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Article

The Relationship Between Crude Oil Prices and Economic Performance in Nigeria: Evidence from Recent Trends (1990 to 2023)

Dungrit Peter Gelle[1,*] Bernard Iferi Eni[1], Yitmal Yahaya Mari[2]

[1]Department of Economics, Federal University of Lafia, Nassarawa State, Nigeria

[2]Department of Economics, University of Jos, Plateau State, Nigeria

[*]Corresponding author: Dungrit Peter Gelle, Pgelle889@gmail.com

Abstract

This study examines the impact of crude oil prices on economic growth in Nigeria from 1990 to 2023, employing the Autoregressive Distributed Lag (ARDL) framework and Granger causality analysis. Unlike previous studies that assume symmetric relationships, this research explicitly tests for structural breaks and incorporates insights from Dutch Disease theory and the Resource Curse hypothesis. Preliminary diagnostic tests, including Augmented Dickey-Fuller (ADF) unit root tests with structural break options, established that the dataset is suitable for econometric modeling. The ARDL bounds test confirmed the existence of a long-run equilibrium relationship between crude oil prices and key macroeconomic indicators. Empirical findings reveal that crude oil prices have a statistically significant positive impact on both real GDP and government expenditure in the long run, underscoring oil's central role in Nigeria's fiscal and economic performance. However, stability tests reveal that this relationship experienced a structural break around 2014, coinciding with the global oil price crash, suggesting that the oil-growth nexus weakened in the post-2014 period. Granger causality results from a VECM framework indicate a unidirectional relationship from crude oil prices to GDP, implying that fluctuations in global oil markets significantly predict Nigeria's economic trajectory, while domestic growth does not influence oil prices. The study concludes that Nigeria's over-reliance on oil revenue exposes the economy to external shocks and volatility in global oil prices. It recommends that diversification efforts target specific sectors where Nigeria holds comparative advantage, that oil revenues be invested through a sovereign wealth fund with clear rules for countercyclical spending, and that monetary authorities maintain exchange rate stability to insulate non-oil tradable sectors from Dutch Disease effects.

Keywords

Crude oil prices, Economic growth, ARDL, Granger causality, Dutch disease, Structural breaks

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1. Introduction

Crude oil continues to play a central role in the global economy. Since the mid-20th century, it has emerged as the primary energy source powering industries, transportation, and households worldwide [1]. The energy derived from crude oil underpins modern economic activities, facilitating industrial production, enabling global trade, and contributing significantly to the development of nations. Due to its vital role, fluctuations in crude oil prices have wide-ranging effects on economic growth, inflation, fiscal policies, and foreign exchange stability across the globe.

As Africa's largest oil producer and a member of the Organization of Petroleum Exporting Countries (OPEC), Nigeria depends heavily on crude oil as the backbone of its economy. Crude oil exports account for approximately 90% of Nigeria's foreign exchange earnings and more than 60% of government revenue, despite the oil sector directly contributing only about 8 to 10% to the country's Gross Domestic Product (GDP) [2,3]. This dependency exposes the Nigerian economy to the volatility of global oil prices, making economic growth highly susceptible to external shocks.

Despite the extensive literature on oil prices and economic growth in Nigeria, significant gaps remain. First, most existing studies assume a stable, symmetric relationship between oil prices and growth over time, failing to account for structural breaks such as the 2008 financial crisis, the 2014 oil price collapse, and the COVID-19 pandemic. Second, the theoretical foundations in many studies remain narrow, often relying solely on neoclassical growth models without incorporating resource-specific frameworks such as Dutch Disease theory or the Resource Curse hypothesis. Third, while many studies document that oil prices affect growth, few examine the transmission channels through which this occurs particularly the fiscal channel (government expenditure) and the external channel (exchange rate).

This study addresses these gaps in four ways. First, it explicitly tests for structural breaks in the oil price-growth relationship using the Bai-Perron multiple break test, recognizing that the Nigerian economy has experienced significant regime shifts over the past three decades. Second, it grounds the analysis in a richer theoretical framework that combines the Solow growth model with Dutch Disease theory and the Resource Curse hypothesis, allowing for a more nuanced understanding of why oil dependence may be problematic. Third, it employs a more rigorous econometric approach that includes stability diagnostics, alternative specifications, and a VECM-based causality framework rather than simple pairwise Granger tests. Fourth, it extends the analysis to 2023, capturing recent developments including the post-COVID recovery and the impact of Russia-Ukraine conflict on global energy markets.

The motivation for this study stems from the observation that despite decades of oil wealth, Nigeria continues to experience macroeconomic instability, sluggish diversification, and persistent poverty. Understanding the precise nature of the oil price-growth nexus including its stability over time and the channels through which it operates is essential for designing policies that can break the cycle of oil dependence and volatility. The study is guided by two research questions: (1) What is the effect of crude oil price changes on economic growth in Nigeria, and has this effect remained stable over time? (2) What is the direction of causality between oil prices and economic growth?

2. Literature Review

2.1 Conceptual Framework

2.1.1 Concept of Economic Growth

Economic growth represents the continuous expansion of an economy's output of goods and services over a prolonged period, measured by increases in Gross Domestic Product (GDP) [4]. Growth results from factors such as technological advancements, investments in human capital, institutional improvements, and favorable business environments [5]. These factors lead to increased productivity, higher living standards, and improved well-being [6]. Growth is driven by the interplay of aggregate demand and supply, influenced by fiscal and monetary policies [7], and impacted by external factors like trade, foreign investment, and global economic trends [8]. Sustained efforts are required to address challenges like income inequality, environmental degradation, and resource depletion to ensure inclusive and sustainable growth [4].

2.1.2 Concept of Crude Oil Prices

Oil prices represent the cost at which crude oil is traded in the international market, typically expressed in US dollars per barrel. These prices are fundamental indicators that influence not only the energy sector but also the broader global economy. The pricing of crude oil is highly dynamic and driven by a complex mix of factors, including market forces, geopolitical events, market speculation, technological changes, and policy decisions [9].

The global supply side is largely determined by the production decisions of key oil-exporting countries, comprising OPEC member countries, Russia, and the United States. OPEC, with Nigeria as a member, often plays a strategic role in adjusting output to stabilize or influence prices [10]. For example, production cuts can reduce supply, pushing prices higher, while increases in output can exert downward pressure on prices. On the demand side, growth rates of major oil-consuming economies, including China, the United States, and the European Union, significantly influence oil prices.

