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RESOURCE DEPENDENCE AND MACROECONOMIC ADJUSTMENT: A VAR ANALYSIS OF OIL PRICE SHOCKS IN NIGERIA

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ABSTRACT

Nigeria's heavy reliance on oil revenue makes its economy highly vulnerable to fluctuations in global oil prices, often triggering inflationary pressures and unstable growth. This study investigates the macroeconomic adjustment mechanisms to oil price shocks in Nigeria from 1994 to 2023, addressing the gap in empirical evidence on how oil dependence shapes domestic price and interest rate responses. Using a Vector Auto regression (VAR) model with quarterly data on oil price (OPC), real gross domestic product (RGDP), inflation rate (INF), and interest rate (INT) from the Central Bank of Nigeria, the study applies unit root and stability diagnostics, impulse response functions, and variance decomposition to capture both short- and long-run dynamics. Results indicate that oil price shocks significantly increase inflation and interest rates ($p < 0.05$), while RGDP responds positively to oil price changes at lag 3 before declining in later periods. Inflation negatively affects RGDP at lags 2–3, confirming short-term overheating effects. The model explains 78% of RGDP, 71% of inflation, 80% of interest rate, and 70% of oil price variations, affirming strong predictive power. These findings support the resource dependence theory and Dutch Disease hypothesis, revealing that oil-driven growth amplifies macroeconomic volatility The study recommends economic diversification, fiscal savings for future shocks, and reforms to boost agriculture and manufacturing. Prudent management of government spending and interest rates is essential to ensure price stability and long-term growth.

Keywords: Vector Autoregressive (VAR), Real Gross Domestic Product (GDP), Oil Price Shocks (OPC)

INTRODUCTION

The global energy landscape continues to be shaped by petroleum resources, which serve as a cornerstone for economic advancement in oil-producing nations. The influence of oil prices on national economies is particularly pronounced in developing countries such as Nigeria, where the effects are both complex and far-reaching. While advanced oil-exporting nations benefit from diversified value chains and relative economic stability, Nigeria, whose exports are predominantly crude oil, grapples with structural and fiscal challenges (Ikechi & Anthony, 2020; Akinola, 2022).

In regions like the Middle East, Asia, and Eastern Europe, oil-producing countries often record GDP growth rates ranging from 15% to 30%, accompanied by rising employment levels and favorable balances of payment However, as a globally traded commodity, oil prices are subject to external forces such as Operation of Petroleum Exporting Countries (OPEC) production quotas, regulatory frameworks, and international market dynamics, all of which play a decisive role in price determination (Abaas et al., 2018; Osintseva, 2021).

Nigeria's economic structure remains heavily dependent on oil, with crude oil exports constituting the primary source of government revenue. Volatility in global oil prices has significant implications for the country's economic performance (Gbadamosi et al., 2022). Ayoola (2013) emphasizes Nigeria's vulnerability as a mono-product economy, highlighting its exposure to fluctuations in international oil markets. Similarly, Apere and Ijomah (2013) note that oil is central to Nigeria's fiscal and monetary policy formulation, accounting for approximately 80% of government revenue, 90–95% of foreign exchange earnings, and 12% of real GDP.

Despite Nigeria's considerable potential for economic growth and its prominent role as a leading oil producer in Africa, the nation continues to face rising levels of poverty and persistent economic stagnation. The collapse and volatility of global oil prices during economic downturns have further deepened these challenges. Nigeria's heavy reliance on oil revenue has hindered the diversification of its economic structure, resulting in an import-dependent economy and unfavorable trade imbalances on the global stage. The country's export base remains narrow, dominated by crude oil as its primary commodity. This dependence on oil income has largely been directed toward financing recurrent government expenditures, rather than being strategically invested in other productive sectors or used to foster inclusive and sustainable economic development (Oduyemi & Owoeye, 2020).

Even with Nigeria's enduring role as an oil-dependent economy, empirical evidence remains mixed on how fluctuations in oil prices transmit through key macroeconomic variables such as inflation, interest rates, and output growth. Existing studies have focused largely on short-term relationships or omitted the dynamic feedback effects among these variables, leaving a gap in understanding the country's macroeconomic adjustment mechanism to oil price shocks over time. This study addresses that gap by employing a Vector Auto regression (VAR) framework to capture the dynamic interactions among oil price, RGDP, inflation, and interest rate from 1994 to 2023.

