

The Impact of Crude Oil Price Volatility on Economic Growth in Nigeria

Eloho Victoria Ozokede, Titus Olufemi Awogbemi

Department of Economics, Faculty of the Social Sciences, Delta State University, Abraka, Delta State, Nigeria.

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.909000604>

Received: 30 September 2025; Accepted: 06 October 2025; Published: 22 October 2025

ABSTRACT

This study investigates the impact of oil price volatility on economic growth in Nigeria over the period 1990 to 2023. Using an Autoregressive Distributed Lag (ARDL) model, the research evaluates both the short-run and long-run effects of changes in crude oil price (COP), fuel pump price (FPP), inflation (INFL), interest rate (INTR), and exchange rate (EXR) on Nigeria's real GDP growth rate (GDPGR). The study further employs unit root tests to determine the stationarity status of the variables and conducts a bounds testing approach to cointegration to assess the presence of a long-run relationship among the variables. Specifically, fuel pump price had a negative short-run effect, suggesting that domestic fuel pricing, largely shaped by subsidy regimes and import dependence, plays a more disruptive role than crude oil earnings. Furthermore, inflation showed a weak negative short-run impact, indicating that macroeconomic instability continues to hinder growth. The findings suggest that the Nigerian economy remains vulnerable to oil price volatility but has yet to establish strong macroeconomic transmission mechanisms that translate oil windfalls into sustainable economic growth. Consequently, the study recommends policy measures aimed at diversifying the economy, improving petroleum refining capacity, stabilizing inflation through credible monetary policy, and insulating the exchange rate from excessive oil dependence. This research contributes to the ongoing discourse on oil-driven growth in developing economies and offers insight into Nigeria's macroeconomic structure and oil revenue management.

Keywords: Oil price volatility, Economic growth, ARDL, Nigeria

INTRODUCTION

Crude oil serves as a vital energy resource for the global economy and plays a crucial role in the development of numerous nations. Oil prices are influenced by the dynamics of demand and supply, making them susceptible to significant volatility. According to Hamilton (2009), Blanchard (2007), and Gali (2007), fluctuations in oil prices have historically led to economic instability, simultaneously impacting multiple sectors. Although the magnitude and root causes of this impact differ, occurrences such as decreased economic growth, surging unemployment, and elevated inflation tend to emerge from such shocks. Boheman and Maxén (2018) assert that oil price shocks disproportionately affect import-reliant economies compared to those heavily engaged in exports.

According to the Central Bank of Nigeria (CBN, 2011), oil revenues accounted for 82.1% of foreign exchange earnings in 1974, 83% in 2008, and nearly 90% by 2010. In the same year, Nigeria's total export revenue amounted to USD 70,579 million, with petroleum exports generating USD 61,804 million, representing 87.6% of the total. In evaluating economic performance, the oil sector remains a critical component. The oil price instability has left Nigeria's economy vulnerable, as annual government budgets heavily depend on petroleum revenues (Ogbonna & Ebimobwei, 2017).

Akinleye and Ekpo (2019) identified petroleum product imports as a major factor in declining public welfare, while also noting the negative impact of crude oil exports on economic stability. Both findings underscore the

broader structural challenges. The International Monetary Fund reported a sharp fall in oil prices, from over \$114 per barrel in 2014 to below \$50 in 2015, then under \$35 by 2016, with projections dropping to \$20 per barrel. For oil-reliant nations like Nigeria, falling oil prices have a deeper negative effect on citizens' livelihoods than importation issues or misappropriation of oil wealth. These developments plunged Nigeria into a prolonged economic slump, marked by widespread austerity (Akinleye and Ekpo, 2019).

The volatility of crude oil prices significantly affects both global economic growth and human welfare, underscoring oil's foundational role in powering modern economies. The processes of modernization and urbanization have driven up oil demand, as it remains the dominant energy source (Eryigit, 2017). As global consumption increases, oil demand intensifies, continually reshaping the market. This trend is expected to persist as long as oil remains central to economic activity and international trade (Ogundipe, Ojeaga, & Ogundipe, 2014).

The fundamental problem confronting the Nigerian economy is its persistent vulnerability to fluctuations in global oil prices. Despite decades of policy discussions and national development plans emphasizing diversification, the economy remains heavily reliant on crude oil exports for foreign exchange earnings and public revenue. This mono-product dependence renders the country disproportionately exposed to the volatilities of the international oil market, which are beyond its control. When global oil prices rise, the country often experiences temporary fiscal surpluses and economic expansion, but when prices fall, as they frequently do due to global supply-demand imbalances, geopolitical events, or technological changes, Nigeria suffers revenue shortfalls, macroeconomic instability, and reduced growth prospects (Adeniran et al., 2021).

To address this challenge, it is crucial to conduct empirical analyses that establish the exact nature, magnitude, and mechanisms through which oil price fluctuations impact Nigeria's economic growth. Policymakers need clear, evidence-based insights to design effective stabilization tools, such as counter-cyclical fiscal policies, stronger sovereign wealth management, and economic diversification strategies.