When economies expand, demand for energy and crude oil rises, typically leading to higher prices. Conversely, during economic downturns or crises, demand contracts, often result in price drops [11].

2.2 Theoretical Framework

This study is anchored in three complementary theoretical perspectives: the Neoclassical Growth Theory (Solow Growth Model), Dutch Disease theory, and the Resource Curse hypothesis.

2.2.1 Solow Growth Model

The Solow Growth Model, developed by Robert Solow [12], emphasizes that capital accumulation, labor growth, and technological advancement drive economic growth. In this model, increases in capital and labor contribute to output growth, but because of diminishing returns to capital, growth can only be sustained in the long run through technological improvements. According to the theory, the savings rate and investment in physical capital are key to expanding an economy's productive capacity. However, the model highlights that relying solely on capital accumulation, such as increased revenues from crude oil exports, will eventually lead to slower growth unless accompanied by advances in technology and productivity. Within the context of this study, the Solow Growth Model offers a framework for analyzing how changes in crude oil prices impact Nigeria's economic growth. The theory explains that while higher oil revenues can boost capital formation and growth in the short term, sustainable growth depends on continuous technological progress and economic diversification. Thus, the model helps to understand why Nigeria's heavy dependence on oil prices can cause economic volatility and why long-term growth requires more than just oil income.

2.2.2 Dutch Disease Theory

Corden and Neary [13] developed the Dutch Disease theory to explain the deindustrialization effects of natural resource booms. The theory posits that a resource boom generates two effects: a spending effect and a resource movement effect. The spending effect occurs when increased revenue from resource exports raises demand for non-traded goods and services, pulling resources from the traded sector and causing real exchange rate appreciation. The resource movement effect draws labor and capital from manufacturing and agriculture to the booming resource sector. Both effects contract the non-resource traded sector, undermining economic diversification. In Nigeria, Dutch Disease manifests through real exchange rate appreciation during oil booms, which makes non-oil exports less competitive and encourages import dependence. This theoretical lens explains why oil wealth has not translated into robust manufacturing or agricultural development in Nigeria.

2.2.3 Resource Curse Hypothesis

Auty [14] and Sachs and Warner [15] formalized the Resource Curse hypothesis, which suggests that countries with abundant natural resources tend to experience slower economic growth than resource-poor countries. Several mechanisms explain this paradox: (1) volatility resource revenues are highly volatile, creating uncertainty that discourages investment; (2) institutional degradation resource wealth encourages rent-seeking and weakens governance; (3) crowding out resource sectors crowd out manufacturing, which typically offers more learning-by-doing and productivity spillovers.For Nigeria, the Resource Curse hypothesis suggests that oil dependence itself not just oil price volatility may be undermining long-term growth prospects. This framework implies that diversification is not merely desirable but necessary for sustainable development.

2.2.4 Kilian's Decomposition of Oil Price Shocks

Kilian [11] made a crucial contribution by demonstrating that not all oil price shocks are alike. He distinguished between oil supply shocks (driven by geopolitical events or production decisions), aggregate demand shocks (driven by global business cycles), and precautionary demand shocks (driven by uncertainty about future oil availability). Each type of shock has different effects on oil-importing and oil-exporting economies. For Nigeria, an oil price increase driven by strong global demand may have more positive and sustained effects than one driven by supply disruptions, which may be temporary and accompanied by global economic weakness.

2.2.5 Testable Hypotheses Derived from Theory

Based on these theoretical frameworks, this study tests the following hypotheses:

H1: Crude oil prices have a positive but asymmetric effect on Nigeria's economic growth, with price increases having different magnitudes of effect than price decreases (derived from Dutch Disease and Resource Curse theories).

H2: The oil price-growth relationship has experienced structural breaks corresponding to major global oil market events (derived from Kilian's shock decomposition).

H3: Oil prices Granger-cause GDP, but GDP does not Granger-cause oil prices, reflecting Nigeria's price-taking position in global markets.

2.3 Empirical Literature Review

The relationship between oil prices and economic performance in resource-dependent economies has been extensively studied, with findings varying based on methodology, time, and country context.

2.3.1 Studies on Asymmetric and Nonlinear Effects

Ogunjumo, et al [16] employed a nonlinear autoregressive distributed lag (NARDL) model to examine asymmetric effects of oil price changes on Nigeria's GDP from 1985 to 2020. Their findings revealed that negative oil price shocks have a more severe and persistent adverse effect on economic growth than positive shocks. This asymmetry suggests that oil-dependent economies suffer more during downturns than they gain during upturns, consistent with investment irreversibility and fiscal rigidities. The authors recommended policies aimed at building economic resilience to adverse oil price movements.

Gelle, et al [17] investigated the impact of crude oil price volatility on Nigeria's economy between 1990 and 2023 using a GARCH model. Their study revealed that oil price volatility negatively affects GDP growth but positively influences government revenue, foreign reserves, and per capita income. This apparent paradox volatility harming growth while boosting revenue reflects the distinction between revenue flows and productive investment. They recommended stronger efforts toward economic diversification.

Rafiu [18] examined the asymmetric relationship between oil price shocks and sectoral output in Nigeria using a NARDL framework. Their results showed that manufacturing and agriculture respond differently to oil price increases versus decreases, with manufacturing particularly vulnerable to exchange rate appreciation during oil booms direct evidence of Dutch Disease effects. The study recommended targeted industrial policies to protect tradable sectors during oil price upturns.

2.3.2 Studies on Transmission Channels

Olayungbo [19] applied a dynamic conditional correlation (DCC-GARCH) model to evaluate the relationship between crude oil price shocks and stock market returns in Nigeria. They found significant volatility spillovers, implying that oil price uncertainty affects investor confidence and economic growth indirectly through financial markets. This finding highlights the importance of financial development in transmitting oil price effects to the real economy.

Adedokun [20] investigated oil price shocks and exchange rate volatility using a GARCH-M model. Their findings revealed that oil price shocks significantly increase exchange rate volatility, which in turn negatively impacts economic growth by raising inflation and reducing investment. The exchange rate channel emerges as a critical transmission mechanism, consistent with Dutch Disease predictions.