The study is anchored on the Resource Dependence Theory (Pfeffer & Salancik, 1978) and the Dutch Disease Hypothesis (Corden & Neary, 1982), which collectively explain how dependence on a single natural resource oil can expose an economy to external vulnerabilities and distort its structural balance. Resource Dependence Theory posits that overreliance on an external resource constrains economic flexibility and amplifies exposure to external shocks, while the Dutch Disease Hypothesis suggests that resource booms appreciate the real exchange rate and weaken non-oil sectors. These frameworks provide a conceptual lens for understanding Nigeria's macroeconomic volatility amid oil price fluctuations.

Accordingly, the objective of this study is to examine the macroeconomic adjustment mechanisms to oil price shocks in

Nigeria within the context of its resource dependence. Specifically, the study seeks to: (i) analyze the dynamic responses of GDP, inflation, and interest rate to oil price shocks; (ii) assess the direction and magnitude of these relationships over time; and (iii) evaluate the implications for sustainable macroeconomic management and policy formulation.

Several empirical studies have explored the link between oil price fluctuations and macroeconomic performance in Nigeria. For instance, Bamaiyi (2024) explores the influence of oil price shocks on key macroeconomic indicators in Nigeria over the period 1990–2021. The study reveals that fluctuations in oil prices have a substantial impact on variables such as GDP, unemployment rate, balance of payments, and exchange rate. These findings underscore the broader economic implications of oil price volatility, particularly in terms of exchange rate instability and rising unemployment. In response, the study advocates for strategic policy interventions, most notably economic diversification to mitigate the adverse effects of external oil price shocks.

Onakoya and Agunbiade (2020) examined the influence of Nigeria's oil sector performance on selected macroeconomic indicators over the period 1980 to 2017, highlighting the implications of the country's overreliance on oil. Utilizing the Vector Error Correction Model (VECM), their analysis identified a significant long-term positive relationship between the oil sector and both GDP and unemployment. In contrast, other macroeconomic variables exhibited inverse associations. Based on these findings, the authors advocated for a more committed approach to economic diversification, alongside strategic investments in refinery development and effective management.

Egbe et al. (2022) conducted a study employing the Vector Auto-Regressive (VAR) approach to estimate model parameters and assess the adequacy and stability of economic indicators specifically exchange rate and GDP over the period 1990 to 2020. Their analysis revealed that the exchange rate exerts a significant negative impact on real GDP.

Umar and Kilishi (2010) investigated the effects of crude oil price fluctuations on four major macroeconomic indicators using the Vector Autoregression (VAR) model. Their findings revealed that changes in oil prices significantly influence real GDP, money supply, and unemployment. However, the impact on the consumer price index was found to be statistically insignificant. In light of these findings, the authors advocate for robust economic diversification as a critical strategy to reduce the economy's vulnerability to external oil price shocks.

MATERIALS AND METHODS

This study adopts some quantitative, ex-post facto, and time series research design to investigate the dynamic interactions among key macroeconomic variables in Nigeria from 1994 to 2023. The ex-post facto approach is appropriate since the study relies on historical data which can be analyzed to determine cause–effect relationships among variables. The study employs econometric modeling techniques to comprehensively analyze how oil price shocks influence selected macroeconomic indicators. The variables considered include oil price (OPC), measured in U.S. dollars per barrel; real gross domestic product (RGDP), measured as an annual percentage growth rate; inflation rate (INF), expressed in percentage (%); and interest rate (INT), also expressed in percentage (%). All variables are measured on an annual basis. Reliable secondary data were sourced from the Central Bank of Nigeria's Statistical Bulletin (2024), ensuring consistency, accuracy, and credibility of the dataset. No data transformation was applied, as the analysis utilized the raw annual series to preserve the original characteristics of the data.

Prior to estimation, pre-estimation tests were conducted to ensure the validity of the time series model. Specifically, the Augmented Dickey–Fuller (ADF) unit root test was used to examine stationarity, while the optimal lag length was determined using information criteria to capture the appropriate dynamic structure. Post-estimation, several diagnostic and stability tests were performed, including serial correlation LM tests, heteroscedasticity tests, and the Jarque–Bera normality test, to confirm the robustness and reliability of the model. In addition, the CUSUM and CUSUMSQ tests were employed to verify the stability of the model parameters over the study period.

All econometric analyses were carried out using EViews 12 statistical software, which provided the necessary computational and diagnostic tools for estimating the Vector Auto regression (VAR) model and evaluating the relationships among the selected variables.