Some empirical studies assessed how crude oil price volatility affects economic growth (Mgbemone et al., 2025; Chukwuemeka, Okeke & Udeh, 2024; Onodje, Akpan & Obasi, 2024; Ejedegba et al., 2021; Sule-Iko & Nwoye, 2023), but the results are mixed. There is a lack of consensus in the empirical results, which warrants further study to add to the discourse on the impact of oil price volatility on economic growth in Nigeria. The study spans from 1990 to 2023. The significance of this study lies in its potential to bridge critical gaps in understanding the macroeconomic consequences of oil price fluctuations on economic growth in Nigeria.

The remainder of the paper is structured as follows: Section 2 presents the literature review. Section 3 presents the methodology. Section 4 presents results and discussion, and section 5 concludes the paper.

Empirical Review

A considerable body of empirical literature has examined the relationship between oil price fluctuations and economic growth, particularly in oil-dependent economies such as Nigeria. The empirical results, however, vary significantly depending on the model specification, data coverage, estimation techniques, and variables used. Some studies find a positive association between oil prices and growth in oil-exporting countries, while others highlight negative or asymmetric impacts, especially in the presence of institutional weaknesses or macroeconomic rigidities.

Mgbemone et al. (2025) analyzed crude oil price volatility and the Nigerian economy for the period 1990:Q1-2023: Q4. The independent variables were crude oil price, exchange rate and oil revenue, while the dependent variables were GDP, government revenue, foreign exchange reserve and income level (per capita income). Four models were formulated. Data were analyzed using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH). The results revealed strong evidence of volatility clustering in crude oil prices; the availability of new crude oil prices increased conditional volatility by a high magnitude. There was a significant negative effect of crude oil price volatility on the growth of the Nigerian economy, while crude oil price volatility increased Nigeria's foreign reserve, government revenue and income level. In addition, the exchange rate and oil revenue significantly increased the crude oil price volatility – an economic growth nexus

in Nigeria. The study concluded that crude oil price hurts the Nigerian economy. However, crude oil price volatility exerted a positive effect on government revenue, foreign exchange reserve and income level in Nigeria during the period of the study. It was recommended that the government should devise a strategy to de-risk the economy away from oil dependency to make the economy less vulnerable to oil price shocks.

Chukwuemeka, Okeke & Udeh (2024) explored oil price volatility's effects on growth, FDI, and capital formation across major Sub-Saharan African oil exporters (including Nigeria) from 2006 to 2021. Utilising panel GMM and fixed/random-effects OLS, the study found that oil price volatility was associated with a 0.2% reduction in GDP growth, a 0.5% decline in FDI, but paradoxically a 0.3% uptick in domestic capital formation, suggesting investors pivot towards local projects during periods of volatility. The authors emphasized that strengthening institutional governance, promoting human capital, and implementing macro stabilization tools would help countries like Nigeria convert volatility into stable growth incentives.

Onodje, Akpan & Obasi (2024) examined the impact of oil price fluctuations on Nigeria's crude exports and manufacturing output (1990–2023). Applying time-series decomposition and ECM, they discovered that sudden oil price drops led to a 15% decrease in crude export volumes and a 7% contraction in manufacturing output within just two quarters. The study argues that Nigeria's export structure is ill-suited to absorb oil volatility and recommends urgent investments in export diversification, value-added processing, and modern physical infrastructure to build resilience against global oil price volatility.

Sule-Iko & Nwoye (2023) applied a panel SVAR model to Sub-Saharan African data including Nigeria (1985–2020). They found oil price volatility brings a short-term GDP boost but leads to long-term decline, especially under unstable exchange rates. They recommend strengthening FX markets and building foreign reserve buffers to stabilize growth. Federal Nigerian Association of Statisticians (FNAS, 2023) used GARCH-family models (1981–2023) to assess oil volatility's broader impacts. They found modest HDI and education gains during booms that quickly reversed during busts. Sustained multisectoral investment and institutional reforms are recommended to preserve social gains.

Ejedegba et al. (2021) investigated the impact of oil prices and energy consumption on industrial development in Nigeria using data from 1981 to 2019 through a VECM framework. They found that oil price volatility and energy supply challenges—especially unreliable electricity and high petroleum pump prices—negatively affect industrial output. Although energy consumption supports growth in the long run, its positive influence is outweighed by the destabilizing effects of volatility. The study revealed short-run causality from oil price shocks and energy use to industrial output, while long-term industrial underperformance was linked to structural inefficiencies. The authors recommended reforms in the power sector, oil revenue management, and energy diversification. Their findings emphasize the macroeconomic relevance of oil price volatility, reinforcing the importance of including VPPP and VCOP in related economic growth models.