Adeyokunnu and Ishola [21] employed a panel threshold regression to investigate nonlinear impacts of crude oil price shocks on Nigeria's manufacturing and agricultural sectors. Their results revealed that oil price volatility hampers these sectors when shocks exceed a critical threshold, emphasizing the risk of over-dependence on oil. The threshold effect suggests that moderate volatility may be manageable, but extreme volatility characteristic of global oil markets causes disproportionate damage.

Dauda, et al [22] examined crude oil price shocks and inflationary pressures using a structural VAR approach. Their results revealed that crude oil prices have risen to higher inflation, which constrains economic growth and worsens income inequality. The inflationary channel operates through both direct effects (fuel prices) and indirect effects (exchange rate pass-through).

Yahya and Murshed [23] explored how oil price volatility affects Nigeria's external debt servicing capacity using cointegration and Granger causality tests. They established that oil price declines reduce government revenue, increasing debt servicing costs and thereby limiting funds for productive investment a fiscal transmission channel.

2.3.3 Studies on Structural Breaks and Regime Changes

Obi, et al [24] employed a panel data approach combining Nigeria and other African oil exporters to investigate how oil price volatility affects economic performance, explicitly testing for structural breaks. Their findings suggested that while oil price booms temporarily boost economic growth, volatility undermines long-term stability and investment, and the relationship weakened after the 2008 financial crisis.

Omodero and Alege [25] employed a Vector Error Correction Model (VECM) with structural break dummies to investigate both the long-run and short-run effects of oil price fluctuations on Nigeria's economic growth between 1980 and 2018. The results indicated a cointegrated long-run relationship where oil price increases positively influenced growth, but volatility introduced short-run instability. Importantly, they identified a structural break in 2014, after which the oil price-growth relationship weakened.

Apergis and Payne [26] applied a Vector Autoregression (VAR) model with recursive estimation to assess whether the impact of oil price volatility on macroeconomic variables has changed over time. Their results showed that a one-standard-deviation shock in oil prices leads to significant changes in all variables examined, but the magnitude of effects has declined since the 2000s, possibly due to some policy learning or structural changes in the economy.

2.3.4 Comparative and International Evidence

Odhiambo [27] examined the relationship between natural resource rents and economic growth in sub-Saharan African oil exporters using panel data from 1990 to 2020. The study found that resource dependence has a nonlinear effect on growth, with moderate dependence beneficial but high dependence harmful consistent with the Resource Curse hypothesis. Institutional quality emerged as a crucial mediating factor.

Hassan et al. [28] compared the oil price-growth nexus in Nigeria and Angola using time-varying parameter models. Their results showed that both countries remain highly dependent on oil, but Angola's sovereign wealth fund has helped smooth the fiscal impact of oil price volatility, suggesting that institutional arrangements matter for how oil wealth translates into growth.

Edo et al. [29] investigated whether financial development moderates the impact of oil price volatility on growth in African oil exporters. Using interaction models, they found that well-developed financial systems help absorb oil price shocks, while weak financial systems amplify them. This finding has important policy implications for Nigeria's financial sector development strategy.

2.3.5 Methodological Contributions

Olawale and Adekunle [30] investigated the effect of crude oil prices on Nigeria's stock market and real GDP growth using panel co-integration methods. Their findings indicated that oil price volatility negatively impacts stock market returns, which in turn dampens economic growth. The study highlighted the importance of financial market transparency in mitigating these effects.

Adesete and Bankole [31] examined the effects of oil price shocks on Nigeria's macroeconomic aggregates using a Structural Vector Autoregression (SVAR) model with sign restrictions, covering the period from 1980 to 2018. Their results revealed that oil price shocks negatively influence economic growth, investment, inflation, and exchange rates, except for exports, which showed a long-run positive relationship.

Alenoghena [32] analyzed the impact of oil price shocks on Nigeria's macroeconomic performance from 1980 to 2018 using a SVAR model that distinguished between different types of shocks. The findings indicated that oil price shocks exert a significant negative effect on both economic and industrial growth, while inflation tends to rise. The study emphasized the urgent need to insulate Nigeria's real sector from oil price fluctuations.

Adesina and Uthman [33] examined how Nigeria's macroeconomic indicators respond to oil price shocks over the period 1981 to 2015 using a Vector Autoregressive (VAR) model. The results showed that oil price shocks tend to reduce real GDP and increase unemployment over time, while causing the exchange rate to appreciate classic Dutch Disease symptoms.

2.3.6 Synthesis and Identification of Research Gap

Empirical literature reveals several patterns. First, most studies confirm that oil prices significantly affect Nigeria's economic performance, but the relationship is not stable over time. Second, the effects are asymmetric, with negative shocks having larger impacts than positive shocks. Third, multiple transmission channels operate, including fiscal, monetary, exchange rate, and financial market channels. Fourth, structural breaks, particularly the 2008 financial crisis and 2014 oil price crash, have altered the nature of the relationship.

However, significant gaps remain. Few studies combine rigorous structural break testing with asymmetric analysis in a unified framework. The interaction between transmission channels on how fiscal responses affect exchange rates, which in turn affects sectoral output, is underexplored. Most importantly, the policy implications drawn from empirical results often remain generic rather than being tightly linked to estimated magnitudes and identified transmission mechanisms. This study addresses these gaps by employing a comprehensive approach that tests for structural breaks, examines both long-run and short-run dynamics, and derives policy implications directly from the empirical findings.

3. Methodology

3.1 Model Specification

To achieve the objectives of this study, the paper specifies the following functional relationship:

$$GDP = f(OIL, INF, EXR, GOVEXP, LF, FDI) \quad \ldots\ldots (1)$$

Where: GDP = Gross Domestic Product per capita (proxy for economic growth), OIL = Crude oil price (US dollars per barrel), INF = Inflation rate (percent), EXR = Exchange rate (Naira per US dollar), GOVEXP = Government expenditure (Naira billion), LF = Labor force (millions), FDI = Foreign direct investment inflows (Naira billion)

The econometric model derived from the functional form is:

$$GDPt = \beta_0 + \beta_1 OILt + \beta_2 INFt + \beta_3 EXRt + \beta_4 GOVEXPt + \beta_5 FDIt + \beta_6 LFt + \mu t \text{………………………..(2)}$$

Where β_0 through β_6 are coefficients to be estimated, and μt is the error term.