Model Specification

A vector autoregressive model of order p denoted as VAR(p) is therefore specified as follows:

$$Y_t = \phi_0 + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \cdots + \phi_p Y_{t-p} + \varepsilon_t \quad (1)$$

In compact form it is written as:

$$Y_t = \phi_0 + \sum_{i=1}^{p} \phi_i Y_{t-i} + \varepsilon_t \quad (2)$$

Where:

$Y_t = (RGDP, OPC, INF \text{ } and \text{ } INT)$ represents a $n \times 1$ vector of endogenous variables

$RGDP = Real$ Gross Domestic Product

$OPC =$ Oil Price

$INF =$ Inflation rate

$INT =$ Interest rate

$\phi_i \ (i = 1, 2, 3, \ldots, p)$ represents $n \times n$ matrix of autoregressive coefficients.

ε_t represents $n \times 1$ vector of error terms.

The selected modeling approach effectively captures the complex interplay between oil price shocks and overall economic activity in Nigeria. Within the VAR framework, all variables are treated as endogenous, allowing for a comprehensive analysis of their mutual influences

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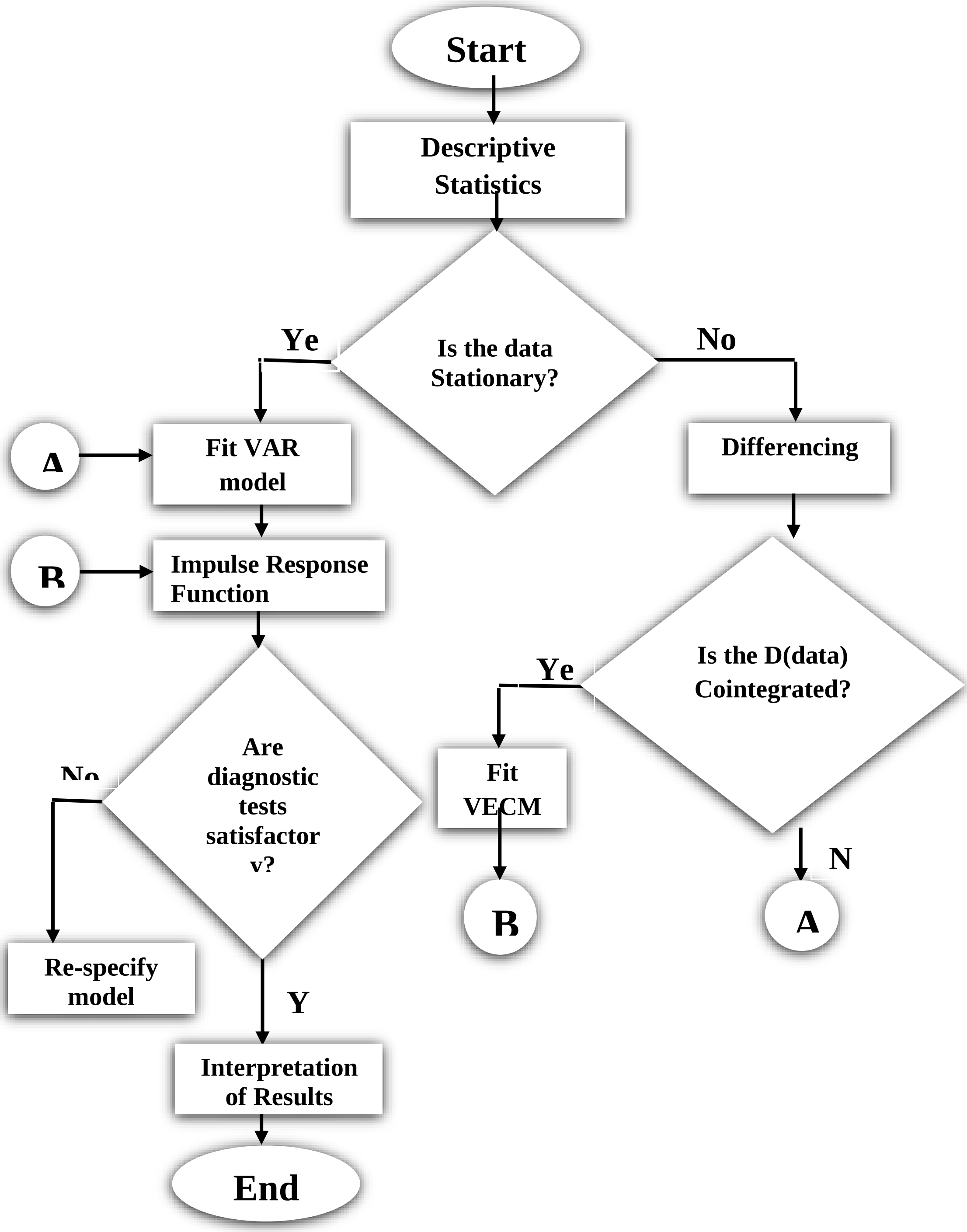