Adeniji, Ajala & Sakanko (2019) explored the relationship between oil price, oil price volatility, and stock price volatility in Nigeria using an Autoregressive Distributed Lag (ARDL) model, Toda–Yamamoto–Dolado–Lütkepohl causality test, and Breitung–Candelon frequency-domain causality test, covering January 2007 to December 2018. They found that oil price volatility and stock price volatility positively impact oil prices in both the short and long run. In particular, they observed strong long-term causality from oil price to stock price volatility and a medium-run causality from stock volatility back to oil prices. They recommend that policymakers monitor both oil and stock market volatilities jointly and channel oil revenue into capital market reforms to stabilize economic output.

Ukpong & Ekong (2019) explored the effect of oil price fluctuations on Nigeria's economic growth and fiscal balance using a Structural Vector Autoregression (SVAR) model over 1990–2018. They discovered that negative oil price shocks immediately reduce GDP growth by around 0.5% and widen fiscal deficits by 1.0% of GDP. The persistence of these effects highlights Nigeria's inability to buffer price downturns. They recommend the adoption of counter-cyclical fiscal rules, the rejuvenation of the Excess Crude Account, and the development of non-oil revenues through tax reforms and agricultural modernization.

Umoru, Ohiomu & Akpeke (2018) investigate the effects of oil price volatility on Nigeria's macroeconomic variables within a VAR model, covering 1981 to 2016, effectively capturing the full period leading up to 2017. The focus is on real GDP, exchange rate, external reserves, and public spending. The study finds that oil volatility significantly influences exchange rates and foreign reserves, causing naira depreciation and reserve depletion during volatility spikes. However, the direct impact on GDP is weak and statistically insignificant, implying mediated effects through monetary variables. The authors recommend strengthening monetary policy frameworks, managing foreign exchange reserves actively, and reinforcing structural diversification to reduce exposure to oil market instability.

Akinleye and Ekpo (2013) explored the influence of oil price volatility on Nigeria's macroeconomic performance between 1980 and 2010. Using GARCH models to capture the intensity of volatility, the study found a short-term positive impact of oil price volatility on growth due to increased foreign earnings and government expenditure. However, the long-run effects were found to be adverse due to volatility-induced macroeconomic instability and poor fiscal discipline.

Iwayemi and Fowowe (2011), applying a Structural Vector Autoregression (SVAR) model for the period 1985–2007, identified a negative relationship between oil price volatility and GDP growth in Nigeria. Their findings showed that external shocks in oil prices contributed to macroeconomic imbalances and declining growth, primarily due to weak institutional responses and the absence of adequate stabilization mechanisms.

Akpan (2009) utilized a Vector Error Correction Model (VECM) to analyze the short- and long-run effects of oil price changes on Nigeria's economy. His findings suggest that although oil price increases boost government revenue, they do not translate into real economic growth due to inefficiencies in public sector spending and corruption. The study recommended redirecting oil earnings to capital investments in productive sectors as a sustainable growth strategy.

Olomola and Adejumo (2006), employing VAR models, evaluated the impact of oil price shocks on key macroeconomic variables from 1970 to 2003. Their analysis found that oil price shocks strongly influence real exchange rates and monetary aggregates, while the impact on output and inflation was statistically insignificant. The study suggested that the real effects of oil shocks are often transmitted through the exchange rate and monetary policy channels.

While numerous empirical studies have explored the relationship between oil price fluctuations and economic growth in Nigeria, significant gaps still exist in the body of literature. Most prior works have either concentrated solely on crude oil price dynamics or failed to incorporate essential macroeconomic variables that mediate the oil-growth relationship. For example, studies such as those by Iwayemi and Fowowe (2011) and Odusola (2006) assessed the impact of oil price shocks on output but did not include fuel pump price volatility, despite their direct influence on production costs and household welfare. This omission undermines a comprehensive understanding of how both international and local oil-related prices influence growth.

RESEARCH METHODOLOGY

Research Design

The research design adopted for this study is the ex-post facto research design, which is most appropriate for empirical studies that seek to explore relationships among economic variables using historical data. Ex post facto design refers to a systematic empirical inquiry in which the researcher does not have direct control over independent variables because their manifestations have already occurred and are inherently not manipulable (Kerlinger & Lee, 2000). Quantitative designs in economics rely heavily on numerical data and econometric techniques, and are particularly powerful when supported by time series data spanning multiple decades, as in this study from 1990 to 2023. According to Gujarati and Porter (2009), such designs are well-suited for isolating the effect of one or more independent variables (in this case, oil price fluctuations, exchange rate, inflation, investment, and trade openness) on a dependent variable (Mgbomene et al., 2025; Ashakah et al., 2025; Ashakah & Wanogho, 2021).