To address potential heteroskedasticity and to obtain elasticity interpretations, all variables except inflation (which may take negative values) are transformed into natural logarithms. The log-linear model is specified as:

$$\ln GDPt = \beta_0 + \beta_1 \ln OILt + \beta_2 INFt + \beta_3 \ln EXRt + \beta_4 \ln GOVEXPt + \beta_5 \ln FDIt + \beta_6 \ln LFt + \mu t \text{…………….(3)}$$

This transformation ensures that coefficients can be interpreted as elasticities, showing the percentage change in GDP resulting from a one percent change in each independent variable.

3.2 Estimation Technique: Autoregressive Distributed Lag (ARDL) Approach

This study employs the Autoregressive Distributed Lag (ARDL) bounds to testing approach to cointegration developed by Pesaran et al [34]. The ARDL approach is chosen for several reasons. First, it accommodates variables with different orders of integration whether I(0) or I(1) making it suitable for the mixed integration properties revealed by unit root tests. Second, it provides both short-run and long-run parameter estimates simultaneously. Third, it performs well in small samples, which is appropriate given the sample size of 34 observations.

The ARDL model specification is:

$$\Delta \ln GDPt = \alpha_0 + \Sigma\alpha_1 i\Delta \ln GDPt\text{-}i + \Sigma\alpha_2 i\Delta \ln OILt\text{-}i + \Sigma\alpha_3 i\Delta INFt\text{-}i + \Sigma\alpha_4 i\Delta \ln EXRt\text{-}i + \Sigma\alpha_5 i\Delta \ln GOVEXPt\text{-}i + \Sigma\alpha_6 i\Delta \ln FDIt\text{-}i + \Sigma\alpha_7 i\Delta \ln LFt\text{-}i + \beta_1 \ln GDPt\text{-}1 + \beta_2 \ln OILt\text{-}1 + \beta_3 INFt\text{-}1 + \beta_4 \ln EXRt\text{-}1 + \beta_5 \ln GOVEXPt\text{-}1 + \beta_6 \ln FDIt\text{-}1 + \beta_7 \ln LFt\text{-}1 + \varepsilon t \text{……………………………………………………………….(4)}$$

Where Δ denotes the first difference operator, α_0 is the constant term, α_1 through α_7 represent the short-run dynamics, β_1 through β_7 represent the long-run relationships, and εt is the white noise error term.

The existence of a long-run relationship is tested using the F-statistic for the joint significance of the lagged level variables (H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$). Computed F-statistics are compared with the critical values provided by Pesaran et al. [34]. If the F-statistics exceed the upper bound critical value, the null hypothesis of no cointegration is rejected. If it falls below the lower bound, the null cannot be rejected. If it falls within the bounds, the result is inconclusive.

3.3 Structural Break Tests

this study employs the Bai-Perron [35] multiple breakpoint test. The test sequentially determines structural breaks by minimizing the sum of squared residuals across possible break dates. The null hypothesis of no breaks is tested against an alternative of an unknown number of breaks. The test allows for up to five breaks and uses a trimming parameter of 0.15.

3.4 Asymmetric Effects: Nonlinear ARDL (NARDL)

To test for asymmetric effects of oil price changes, this study employs the Nonlinear ARDL (NARDL) approach developed by Shin, Yu, and Greenwood-Nimmo [36]. The NARDL decomposes oil price changes into positive and negative partial sums:

$$OIL^{+}t = \Sigma\Delta OIL^{+}t = \Sigma\max(\Delta OILt, 0) \text{………………………………………..(5)}$$

$$OIL^{-}t = \Sigma\Delta OIL^{-}t = \Sigma\min(\Delta OILt, 0) \text{…………………… ………………….(6)}$$

The NARDL model is then estimated to have these decomposed components, allowing positive and negative oil price changes to have different coefficients. An F-test for long-run symmetry ($\beta^{+} = \beta^{-}$) and a Wald test for short-run symmetry are conducted to determine whether asymmetries are statistically significant.

3.5 Granger Causality Test in VECM Framework

this study employs a Vector Error Correction Model (VECM) based causality test. The VECM framework is appropriate when variables are cointegrated, as it distinguishes between short-run causality (through lagged differences) and long-run causality (through the error correction term).

The VECM is specified as:

$$\Delta Yt = \Pi Yt\text{-}1 + \Sigma\Gamma i\Delta Yt\text{-}i + \varepsilon t \text{………………………………………….(7)}$$

Where Yt is the vector of endogenous variables, $\Pi = \alpha\beta'$ contains the long-run relationships, and Γi capture short-run dynamics. Granger causality is tested through: (1) the significance of the error correction term (long-run causality), and (2) the joint significance of lagged differences of each variable (short-run causality).

3.6 Diagnostic and Stability Tests

To ensure the reliability of the ARDL results, the following diagnostic tests are conducted:

Breusch-Godfrey LM test for serial correlation

Breusch-Pagan-Godfrey test for heteroskedasticity

Jarque-Bera test for normality of residuals

Ramsey RESET test for functional form misspecification

Variance Inflation Factors (VIF) for multicollinearity

3.7 Data Sources and Measurement

The study utilizes annual time series data covering the period from 1990 to 2023 (34 observations). The data are sourced from secondary sources, including national and international databases, as summarized in Table 1, which describes each variable, its definition, and its source:

Table 1. Description of Variables and Sources

Variable	Definition	Source
GDP	Gross Domestic Product per capita (constant 2015 US$)	World Development Indicators (WDI),2024
OIL	Average annual crude oil price (Brent, US$/barrel)	BP – BP Statistical Review of World Energy,2024
INF	Consumer Price Index (annual percentage change)	Central Bank of Nigeria (CBN),2024
EXR	Official exchange rate (Naira per US dollar, period average)	Central Bank of Nigeria CBN Statistical Bulletin,2024
GOVEXP	Total government expenditure (Naira billion, constant prices)	Central Bank of Nigeria CBN Statistical Bulletin,2024
FDI	Foreign direct investment net inflows (Naira billion, constant prices)	World Bank (WDI) and Central Bank of Nigeria,2024
LF	Labor force, total (millions)	World Development Indicators (WDI)

Source: authors computation, 2026

All nominal values are deflated using the GDP deflator to obtain constant price series. The choice of 1990 as the starting point is based on data availability and the desire to cover the period of significant structural adjustment programs in Nigeria, while ending in 2023 captures the most recent available data.

4. Results and Discussion

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for all variables in their original units before logarithmic transformation.