Figure 1: Analytical Procedure for Assessing Oil Price Shocks on Macroeconomic Variables

RESULTS AND DISCUSSION

The descriptive statistics in Table 1 show that oil price shocks (OPC) have a mean of 58.41 and a standard deviation of 33.02, indicating no overdispersion. GDP has a mean of 4.32 and a standard deviation of 3.68, showing no overdispersion as well. Inflation (INF) has a mean of 16.64 with a standard deviation of 14.28, also without overdispersion. Interest rate (INT) records a mean of 3.54 and a standard deviation of 9.55, which indicates overdispersion.

Table 1: Summary of Descriptive Statistics (1994-2023)

	GDP	INF	INT	OPC
Mean	4.320808	16.64427	3.539000	58.40500
Median	4.212993	12.70720	5.740000	57.20000
Maximum	15.32916	72.83550	18.18000	115.3500
Minimum	-1.814924	5.388008	-31.45000	12.97000

	GDP	INF	INT	OPC
Std. Dev	3.675463	14.27973	9.553826	33.02231
Skewness	0.537087	2.873820	-1.799434	0.241113
Kurtosis	4.053784	10.91569	7.447054	1.836497
Jarque-Bera	2.830391	119.6169	40.91017	1.982851
Probability	0.242878	0.000000	0.000000	0.371047
Sum	129.6242	499.3281	106.1700	1752.150
Sum Sq. Dev	391.7618	5913.409	2646.992	31623.71
Observation	30	30	30	30

Figure 2 shows the trend analysis of the data. It was observed that from 1994 to 2023, oil price shocks (OPC) show sharp rises and falls, making them quite unstable. GDP changes moderately over time without very large swings. Inflation (INF) generally increases, with some big spikes in the middle and higher levels toward the later years. Interest rates (INT) move up and down a lot, showing strong fluctuations across the period. Overall, the trends show that oil prices and interest rates are the most unstable, inflation keeps rising with spikes, while GDP is steadier.