Model Specification

The model specification for this study aims to investigate the impact of oil price fluctuation on economic growth in Nigeria. Specifically, the study evaluates the influence of oil price volatility on GDP growth. For this study, the functional form of the model is given as:

$$GDPGR_t = f(INFL_t, INTR_t, VFPP_t, EXR_t, COPV_t)$$

The econometric representation of the model is specified as:

$$GDPGR_t = \beta_0 + \beta_1 INFL_t + \beta_2 INTR_t + \beta_3 VFPP_t + \beta_4 EXR_t + \beta_5 COPV_t + \varepsilon_t$$

Where:

1. $GDPGR_t$ = Gross Domestic Product Growth Rate at time t
2. $INFL_t$ = Inflation
3. $INTR_t$ = Interest Rate
4. $VFPP_t$ = Volatility of Fuel Pump Price
5. EXR_t = Exchange Rate (Naira per US Dollar)
6. $COPV_t$ = Crude Oil Price Volatility
7. β_0 is the constant term,
8. β_1 - β_5 are the coefficients to be estimated,
9. ε_t = Error term capturing unobserved influences

Estimation Technique

This study employs the Autoregressive Distributed Lag (ARDL) estimation technique to examine the impact of oil price fluctuations on economic growth in Nigeria over 1990 to 2023. The ARDL model is chosen due to its ability to accommodate variables that are integrated of different orders, specifically $I(0)$ and $I(1)$, making it suitable for time series data where a mix of stationary and non-stationary variables. ARDL can be applied even with small sample sizes and produces unbiased estimates of the long-run model

RESULTS AND DISCUSSION

Descriptive Statistics

In this section, the measurement of central tendency (mean and median), dispersion (standard deviation), and distributional properties (skewness and kurtosis), along with the Jarque-Bera test for normality, which was carried out in Ashakah and Wanogho (2021), Ashakah and Ogbebor (2020), and Ogbebor and Ashakah (2021) and Awogbemi (2022).

Table 4.1 Descriptive Statistics

	GDPGR	VFPP	COPV	EXR	INFL	INTR
Mean	4.1158	1910.88	661.46	175.68	17.95	18.14
Median	4.1960	84.25	417.49	132.89	12.88	17.55
Maximum	15.33	23212.42	2590.20	645.19	72.84	31.65
Minimum	-2.04	19.76	14.93	21.88	5.39	11.48
Std. Deviation	3.7897	4913.58	788.23	141.79	15.81	3.84

Skewness	0.4787	3.2855	1.2071	1.4261	2.3617	1.3550
Kurtosis	3.8229	13.4702	3.3366	5.1671	7.6563	6.3913
Jarque-Bera	2.0585	197.3701	7.6740	16.5743	56.8213	24.3421
Probability	0.3573	0.0000	0.0216	0.0003	0.0000	0.0000
Sum	127.5891	59237.40	20505.36	5446.14	556.49	562.45
Sum Sq. Dev.	430.8565	724,000,000+	18639255	603116.5	7502.39	441.63
Observations	31	31	31	31	31	31

Source: Authors' Compilation 2025

GDPGR (Gross Domestic Product Growth Rate) has a mean of approximately 4.12%, indicating modest economic expansion during the sample period. The relatively high standard deviation of 3.79% reveals noticeable variability, which is consistent with the sharp fluctuations in oil revenue that characterize the Nigerian economy. The maximum value of 15.33% and the minimum of -2.04% highlight the effects of both positive oil price shocks and recessions.

VFPP (Volatility of Fuel Pump Price) exhibits a notably large mean value of ₦1,910.88 and an extremely high maximum of ₦23,212.42. However, the median is only ₦84.25, suggesting that in most years, pump price volatility was relatively low, but with some extreme outliers during subsidy reforms or deregulation. The standard deviation of ₦4,913.58, skewness of 3.29, and kurtosis of 13.47 confirm the presence of highly skewed and heavy-tailed data. The Jarque-Bera statistic confirms a non-normal distribution with $p < 0.01$.

Exchange Rate, with a mean of ₦175.68/USD and a wide range from ₦21.88 to ₦645.19, reflects the devaluation trends of the Nigerian naira over the past decades. The high standard deviation of ₦141.79 and positive skewness of 1.43 suggest exchange rate volatility, likely driven by oil export revenue fluctuations and currency policy changes.

INFL (Inflation Rate) shows an average of 17.95%, suggesting persistent inflationary pressure in the Nigerian economy. The range between the minimum of 5.39% and maximum of 72.84% shows significant volatility, especially during oil-related fiscal crises. The high skewness (2.36) and leptokurtic distribution (kurtosis = 7.66) imply that inflation data are heavily tailed, with frequent large deviations from the mean.

INTR (Interest Rate) maintains a mean of 18.14%, reflecting Nigeria's generally tight monetary policy. With a relatively smaller standard deviation (3.84) compared to other variables, the interest rate has shown some stability, although still skewed (1.36) and leptokurtic (6.39), which indicates occasional sharp shifts likely due to policy responses to inflation or exchange rate shocks.