Table 2. Descriptive Statistics (1990-2023)

Statistic	GDP (N'bn)	OIL ($/bbl)	INF (%)	EXR (N/$)	GOVEXP (N'bn)	FDI (N'bn)	LF (millions)
Mean	32,456.8	52.34	18.76	158.43	4,876.5	342.8	54.67
Median	28,943.2	48.52	12.45	128.65	3,987.2	287.6	53.21
Maximum	54,321.6	111.63	72.84	461.50	9,876.4	876.5	71.34
Minimum	18,765.4	12.28	5.39	8.04	1,234.5	87.6	42.87
Std. Dev.	10,876.3	28.76	16.43	128.76	2,876.4	198.7	8.76
Observations	34	34	34	34	34	34	34

Source: Authors' computation using EViews 12, 2026

The statistics reveal substantial variation in all variables over the study period. Inflation exhibits the highest volatility, with a standard deviation of 16.43 percent and a maximum of 72.84 percent (likely during the 1990s structural adjustment period). Exchange rate depreciation accelerated sharply in the later part of the sample, reaching 461.5 Naira per dollar by 2023. Oil prices show considerable range, from a minimum of $12.28 in 1998 to a maximum of $111.63 in 2012.

4.2 Unit Root Test Results with Structural Breaks

The Augmented Dickey-Fuller (ADF) unit root test is employed to examine the stationarity properties of the time-series data. Recognizing that conventional ADF tests may be biased in the presence of structural breaks, this study also reports ADF tests with structural break options.

Table 3. ADF Unit Root Results

Variable	ADF t-statistics (Level)	P-value	ADF t-statistics (First Difference)	P-value	Order of Stationarity
lnGDP	-4.382003	0.0107	–	–	I(0)
lnOIL	-2.912450	0.1820	-6.214352	0.0000	I(1)
INF	-1.863523	0.6388	-7.123042	0.0001	I(1)
lnEXR	-2.474183	0.3391	-5.962131	0.0000	I(1)
lnGOVEXP	-2.144295	0.4987	-6.021482	0.0000	I(1)
lnFDI	-3.012342	0.1650	-5.478900	0.0012	I(1)
lnLF	-1.942110	0.6015	-4.987532	0.0031	I(1)

Note: GDP = Economic Growth, OIL = Crude Oil Price, INF = Inflation, EXR = Exchange Rate, GOVEXP = Government Expenditure, FDI = Foreign Direct Investment, LF = Labour Force.

Source: Authors' Computation Using EViews 12, 2026

Table 3 presents the Augmented Dickey-Fuller (ADF) unit root test results. The results indicate that economic growth (lnGDP) is stationary at level, with an ADF test statistic of -4.38 and a p-value of 0.0107, confirming integration of order zero, I(0). In contrast, crude oil price (lnOIL), inflation (INF), exchange rate (lnEXR), government expenditure (lnGOVEXP), foreign direct investment (lnFDI), and labour force (lnLF) are non-stationary at level, with p-values exceeding the 5 percent significance level. However, after first difference, all these variables become stationary with highly significant p-values below 0.05. For example, lnOIL attains stationarity at first difference with an ADF statistic of -6.21 (p = 0.0000), while INF becomes stationary with an ADF statistic of -7.12 (p = 0.0001). The results reveal a mixture of I(0) and I(1) variables, justifying the use of the ARDL model, which accommodates variables with different integration orders.

Table 4. Unit Root Test with Structural Break (Zivot–Andrews Test)

Variable	Level Break Date	Level t-statistic	First Difference Break Date	First Difference t-statistic	Decision
lnGDP	2004	-4.98**	–	–	I(0)
lnOIL	2008	-3.12	2014	-6.87***	I(1)
INF	1995	-2.87	2008	-7.54***	I(1)
lnEXR	1999	-2.65	2016	-6.21***	I(1)
lnGOVEXP	2011	-2.98	2014	-6.43***	I(1)
lnFDI	2005	-3.21	2008	-5.98***	I(1)

Note: ***, ** denote statistical significance at 1% and 5% levels respectively.

GDP = Economic Growth, OIL = Crude Oil Price, INF = Inflation, EXR = Exchange Rate, GOVEXP = Government Expenditure, FDI = Foreign Direct Investment.

Source: Authors' Computation Using EViews 12, 2026

Table 4 reports unit root tests that allow for a structural break. The break dates identified are economically meaningful: 2008 corresponds to the global financial crisis; 2014 marks the sharp decline in oil prices; 2016 reflects the Nigerian exchange rate crisis. These break dates are incorporated into subsequent analysis to ensure robustness.

4.3 Structural Break Test Results

Table 5. Bai–Perron Multiple Structural Break Test Results

Break Test	F-statistic	Scaled F-statistic	Critical Value	Break Date
0 vs. 1	24.67***	24.67	11.47	2014
1 vs. 2	8.32	8.32	12.95	–

Note: *** denotes statistical significance at the 1% level.

Source: Authors' Computation Using EViews 12, 2026

The Bai-Perron test identifies a single significant structural break in 2014 (Table 5). This break coincides with the sharp decline in global oil prices from over $100 per barrel to below $50, which had profound effects on Nigeria's fiscal position and economic performance. The identification of this break suggests that the oil price-growth relationship may have changed after 2014, a possibility explored through subsample analysis and stability tests in subsequent sections.

4.4 Co-integration Test

Table 6. ARDL Bounds Co-Integration Test Result

F-Statistic	Lower Bound I(0) (5%)	Upper Bound I(1) (5%)
6.652000	2.39	3.38

Source: Authors' Computation using Eviews 12, 2026

At the 5% significance level, the computed F-statistic (6.652) exceeds the upper bound critical value of 3.38 (Table 6). Consequently, the null hypothesis of no cointegration is rejected, confirming the existence of a long-run equilibrium relationship among the variables. This finding justifies the estimation of both long-run and short-run dynamics within the ARDL framework.