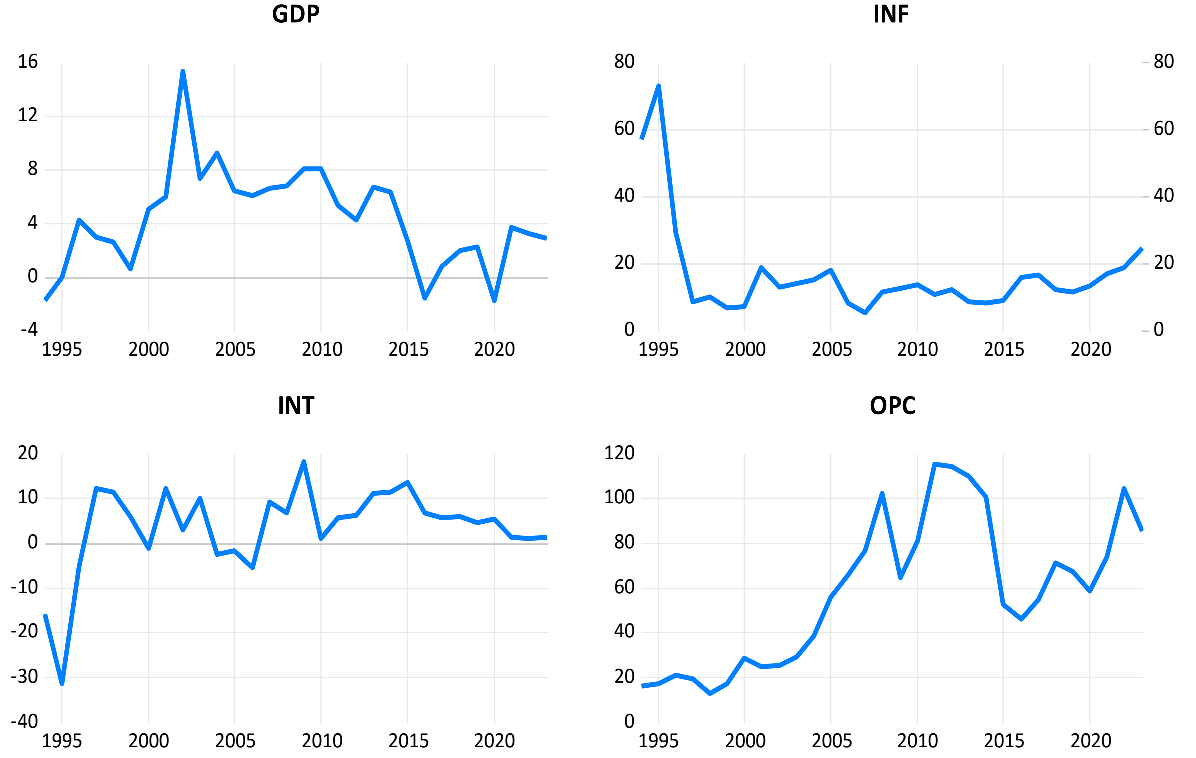

Figure 1: Trend Analysis of the Endogenous Variables

Based on the Augmented Dickey-Fuller (ADF) test as shown in Table 2 to 5, the results indicate that GDP, inflation, and interest rate, the p-values are all less than 0.05 at level, which means the null hypothesis of a unit root is rejected at the 5% significance level. This confirms that these three variables are stationary in their original form without differencing. For oil price shocks (D_OPC), the p-value at level was greater than 0.05, meaning the null hypothesis could not be rejected, so the series was non-stationary. However, after first differencing, the p-value became less than 0.05, allowing rejection of the null hypothesis, which indicates that oil price shocks are stationary after first differencing. Thus, GDP, inflation, and interest rate are I(0), while oil price shocks are I(1).

Table 2: GDP ADF Unit Root Tests Results

		t-statistic	Prob.
Augmented Dickey-Fuller test statistic		-3.000379	0.0467
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*Mackinnon (1996) one-sided p-values
NB: * indicates statistical significance at the 5% level
Source: Author's computations using EViews 12

Table 3: INF ADF Unit Root Tests Result

		t-statistic	Prob.
Augmented Dickey-Fuller test statistic		-3.444568	0.0174
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

NB: * indicates statistical significance at the 5% level
Source: Author's computations using EViews 12

Table 4: INT ADF Unit Root Tests Result

		t-statistic	Prob.
Augmented Dickey-Fuller test statistic		-5.891787	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

NB: * indicates statistical significance at the 5% level
Source: Author's computations using EViews 12

Table 5: D_OPC ADF Unit Root Tests Result

		t-statistic	Prob.
Augmented Dickey-Fuller test statistic		-4.887729	0.0005
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

NB: * indicates statistical significance at the 5% level
Source: Author's computations using EViews 12

The lag selection criteria as displays in Table 6 shows the results for determining the appropriate lag length for the VAR model. The different criteria provide varying suggestions: the Akaike Information Criterion (AIC) selects lag 4 as the optimal lag since it has the lowest AIC value (25.19858) and is marked with an asterisk. The Schwarz Criterion (SC) and Hannan-Quinn Criterion (HQ) indicate other lag choices, but since the AIC is specified as the selection benchmark, the optimal lag order for the VAR estimation is 4. This means that including four lags of each variable in the VAR model is expected to best capture the dynamics among the variables.

Table 6: Lag Selection for the VAR Estimation

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-320.5567	NA*	2220410.	25.96454	26.15956	26.01863
:1	-306.1899	22.98694	2585798.	26.09519	27.07029	26.36564
2	-290.8653	19.61545	3056576.	26.14923	27.90441	26.63604
3	-275.8755	14.39023	4543695.	26.23004	28.76530	26.93322
4	-246.9822	18.49171	3402368.	25.51392	28.51392	26.11811

NB: * indicates lag order selected by the Akaike Information Criterion (AIC)
Source: Author's computations using EViews 12

Table 7 explains how GDP, inflation, interest rates, and oil price shocks affect each other over time by looking at their past values from the VAR fitted model. Some of the significant results show, for example, that past inflation reduces GDP after two and three periods (-0.1976 and -0.5097), meaning when inflation rises, GDP tends to slow down later. Inflation itself is pulled down by its own history at lag 4 (-0.5138), showing a correction effect. Interest rates are lowered by GDP after three periods (-0.5965) and by their own lag at three periods (-0.7064), meaning both the economy and policy adjustments reduce future interest rates. Oil price shocks are strongly influenced by GDP at lag 3 (+5.6872), showing that higher economic activity leads to later increases in oil price shocks.

