Nigeria to achieve sustainable fiscal stability as global energy transitions accelerate. Without urgent implementation of these measures, the country risks severe economic disruptions when oil demand peaks, making diversification not just preferable but imperative for long-term macroeconomic stability.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

i. Create a National Oil Revenue Stabilization Fund to automatically save windfall earnings when oil prices exceed $80 per barrel, while allocating 15% of annual oil income to fund renewable energy transition programs.
ii. Implement targeted development programs for high-potential non-oil sectors like cocoa and lithium, including tax incentives, infrastructure upgrades, and regulatory reforms to attract private investment in value-added processing.
iii. Mandate state governments to achieve 50% internally-generated revenues by 2030 through improved tax administration and economic diversification, with federal transfers tied to performance benchmarks.

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