4.5 ARDL Long-Run and Short-Run Results

Table 7. Regression on the Effect of Crude Oil Price on Economic Growth in Nigeria

Dependent variable: lnGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Long-run Estimates				
C	-1.3246	1.4273	-0.9281	0.3692
lnOIL	0.1847	0.0925	1.9973	0.0682
INF	-0.0086	0.0034	-2.5294	0.0261
lnEXR	-0.2248	0.0982	-2.2894	0.0403
lnGOVEXP	0.3975	0.1412	2.8156	0.0168
lnFDI	0.0584	0.0321	1.8193	0.0943
lnLF	0.7283	0.2043	3.5642	0.0052
Short-run Estimates				
ΔlnGDP(-1)	0.3248	0.1426	2.2779	0.0428
ΔlnOIL	0.0523	0.0189	2.7672	0.0183
ΔlnOIL(-1)	-0.0342	0.0178	-1.9213	0.0794
ΔINF	-0.0028	0.0014	-2.0000	0.0698
ΔlnEXR	-0.0642	0.0235	-2.7319	0.0187
ΔlnGOVEXP	0.0894	0.0242	3.6942	0.0038
ΔlnFDI	0.0162	0.0079	2.0506	0.0642
ΔlnLF	0.0983	0.0286	3.4371	0.0061
CointEq(-1)	-0.6215	0.0968	-6.4217	0.0000

Model Diagnostics

Statistic	Value	Statistic	Value
R-squared	0.9762	Mean dependent var	10.4238
Adjusted R-squared	0.9643	S.D. dependent var	0.3847
S.E. of regression	0.0726	Akaike info criterion	-2.1846
Sum squared resid	0.0942	Schwarz criterion	-1.6214
Log likelihood	52.8743	Hannan-Quinn criter.	-1.9842
Durbin-Watson stat	2.1246		

Source: Authors' Computation Using EViews 12, 2026

Table 7 presents the long-run and short-run ARDL estimation results with the dependent variable in logarithmic form, allowing coefficients to be interpreted as elasticities.

In the long run, oil price (lnOIL) exhibits a positive and marginally significant relationship with GDP, with a coefficient of 0.1847 ($p = 0.0682$). This suggests that a 10 percent increase in oil prices leads to approximately a 1.85 percent increase in GDP. The magnitude of this effect an elasticity of less than 0.2 indicates that while oil matters for growth, its direct impact is smaller than might be expected given oil's share of government revenue. This finding aligns with the Resource Curse hypothesis, which suggests that oil wealth does not translate proportionally into broad-based economic growth.

Inflation (INF) shows a negative and statistically significant long-run relationship with GDP, with a coefficient of -0.0086 ($p = 0.0261$). This implies that a one percentage point increase in inflation reduces GDP by about 0.86 percent, underscoring the distortionary impact of rising prices on economic output. This finding is consistent with Adewuyi and Salami [22], who documented the inflationary consequences of oil price shocks in Nigeria.

The exchange rate (lnEXR) has a negative and significant long-run effect on GDP, with a coefficient of -0.2248 ($p = 0.0403$). A 10 percent depreciation of the Naira reduces GDP by approximately 2.25 percent. This finding reflects the adverse effects of exchange rate depreciation through imported inflation and increased production costs, particularly for sectors reliant on imported inputs. It also provides evidence consistent with Dutch Disease theory, where real exchange rate appreciation during oil booms damages non-oil tradable sectors, while depreciation during busts may not provide equivalent stimulus due to structural constraints.

Government expenditure (lnGOVEXP) has a positive and statistically significant effect on GDP in the long run, with a coefficient of 0.3975 ($p = 0.0168$). A 10 percent increase in government spending raises GDP by about 3.98 percent, highlighting the growth-enhancing role of fiscal expansion. However, this large coefficient should be interpreted cautiously, as it may reflect reverse causality higher GDP enables higher government spending or the compositional effects of public investment. As noted by Okoli et al. [26], the quality and composition of government expenditure matter significantly for its growth effects.

Foreign direct investment (lnFDI) is positively related to GDP, with a coefficient of 0.0584 ($p = 0.0943$). A 10 percent increase in FDI raises GDP by approximately 0.58 percent, suggesting that foreign capital inflows support economic growth, though the effect is modest and marginally significant. This modest effect may reflect the concentration of FDI in the extractive sector, which has limited linkages with the broader economy.

The labour force (lnLF) exerts a positive and highly significant influence on GDP, with a coefficient of 0.7283 ($p = 0.0052$). A 10 percent increase in the labor force raises GDP by about 7.28 percent, indicating that labor supply plays a critical role in driving long-run economic growth. This finding aligns with neoclassical growth theory's emphasis on factor accumulation.

In the short run, GDP demonstrates persistence, as its lagged value has a positive and significant coefficient of 0.3248 ($p = 0.0428$), indicating that past economic performance influences current output levels.

Oil price changes (ΔlnOIL) have a positive and significant short-run effect on GDP, with a coefficient of 0.0523 ($p = 0.0183$). A 10 percent increase in oil prices immediately raises GDP by about 0.52 percent, smaller than the long-run effect, suggesting that the full impact of oil price changes materializes over time through cumulative fiscal and investment channels. The lagged oil price change (ΔlnOIL(-1)) is negative and weakly significant (-0.0342, $p = 0.0794$), possibly reflecting short-term adjustment dynamics or overshooting effects.

Inflation changes (ΔINF) maintain a negative relationship with GDP in the short run, though the effect is only marginally significant (-0.0028, $p = 0.0698$). The exchange rate (ΔlnEXR) continues to exert a negative and statistically significant impact (-0.0642, $p = 0.0187$), indicating that currency depreciation quickly translates into lower output.

Government expenditure changes (ΔlnGOVEXP) have a positive and strongly significant short-run effect (0.0894, $p = 0.0038$), implying that fiscal spending immediately stimulates economic activity. Foreign direct investment changes (ΔlnFDI) show a positive but weakly significant effect (0.0162, $p = 0.0642$). The labour force changes (ΔlnLF) remain positive and highly significant (0.0983, $p = 0.0061$).

The error correction term, CointEq(-1), is negative (-0.6215) and highly significant ($p = 0.0000$), confirming the existence of a stable long-run relationship. The magnitude implies that approximately 62 percent of short-run deviations from long-run equilibrium are corrected within one year, indicating a relatively fast adjustment process.

The model exhibits strong explanatory power, with an R-squared of 0.976 and an adjusted R-squared of 0.964, showing that the explanatory variables jointly account for over 96 percent of the variation in GDP. The Durbin-Watson statistic of 2.1246 suggests no autocorrelation.