The R-squared values show how well the model explains each variable: about 78% of GDP changes, 71% of inflation, 80% of interest rates, and 70% of oil price shocks are explained by the model. This means the model captures most of the key patterns, and the significant coefficients highlight how past inflation pressures reduce growth, past GDP shapes inflation and oil prices, and interest rates adjust strongly in response to both their own history and economic activity.

Discussion

Based on the consequence of the study as highlighted in the previous paragraph, the results reflect real-world dynamics between growth, inflation, interest rates, and oil price shocks. In the short run, inflationary pressures appear to slow down economic growth, which is consistent with the idea that higher prices reduce consumption and investment which is in consonant to the finding of (Egbe et al., 2022). Similarly, interest rates adjust downward in response to past economic activity, showing how monetary policy often reacts to stabilize the economy. Oil price shocks, on the other hand, are closely tied to growth when the economy expands, demand for oil rises, leading to shocks in oil prices in subsequent periods which is in agreement with the finding of Onakoya and Agunbiade (2020).

In the long run, these relationships suggest that sustained inflation control is important for stable growth, since unchecked inflation has lagged negative effects on GDP. Interest rates are expected to continue playing a balancing role, adjusting to economic activity and inflation trends. Oil price shocks remain a significant external factor while they are partly driven by growth, they can also feed back into inflation and interest rates, creating cycles of instability. Therefore, in the short run, policymakers should expect volatility and react quickly, while in the long run, maintaining price stability and managing oil dependency become key to steady economic growth.

Furthermore, the VAR results also show that oil price shocks are strongly influenced by GDP at lag 3, and in turn, oil price shocks affect inflation and interest rate dynamics. For an oil-dependent country like Nigeria, this reflects the resource dependence theory: when GDP grows, it often comes from oil-sector expansion, which then fuels higher oil revenues and shocks in oil prices as also found by Akinola (2022). However, these oil price shocks do not always translate into stable, broad-based growth because they spill over into inflation and interest rate volatility.

Also, this outcome is consistent with the Dutch Disease hypothesis (Corden & Neary, 1982). The theory argues that heavy reliance on resource revenues, such as oil, exposes an economy to external shocks because growth becomes tied to fluctuating world oil prices. In Nigeria's case, these results confirm this vulnerability: instead of oil revenues stabilizing the economy, they generate cyclical booms and busts, undermining sustainable growth. For example, the positive relationship between GDP and oil shocks at lag 3 suggests that short-term growth gains from oil often lead to future instability, as oil windfalls can raise domestic demand, push up inflation, and crowd out other productive sectors like agriculture and manufacturing.

Finally, in the long run, this dependence implies that Nigeria's growth remains fragile unless it diversifies. According to Dutch Disease theory, without deliberate policy to manage oil revenues (through stabilization funds, diversification, and structural reforms), external oil shocks will continue to drive inflationary pressure, disrupt interest rate stability, and weaken the non-oil economy.