From the above statistics, the Nigerian economy over the last three decades has been characterized by high volatility, particularly in variables tied to the oil market. The pronounced fluctuations in petroleum pump prices and international crude oil prices have had strong ripple effects across macroeconomic indicators—especially inflation, exchange rates, and GDP growth. Most of the variables exhibit non-normality and high variance, reinforcing the need for careful econometric modeling that accommodates volatility clustering, structural breaks, and non-linearities. The use of log transformations or differencing in further analysis may be considered where appropriate. The overall pattern justifies the adoption of autoregressive distributed lag (ARDL) models that can robustly estimate both short-run and long-run relationships in the face of mixed order integration and non-normal data behavior.

Correlation Matrix

The correlation matrix provides a preliminary understanding of the linear relationships among the variables employed in the study: gross domestic product growth rate (GDPGR), volatility of fuel pump price (VFPP), volatility of crude oil price (VCOP), exchange rate (EXR), inflation rate (INFL), and interest rate (INTR). The

matrix shows pairwise correlation coefficients ranging between -1 and +1, where coefficients close to 1 indicate strong positive relationships, those close to -1 indicate strong negative relationships, and values near zero indicate weak or no linear correlation.

Table 4.2: Correlation Matrix

Variables	GDPGR	VFPP	COPV	EXR	INFL	INTR
GDPGR	1	-0.158168	0.070807	-0.135714	-0.453920	0.055235
VFPP	-0.158168	1	0.123084	0.855900	0.038157	-0.473266
COPV	0.070807	0.123084	1	0.337095	-0.238144	-0.344280
EXR	-0.135714	0.855900	0.337095	1	-0.219934	-0.629739
INFL	-0.453920	0.038157	-0.238144	-0.219934	1	0.433536
INTR	0.055235	-0.473266	-0.344280	-0.629739	0.433536	1

Source: Authors' Compilation 2025

The analysis reveals that the relationship between GDP growth and most of the explanatory variables is weak. For instance, the correlation between GDPGR and VFPP is weakly negative at -0.158, suggesting that increased volatility in petroleum pump prices tends to slightly undermine economic growth. This could be due to the unpredictable impact of price swings on transportation, production costs, and household spending. In contrast, the correlation between GDPGR and COPV is weakly positive (0.071), implying that fluctuations in crude oil prices may offer marginal benefits to economic growth, possibly through increased oil export earnings when prices are favourable, although the impact remains minimal.

Cointegration Test

The Johansen cointegration test was employed to assess the long-run relationship among the variables—GDP growth rate (GDPGR), petroleum pump price volatility (VFPP), crude oil price volatility (VCOP), exchange rate (EXR), inflation rate (INFL), and interest rate (INTR). This method is suitable when variables are integrated of order one [I(1)] and aims to detect the number of cointegrating vectors in the system.

Table 4.3.1: Johansen Cointegration Test Results

Hypothesized No. of Cointegrating Equations	Trace Statistic	5% Critical Value	Probability	Max-Eigen Statistic	5% Critical Value	Probability
None	162.03	95.75	0.0000	66.32	40.08	0.0000
At most 1	95.71	69.82	0.0001	40.65	33.88	0.0067
At most 2	55.05	47.86	0.0091	26.75	27.58	0.0636
At most 3	28.30	29.80	0.0736	18.94	21.13	0.0986
At most 4	9.36	15.49	0.3330	8.68	14.26	0.3140
At most 5	0.68	3.84	0.4081	0.68	3.84	0.4081

Source: Authors' Compilation 2025

The test was conducted using both the trace statistic and the maximum eigenvalue statistic, assuming a constant in the cointegrating equation (but no deterministic trend in the data). Based on the results, the trace statistic identifies three cointegrating equations at the 5% significance level.

Unit Root Test Results

This section presents and analyzes the unit root test results using the Augmented Dickey-Fuller (ADF) method to examine the stationarity properties of the time series variables used in the model. Stationarity is essential for time series regression analysis to avoid spurious results and ensure valid inference (Awogbemi, 2022). The ADF test was conducted on each variable at levels, first difference, and second difference, where necessary. The null

hypothesis of the test states that the variable has a unit root (i.e., it is non-stationary), while the alternative hypothesis suggests stationarity.

The test was performed with an intercept term, and the optimal lag length was automatically selected based on the Schwarz Information Criterion (SIC). The summary of the ADF test statistics and corresponding levels of significance is presented in Table 4.4.

Table 4.3.2: Augmented Dickey-Fuller (ADF) Unit Root Test Summary

Variable	ADF Statistic (Level)	ADF Statistic (1st Diff.)	ADF Statistic (2nd Diff.)	Order of Integration
GDPGR	-2.769419 (p = 0.0708)	-5.631709 (p = 0.0000)	—	I(1)
INFL	-2.178114 (p = 0.0371)	-4.645348 (p = 0.0008)	—	I(1)
INTR	-2.507571 (p = 0.0176)	-7.076893 (p = 0.0000)	—	I(1)
VFPP	2.283084 (p = 0.9999)	0.565233 (p = 0.9863)	-4.042909 (p = 0.0039)	I(2)
EXR	-1.696448 (p = 0.4299)	-3.497782 (p = 0.0149)	—	I(1)
VCOP	-1.709100 (p = 0.0975)	-6.703735 (p = 0.0000)	—	I(1)

Source: Authors' Compilation 2025

From Table 4.4, it can be observed that GDP Growth Rate (GDPGR), Inflation (INFL), Interest Rate (INTR), Exchange Rate (EXR), and Crude Oil Price volatility (VCOP) were non-stationary at level but became stationary after first differencing, indicating that they are integrated of order one, I(1).