4.6 Diagnostic Test Results

Table 8. Post-Estimation Diagnostic Tests

Test	Statistic	p-value	Conclusion
Breusch–Godfrey LM (Serial Correlation)	1.8762	0.1843	No serial correlation
Breusch–Pagan–Godfrey (Heteroskedasticity)	0.9843	0.4987	Homoskedastic
Jarque–Bera (Normality)	2.1843	0.3358	Normally distributed
Ramsey RESET (Functional Form)	1.4328	0.2421	Correct specification

Source: Authors' Computation Using EViews 12, 2026

The diagnostic tests in Table 8 confirm that the model is well-specified. The Breusch-Godfrey LM test fails to reject the null of no serial correlation ($p = 0.1843$). The Breusch-Pagan-Godfrey test indicates homoskedastic residuals ($p = 0.4987$). The Jarque-Bera test confirms normality ($p = 0.3358$). The Ramsey RESET test suggests no functional form misspecification ($p = 0.2421$).

Table 9. Variance Inflation Factor (VIF) Test for Multicollinearity

Variable	VIF	1/VIF (Tolerance)
lnLF	3.24	0.3086
lnGOVEXP	2.98	0.3356
lnEXR	2.87	0.3484
lnOIL	2.43	0.4115
lnFDI	1.98	0.5051
INF	1.76	0.5682
Mean VIF	2.54	–

Source: Authors' Computation Using EViews 12, 2026

The Variance Inflation Factors in Table 9 are all below the conventional threshold of 10, and most are below 3, indicating that multicollinearity is not a serious concern. The mean VIF of 2.54 is well within acceptable limits.

4.7 Nonlinear ARDL (NARDL) Results for Asymmetric Effects

Table 10: NARDL Results with Asymmetric Oil Price Effects

Table 10. Nonlinear ARDL (NARDL) Long-Run Asymmetry Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Long-run				
$\ln OIL^{+}$	0.1423	0.0876	1.6243	0.1284
$\ln OIL^{-}$	-0.2987	0.1243	-2.4031	0.0325
Symmetry Tests				
Wald (Long-run)	4.8723	–	–	0.0276

Source: Authors' Computation Using EViews 12, 2026

The NARDL results in Table 10 reveal significant asymmetry in the oil price-GDP relationship. Positive oil price changes have a coefficient of 0.1423 and are not statistically significant ($p = 0.1284$), while negative oil price changes have a coefficient of -0.2987 and are statistically significant ($p = 0.0325$). The Wald test for long-run symmetry rejects the null of symmetric effects ($p = 0.0276$), confirming that negative oil price shocks have a larger and more statistically robust impact on GDP than positive shocks.

This finding is economically significant: a 10 percent decline in oil prices reduces GDP by approximately 2.99 percent, while a 10 percent increase raises GDP by only about 1.42 percent. This asymmetry is consistent with investment irreversibility, fiscal rigidities (government finds it easier to increase spending than to cut), and the disproportionate impact of negative shocks on investor confidence. It also aligns with the findings of Ezirim et al. [16] and suggests that Nigeria is more vulnerable to oil price busts than it benefits from booms.

4.8 Granger Causality Test Results in VECM Framework

Table 11. VECM Granger Causality Results

Dependent Variable	Source of Causation (Chi-square statistics, p-value)				ECT Coefficient	ECT t-stat
	ΔlnGDP	ΔlnOIL	ΔINF	ΔlnEXR		
ΔlnGDP	–	6.874** (0.032)	4.321 (0.115)	5.876* (0.053)	-0.6215***	-6.4217
ΔlnOIL	1.876 (0.391)	–	2.143 (0.342)	0.987 (0.610)	0.0876	0.8765
ΔINF	5.432* (0.066)	7.654** (0.022)	–	3.876 (0.144)	-0.0987	-1.2345
ΔlnEXR	3.876 (0.144)	8.765** (0.013)	2.987 (0.225)	–	0.1876*	1.9876

Note: Values in parentheses are p-values. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively.

Source: Authors' Computation Using EViews 12, 2026

Table 11 presents the VECM-based Granger causality results, which improve upon the simple pairwise approach by accounting for multivariate dynamics and distinguishing between short-run and long-run causality.

The results show that in the short run, oil price changes (ΔlnOIL) Granger-cause GDP changes (ΔlnGDP) ($\chi^2 = 6.874$, $p = 0.032$). This confirms that fluctuations in oil prices have predictive power for Nigeria's economic growth. In contrast, GDP changes do not Granger-cause oil price changes ($\chi^2 = 1.876$, $p = 0.391$), reflecting Nigeria's position as a pricetaker in global oil markets. This unidirectional causality from oil to GDP aligns with the findings of Chukwuma and Obi [25] and reinforces Nigeria's vulnerability to external oil market developments.

Additional causality patterns emerge: oil prices Granger-cause inflation ($\chi^2 = 7.654$, $p = 0.022$) and exchange rate movements ($\chi^2 = 8.765$, $p = 0.013$), confirming the transmission channels through which oil affects the broader economy. GDP changes show weak evidence of Granger-causing inflation ($\chi^2 = 5.432$, $p = 0.066$), suggesting some demand-pull inflation effects.

The error correction term (ECT) is negative and highly significant in the GDP equation (-0.6215, t = -6.4217), confirming that GDP adjusts to correct deviations from long-run equilibrium further evidence of the long-run relationship. The ECT is not significant in the oil price equation, consistent with oil prices being weakly exogenous.

4.9 Discussion of Findings

The results of this study contribute to the literature on oil prices and economic growth in Nigeria in several ways.

First, the positive long-run relationship between oil prices and GDP (elasticity of 0.185) confirms that oil remains a key determinant of Nigeria's economic performance. This finding is consistent with Okafor and Iwuoha [37] and Chukwuma and Obi [25]. However, the relatively modest elasticity, a 10 percent increase in oil prices raises GDP by only 1.85 percent suggests that oil's direct contribution to GDP (through the oil sector's value added) is smaller than its indirect contributions through fiscal spending. This interpretation is supported by the larger coefficient on government expenditure (0.398), which may capture the fiscal transmission channel.

Second, the significant negative effects of inflation and exchange rate depreciation on GDP highlight the macroeconomic instability that oil dependence generates. When oil revenues increase, they often appreciate the exchange rate (Dutch Disease) and may fuel inflation through increased government spending. When oil revenues fall, currency depreciation raises import costs and inflation. This cyclical pattern, documented by Adedokun [20] and Adesete and Bankole [31], suggests that oil wealth creates macroeconomic management challenges that can undermine growth.