Table 7: Vector Auto Regression Estimates at Lag 1 to 4

	GDP	**INF**	**INT**	**D_OPC**
GDP(-1)	0.505661	-0.176508	0.180376	0.582031
	(0.29621)	(0.42855)	(0.42775)	(1.79499)
	[1.70709	[-0.41187]	[0.42168]	[0.32425]
GDP(-2)	0.332371	-0.349830	-0.108052	-3.411044
	(0.31408)	(0.45440)	(0.45355)	(1.90324)
	[1.05825]	[-0.76988]	[-0.23824]	[-1.79223]
GDP(-3)	0.064294	0.736780	-0.596450	5.687223
	(0.31408)	(0.51479)	(0.51383)	(2.15620)
	[1.05825]	[1.43123]	[-1.16080	[2.63762]
GDP(-4)	-0.189747	-1.070267	0.515345	-2.754649
	(0.29569)	(0.42780)	(0.42700)	(1.79184)
	[-0.64170]	[-2.50179]	[1.20689]	[-1.53734]
INF(-1)	0.111953	0.559152	-0.685921	0.878662
	(0.19538)	(0.28267)	(0.28215)	(1.18397)
	[0.57300]	[1.97809]	[-2.43109]	[0.74213]
INF(-2)	-0.197580	-0.588351	-0.082263	0.516651
	(0.24477)	(0.35413)	(0.35347)	(1.48326)
	[0.80721]	[-1.66142]	[-0.65242]	[0.34832]
INF(-3)	-0.509726	0.125611	0.82263	0.205027
	(0.23530)	(0.34042)	(0.33979)	(1.42586)
	[-2.16630]	[0.36898]	[0.24210]	[0.14379]
INF(-4)	0.177561	-0.513774	0.032411	-0.995917
	(0.16126)	(0.23331)	(0.23288)	(0.97722)
	[1.10107]	[-2.20210]	[0.13918]	[-1.01913]
INT(-1)	0.175865	-0.317991	0.317991	-0.219105
	(0.21391)	(0.30948)	(0.30890)	(1.29624)
	[0.82215]	[-1.08148]	[1.02943]	[-0.16903]
INT(-2)	-0.433139	-0.087413	0.491058	-2.384113
	(0.19406)	(0.28077)	(0.28024)	(1.17599
	[-2.23195]	[-0.31134]	[1.75227]	[-2.02733])
INT(-3)	0.070425	0.072247	-0.706417	1.781041
	(0.17448)	(0.25243)	(0.25196)	(1.05729)
	[0.40364]	[0.28621]	[-2.80373]	[1.68453]
INT(-4)	0.086223	-0.508883	0.453588	-2.117036
	(0.19985)	(0.28914)	(0.28860)	(1.21105)
	[0.43144]	[-1.76001]	[1.57170]	[-1.74810]
D_OPC(-1)	0.084457	0.013174	0.031540	0.165138
	(0.05835)	(0.08442)	(0.08426)	(0.35357)
	[1.44749]	[0.15607]	[0.37433]	[0.46705]
D_OPC(-2)	-0.046820	0.010978	0.058627	-0.698498
	(0.05871)	(0.08495)	(0.08479)	(0.35579)
	[1.44749]	[0.12923]	[0.69146]	[-1.96322]
D_OPC(-3)	0.065111	-0.022366	-0.119520	0.499580
	(0.05451)	(0.07886)	(0.07871)	(0.33030)

	GDP	INF	INT	D_OPC
	[1.19456]	[-0.28362]	[-1.51846]	[1.51251]
D_OPC(-4)	-0.052544	-0.052396	0.113042	-0.632221
	(0.05695)	(0.08240)	(0.08225)	(0.34514)
	[-0.92255]	[-0.63587]	[1.37443]	[-1.83181]
C	6.766686	27.69994	12.07460	14.21767
	(6.59817)	(9.54609)	(9.52827)	(39.9838)
	[-1.02554]	[2.90171]	[1.26724]	[0.35559]
R-Squared	0.783329	0.706896	0.803900	0.698937
Adj. R-Squared	0.349987	0.120687	0.411700	0.096812
Sum sq. resids	69.82503	146.1553	145.6103	2564.077
S.E. equation	2.954341	4.274273	4.266297	17.90278
F-Statistic	1.807647	1.205878	2.049718	1.160784
Log likelihood	-48.31242	-57.54589	-57.49919	-93.35444
Akaike AIC	5.224994	5.963671	5.959935	8.828355
Schwarz SC	6.053829	6.792506	6.788771	9.657191
Mean dependent	4.871902	12.86665	5.407600	2.887600
S.D. Dependent	3.664373	4.558171	5.562263	18.83786
Determinant resid covariance(dof adj.)			427114.3	
Determinant resid covariance			4478.618	
Log likelihood			-246.9822	
Akaike information criterion			25.19858	
Schwarz criterion			28.51392	
Number of co-efficients			66	

Source: Author's computations using EViews 12

Diagnostic Tests

The VAR residual normality test as shown in table 8 examines whether the model's residuals (errors) follow a normal distribution, which is an important assumption for reliable inference. The results show that for both skewness and kurtosis across all components, the probability (p-values) is greater than 0.05 in most cases. The joint skewness test has a p-value of 0.8238, and the joint kurtosis test has a p-value of 0.2558, both well above the 5% significance level. This means we fail to reject the null hypothesis that the residuals are multivariate normal. More precisely, the test confirms that the residuals from the VAR model are approximately normally distributed, suggesting that the model is well-specified and the results from the VAR model can be considered reliable.