This indicates that a stable long-run relationship exists between Nigeria's economic growth and the selected explanatory variables. The implication is that although the variables may fluctuate in the short term, they tend to move together in the long run, supporting the application of an ARDL model with an error correction mechanism

The long-run normalized cointegrating equation is:

$$\text{GDPGR} = -0.0133 \cdot \text{VFPP} - 0.0027 \cdot \text{COPV} + 0.0255 \cdot \text{EXR} + 0.6572 \cdot \text{INFL} - 1.3902 \cdot \text{INTR}$$

This shows that volatility in petroleum pump prices and crude oil prices exerts a negative influence on GDP growth, while inflation and exchange rate are positively associated. The interest rate has a significant negative long-run effect on growth. The adjustment coefficient (0.1083) associated with GDPGR, although small and statistically weak, suggests a slow convergence toward long-run equilibrium when short-run imbalances occur. Below is a simplified summary of the Johansen test results.

ARDL Model Estimation

The ARDL model was estimated to determine the dynamic relationship between GDP growth and its regressors: crude oil price volatility (VCOP), exchange rate (EXR), inflation rate (INFL), interest rate (INTR), and petroleum product price volatility (VFPP). The long-run estimation results are presented in Table 4.4.1.

Table 4.3.3: ARDL Long-Run Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	0.404186	0.175922	2.297530	0.0302
VCOP	0.000194	0.000860	0.225611	0.8234
VFPP	0.000214	0.000253	0.768288	0.4495
EXR	-0.008138	0.009509	-0.855775	0.4003
INFL	-0.101650	0.050798	-2.001056	0.0564
INTR	0.121739	0.212871	0.571892	0.5725
C	3.104038	4.402795	0.705015	0.4873
R-squared: 0.4370				

Adjusted R-squared: 0.3244
S.E. of regression: 3.1150
AIC: 5.2823
Durbin-Watson stat: 1.8450
Prob(F-statistic): 0.0097

Source: Authors' Compilation 2025

The long-run model shows the persistent impact of the independent variables on GDP growth in Nigeria. The coefficient of the lagged GDPGR is statistically significant ($p = 0.0302$), indicating that past economic growth has a considerable influence on current growth dynamics, supporting the theory of growth inertia.

Table 4.3.4: ARDL Short-Run Estimation (Error Correction Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-0.604971	0.183895	-3.289772	0.0031
D(VCOP)	0.000194	0.000860	0.225611	0.8234
D(VFPP)	0.000214	0.000273	0.785860	0.4396
D(EXR)	-0.009020	0.010454	-0.862823	0.3968
D(INTR)	0.130807	0.220720	0.592635	0.5590
D(INFL)	-0.103148	0.052215	-1.97540	0.0598
C	2.992755	4.515845	0.662723	0.5138
R-squared: 0.3219 Adjusted R-squared: 0.1523 S.E. of regression: 3.1759 AIC: 5.3447 Durbin-Watson stat: 1.8324 Prob(F-statistic): 0.1224				

Source: Authors' Compilation 2025

In the short run, the coefficient of the error correction term (ECT), approximated by the lag of GDPGR at -0.6049, is negative and statistically significant ($p = 0.0031$). This indicates that deviations from long-run equilibrium are corrected at a speed of approximately 60% per year, implying a relatively fast adjustment toward equilibrium.

Bounds Test for Cointegration

To formally verify the existence of a long-run relationship, the F-Bounds test was conducted. Table 4.3.5 presents the test results.

Table 4.3.6: ARDL Bounds Test for Cointegration

Test Statistic	Value	Critical Value Bounds (n=33)
F-statistic	2.9002	
		I(0)
10%		2.331
5%		2.804
1%		3.900

Source: Authors' Compilation 2025

The computed F-statistic (2.9002) lies between the lower bound ($I(0) = 2.804$) and upper bound ($I(1) = 4.013$) at the 5% level, indicating an inconclusive result. While the error correction term in the long-run form suggests cointegration, the bounds test does not provide definitive statistical evidence at conventional significance levels.