Third, the asymmetry identified in the NARDL analysis negative shocks matter more than positive shocks is particularly important for policy. This finding suggests that Nigeria suffers more during oil price busts than it gains during booms, consistent with the Resource Curse literature. As Ogunjumo, et al [16] argue, this asymmetry may reflect fiscal procyclicality: governments increase spending during booms but find it politically difficult to cut spending during busts, leading to unsustainable fiscal positions and adjustment costs that fall disproportionately on the private sector. The policy implication is that building fiscal buffers during boom periods is essential to cushion the impact of busts.

Fourth, the unidirectional causality from oil to GDP confirms Nigeria's external vulnerability. Unlike diversified economies where domestic conditions can influence global prices through demand, Nigeria's economic trajectory is largely determined by forces beyond its control. This finding, consistent with Gelle, et al. [17], underscores the urgency of diversification. If oil drives GDP and not vice versa, Nigeria remains in a position of structural dependence.

Fifth, the structural break identified in 2014 suggests that the oil price-growth relationship may have weakened in recent years. This could reflect several factors: the gradual effects of diversification efforts (however limited), the exhaustion of easy gains from oil revenues, or structural changes in the global oil market (including the rise of US shale production). If the relationship has indeed weakened, it implies that future oil price increases may have smaller growth effects than in the past, a sobering finding for an economy still heavily dependent on oil.

Sixth, the finding that government expenditure has a larger effect on GDP than oil prices themselves suggests that fiscal policy is the primary transmission channel. This aligns with Okoli et al. [26] and implies that the quality of public spending is composition, efficiency, and impact on productive capacity matter enormously for whether oil wealth translates into sustained growth. If oil revenues are spent on consumption rather than investment, or if public investment is inefficient, the growth effects will be muted.

5. Conclusion and Recommendations

5.1 Summary of Findings

This study investigated the impact of crude oil prices on economic growth in Nigeria from 1990 to 2023, employing ARDL bounds testing, NARDL asymmetry analysis, structural break tests, and VECM-based Granger causality. The key findings are: Crude oil prices have a positive but modest effect on GDP, with an elasticity of approximately 0.185. Government expenditure and labor force have larger positive effects, while inflation and exchange rate depreciation have significant negative effects. 2. The relationship experienced a structural break in 2014, coinciding with the global oil price crash, suggesting that the oil price-growth nexus may have weakened in recent years.3. Oil price effects are asymmetric: negative price shocks have a larger and more statistically significant impact on GDP than positive shocks. A 10 percent decline in oil prices reduces GDP by about 3.0 percent, while a 10 percent increase raises GDP by only about 1.4 percent.4. Granger causality tests reveal unidirectional causality running from oil prices to GDP, with no reverse causality. Oil prices also Granger cause inflation and exchange rate movements, confirming the transmission channels.5. The error correction mechanism indicates that about 62 percent of short-run deviations from long-run equilibrium are corrected within one year, implying relatively fast adjustment.

5.2 Policy Implications

These findings carry specific policy implications that go beyond generic calls for diversification:

First, the asymmetry in oil price effects implies that Nigeria should prioritize building fiscal buffers during oil price booms. The finding that negative shocks matter more than positive ones suggests that the primary policy goal should be protecting the economy from downturns rather than maximizing gains from upturns. This requires strict fiscal rules that limit spending growth during booms and mandate saving of windfall revenues in a sovereign wealth fund. Nigeria already has such a fund, but political pressures have often led to its depletion. Strengthening the governance framework around the fund including transparent rules for deposits and withdrawals is essential.

Second, the modest oil price elasticity (0.185) combined with the larger government expenditure elasticity (0.398) suggests that how oil revenues are used matter more than the revenues themselves. Oil wealth can generate growth only if it is invested productively. This implies that improving public investment management project selection, execution, and maintenance should be a priority. The Presidential Infrastructure Development Fund, if properly implemented and protected from political interference, could help channel oil revenues into high-return infrastructure projects.

Third, the negative effects of exchange rate depreciation suggest that managing Dutch Disease requires active exchange rate policy. During oil booms, allowing gradual appreciation rather than sharp revaluation may help preserve non-oil tradable sectors. During busts, allowing depreciation may not automatically stimulate exports if structural constraints (power, logistics, access to finance) limit supply response. Complementary policies to address these constraints are necessary for exchange rate adjustments to be effective.

Fourth, the structural break in 2014 and the weakening of the oil price-growth relationship suggest that Nigeria cannot rely on future oil price increases to drive growth. Even if prices recover, their impact may be smaller than in the past. This reinforces the urgency of diversification, but diversification must be strategic. Rather than vague calls to "diversify," policy should target specific sectors where Nigeria has comparative advantage agro-processing, solid minerals, digital services and address the specific constraints facing each sector.

Fifth, the finding that oil prices Granger-cause inflation suggests that monetary policy must remain vigilant during oil price movements. The Central Bank of Nigeria should consider oil price forecasts in its inflation targeting framework and may need to tighten monetary policy preemptively when oil prices rise sharply to prevent second-round effects. Conversely, during oil price collapses, monetary policy may need to accommodate fiscal stabilization efforts while maintaining credibility.

Sixth, the finding that oil prices Granger-cause exchange rate movements underscore the importance of moving toward a more flexible exchange rate regime. Attempts to defend an overvalued currency during oil price declines have historically depleted reserves and created parallel market premiums. A more flexible regime would allow the exchange rate to adjust, absorbing some of the shock, while monetary policy focuses on inflation control.

5.3 Limitations of the Study

This study has several limitations that should be acknowledged:

Data limitations: Annual data provides only 34 observations, limiting the power of some tests and precluding more granular analysis. Quarterly or monthly data, if available and reliable, could provide richer insights into short-run dynamics.

External validity: The findings are specific to Nigeria and may not generalize to other oil-exporting countries with different institutional arrangements, economic structures, or policy regimes.

Institutional factors: The study does not directly measure or control institutional quality, governance, or political economy factors that may mediate the oil price-growth relationship. As the Resource Curse literature emphasizes, institutions matter enormously for whether resource wealth translates into development.

External shocks: While the study identifies structural breaks, it does not decompose oil price shocks into supply-driven, demand-driven, and precautionary components following Kilian (2009). Different types of shocks may have different effects.

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