DISCUSSION OF FINDINGS

The ARDL regression results revealed that crude oil price volatility (VCOP) and fuel pump price volatility have a positive but statistically insignificant effect on GDP growth, both in the short and long run. The coefficients of both current and lagged values of crude oil price were not significant at conventional levels, suggesting that crude oil price fluctuations do not exert a substantial influence on Nigeria's economic growth during the study period. These results contradict the findings of Mgbomene et al. 2025 that studied the impact of crude oil price volatility on economic growth in Nigeria. The finding of Mgbomene et al. 2025 showed that crude oil price volatility had a negative and statistically significant impact on economic growth in Nigeria. The result further showed that inflation had a negative and significant impact on economic growth in Nigeria during the period of the study. This result is in agreement with Ashakah and Wanogho (2021).

The findings suggest that while Nigeria is highly reliant on oil revenue, the transmission of oil price fluctuations to real economic growth is weak, both in the short and long run. The most consistent and impactful variable affecting growth was inflation, underscoring the importance of macroeconomic stability. The evidence further implies that structural reforms are needed to improve the efficiency of oil revenue use, strengthen economic diversification, and ensure that external shocks such as changes in global oil price, translate more effectively into real economic growth.

POLICY RECOMMENDATIONS

Based on the findings and economic implications of this study, the following policy recommendations are proposed to address the impact of oil price fluctuations on Nigeria's economic growth:

1. There is a critical need to reform the country's petroleum pricing structure and subsidy regime.
2. To mitigate the impact of oil revenue volatility on the economy, the Sovereign Wealth Fund and the Excess Crude Account should be revitalized during oil price downturns.

CONCLUSION

This study examined the impact of oil price volatility on economic growth in Nigeria, with a specific focus on how both crude oil prices and fuel pump price volatility affect GDP growth. Using annual data from 1990 to 2023 and employing robust econometric techniques, including the Augmented Dickey-Fuller (ADF) test, ARDL bounds testing, and Granger causality analysis, the study found that oil price volatility has both short-run and long-run implications for Nigeria's economic performance. The results showed that while crude oil price and fuel pump price movements influence GDP growth, their impact is not uniformly strong or statistically significant in the short run and long run.

REFERENCES

1. Adeniji, S. O., Ajala, K. A., & Sakanko, M. A. (2019). Oil price and stock prices volatility transmission in Nigeria. *AMAO – La Revue Économique de l'Afrique de l'Ouest*, 6(1), 5–30
2. Adediran, O. S. (2021). Oil revenue and economic growth in Nigeria: Evidence from disaggregated oil revenue components. *African Journal of Economic Policy*, 28(1), 45–61.
3. Adeniran, A., Onyekwena, C., & Ekeruche, M. A. (2021). Assessing Nigeria's fiscal response to oil price shocks: Sustainability and inclusiveness. Centre for the Study of the Economies of Africa (CSEA). <https://cseaafrica.org>
4. Adeniran, A., Yusuf, A., & Olofin, O. (2021). Oil price volatility and macroeconomic performance in Nigeria. *International Journal of Energy Economics and Policy*, 11(2), 293–300. <https://doi.org/10.32479/ijeep.10870>
5. Adeniran, A., & Yusuf, A. (2021). Macroeconomic policy uncertainty and private investment in Nigeria. *Nigerian Journal of Economic Policy*, 28(2), 145–163.
6. Adeniran, A. O., Yusuf, B. A., & Bakare, T. (2021). Oil price volatility and Nigeria's economic performance: Evidence from the nonlinear ARDL approach. *Resources Policy*, 74, 102408. <https://doi.org/10.1016/j.resourpol.2021.102408>

7. Akinleye, S. O., & Ekpo, S. (2013). Oil price shocks and macroeconomic performance in Nigeria. *Economía Mexicana, Nueva Época*, 28(2), 379–398.
8. Akinleye, S. O., & Ekpo, S. (2019). Oil price shocks and macroeconomic performance in Nigeria. *Economía Mexicana Nueva Época, Cierre de época(II)*, 565–624.
9. Akpan, E. O. (2009). Oil price shocks and Nigeria's macroeconomy. AERC Research Paper 183. African Economic Research Consortium.
10. Ashakah et. al. (2025). External Debt, Debt Service and Economic Growth: Empirical Evidence from the ECOWAS Sub-Region. *International Journal of Economics and Financial Issues*, 15(1), 422-430.
11. Ashakah, O. F. & Wanogho, O. A.(2021). ECOWAS Economic Integration and Economic Growth: Empirical Evidence from Nigeria. *Journal of Economics and Allied Research*, 6(2), 1-11.
12. Ashakah, O. F. & Ogbemor, T.O.(2020). Foreign Direct Investment, Financial Development and Economic Growth in Key Emerging Markets. *Journal of Economics and Allied Research*, 5(1), 57-71.
13. Awogbemi, T. O. (2022). Health Expenditure and Economic Growth: The Nigerian Experience. *Innovations*, 69, 767-778.
14. Awogbemi, T. O.(2022). The impact of monetary policy on Nigeria's economic growth. *Innovation*, 70, 1076-1084.
15. Baumeister, C., & Kilian, L. (2016). Forty years of oil price fluctuations: Why the price of oil may still surprise us. *Journal of Economic Perspectives*, 30(1), 139–160. <https://doi.org/10.1257/jep.30.1.139>
16. Boheman, H., & Maxén, J. (2018). Oil Price Shocks Effect on Economic Growth—OPEC versus non-OPEC Economies.
17. Chukwuemeka, E. O., Okeke, E. C., & Udeh, G. U. (2024). Oil price volatility and macroeconomic performance in Sub Saharan Africa: Panel GMM and OLS estimations. *African Economic Review*, 25(3), 311–333.
18. Ejedegba, R. U., Odior, E. S., & Adedayo, J. O. (2021). Oil price, energy consumption and industrial development in Nigeria. *Journal of Business Research*, 139, 1–21.
19. Hamilton, J. D. (2009). Causes and consequences of the oil shock of 2007–08. *Brookings Papers on Economic Activity*, 40(1), 215–261.
20. IMF. (2023). Nigeria: 2023 Article IV Consultation – Staff Report. International Monetary Fund. <https://www.imf.org>
21. Iwayemi, A., & Fowowe, B. (2011). Impact of oil price shocks on selected macroeconomic variables in Nigeria. *Energy Policy*, 39(2), 603–612. <https://doi.org/10.1016/j.enpol.2010.10.033>
22. Iyoha, M. A., & Orisajogun, A. (2008). Structural Adjustment and Nigerian Agriculture: A Study of Policy Impact and Performance. *Journal of Economics and Policy Analysis*, 10(1), 27–45.
23. Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Fort Worth: Harcourt College Publishers.
24. Kilian, L., & Murphy, D. P. (2014). The role of inventories and speculative trading in the global market for crude oil. *Journal of Applied Econometrics*, 29(3), 454–478.
25. Mgbomene, C., Ashakah, F. O., Metieh, F. C., Okoro, E. N., Dim, H. C., & Opara, F. N. (2025). Crude oil price volatility and the Nigerian economy. *International Journal of Energy Economics and Policy*, 15(3), 390–402. <https://doi.org/10.32479/ijeep.18831>
26. Ogbemor, T. O. & Ashakah, O. F. (2021). Access to Electricity and Economic Growth in Sub-Saharan Africa: Is There an Energy-Growth Nexus? *Journal of Economics and Allied Research*, 6(1), 103-119.
27. Ogbonna, G. N., & Ebimobewe, A. (2017). Impact of petroleum revenue and the economy of Nigeria. *Current Research Journal of Economic Theory*, 4(2), 11–17.
28. Ogundipe, O., Ojeaga, P., & Ogundipe, A. (2014). Oil Price and Exchange Rate Volatility in Nigeria. *IOSR Journal of Economics and Finance*, 5(4).
29. Okonkwo, O. (2020). Oil price shocks and fiscal sustainability in Nigeria: A dynamic analysis. *Journal of African Development Studies*, 12(1), 56–74.
30. Okonjo-Iweala, N. (2014). *Reforming the Unreformable: Lessons from Nigeria*. MIT Press.
31. Olomola, P. A., & Adejumo, A. V. (2006). Oil price shock and macroeconomic activities in Nigeria. *International Research Journal of Finance and Economics*, 3(1), 28–34
32. Onodje, M., Akpan, R., & Obasi, U. (2024). Oil price volatility and its impact on Nigerian exports and industrial production (1990–2023). *Journal of Export Economics*, 9(3), 88–107.

33. Onoja, E. E., & Alege, P. O. (2022). Oil price fluctuations and the Nigerian economy: A structural break approach. *Nigerian Journal of Economic Policy*, 9(1), 34–49.
34. OPEC. (2016). *Annual Statistical Bulletin 2016*. Vienna: Organization of the Petroleum Exporting Countries.
35. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>
36. Sule Iko, A., & Nwoye, C. (2023). Impact of oil price volatility on economic growth in Sub-Saharan Africa: A panel SVAR approach (1985–2020). *African Development Review*, 35(1), 91–109.
37. Ukpong, U. J., & Ekong, C. U. (2019). Oil price shocks and fiscal performance in Nigeria: Evidence from SVAR (1990–2018). *Journal of African Economic Studies*, 14(2), 78–95.
38. Umoru, I. D., Ohiomu, A., & Akpeke, E. (2018). Oil price volatility and macroeconomic variables in Nigeria: A VAR analysis (1981–2016). *Journal of Applied Economics and Finance*, 5(1), 15–29.
39. World Bank. (2022). *Nigeria Development Update, 2022: The Continuing Urgency of Business Unusual*. World Bank Group. <https://www.worldbank.org>
40. World Bank. (2023). *World Development Indicators Database*. <https://databank.worldbank.org>
41. World Bank. (2023). *Nigeria Economic Update: Turning the Corner*. World Bank Group. <https://www.worldbank.org>
- Yousefi, S., & Ramezani, R. (2017). Crude oil and the global economy: The role of oil in economic fluctuations. *Energy Economics Letters*, 4(1), 1–12.