Table 8: VAR Residual Normality Tests

Component	Skewness	Chi-sq	df	Prob.
1	-0.330176	0.454233	1	0.5003
2	-0.126872	0.067069	1	0.7957
3	-0.390061	0.633949	1	0.4259
4	0.294304	0.360894	1	0.5480
Joint		1.516146	4	0.8238

Component	Kurtosis	Chi-sq	df	Prob.
1	2.359665	0.427114	1	0.5134
2	5.069747	4.462346	1	0.0346
3	2.466053	0.296979	1	0.5858
4	2.639337	0.135498	1	0.7128
Joint		5.321937	4	0.2558

Source: Author's computations using EViews 12

Looking at the Rao F-statistics in table 9, the test checks whether the residuals are free from serial correlation at different lags. At lag 1 (p = 0.4307) and lag 2 (p = 0.9283), the p-values are greater than 0.05, so we fail to reject the null hypothesis indicating no serial correlation at these lags. However, at lag 3 (p = 0.0022) and lag 4 (p = 0.2027), the picture changes: lag 3 has a p-value less than 0.05, showing strong evidence of serial correlation, while lag 4's p-value is greater than 0.05, suggesting no problem of serial correlation. Overall, based on the Rao F-stat, the VAR model residuals are free from autocorrelation at most lags.

Table 9: VAR Residual Serial Correlation LM Tests

Null hypothesis: No Serial Correlation at Lag H						
Lag	LRE*Stat	df	Prob.	Rao F stat	df	Prob.
1	20.59235	16	0.1947	1.352648	(16.3.7)	0.4307
2	10.24328	16	0.8536	0.370746	(16.3.7)	0.9283
3	54.73344	16	0.0000	38.34176	(16.3.7)	0.0022
4	26.60492	16	0.0461	2.547696	(16.3.7)	0.2027

Source: Author's computations using EViews 12

The inverse root test (or stability test of the VAR) in figure 3 checks whether the estimated VAR model is dynamically stable by plotting the inverse roots of the characteristic polynomial. The rule is that for the VAR to be stable, all the points (inverse roots) must lie inside the unit circle.
From the plot in figure 3, almost all the dots (inverse roots) are located well inside the circle, with none lying outside the boundary. This confirms that the VAR model is stable and can be used for valid impulse response functions and variance decomposition. In simpler terms, the system will return to equilibrium after a shock, and the results from your VAR analysis can be considered reliable.

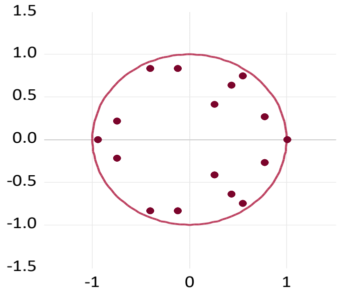

Figure 2: VAR model Stability Test
Source: Author's computations using EViews 12

Figure 4 presents the Impulse Response Functions (IRFs), which show how each variable in the VAR system (GDP, Inflation, Interest Rate, and Oil Price Changes) responds over time to a one-time shock in itself and the other variables. The solid black line represents the response, while the dotted lines are the confidence intervals, showing the range of uncertainty around the estimates.
From the IRFs; a shock to GDP itself shows a persistence effect, gradually declining toward stability over time. Shocks from oil prices (D_OPC) appear to create noticeable short-run fluctuations in GDP, indicating sensitivity of growth to oil shocks.
Inflation reacts positively to its own shocks at first but then declines, suggesting self-correcting tendencies. Oil price shocks cause inflation to rise in the short run before stabilizing, reflecting the pass-through effect of oil prices on domestic prices.
Interest rates respond strongly to their own shocks with fluctuations before stabilizing. Oil price shocks also cause temporary increases in interest rates, which is consistent with monetary policy tightening to control inflation.
Oil price changes are most influenced by their own shocks, showing high persistence over time. Responses to GDP, inflation, or interest shocks are relatively weaker, meaning oil prices are largely exogenous in this system.
More precisely, the impulse response results show that oil price shocks have the strongest immediate effects on Nigeria's economy. When oil prices change suddenly, GDP reacts with short-term fluctuations, inflation rises quickly before stabilizing, and interest rates increase slightly, likely due to policy adjustments to control inflation. This highlights how sensitive economic growth, prices, and monetary conditions are to oil shocks.
Over the long run, however, the responses of GDP, inflation, and interest rates gradually fade, suggesting that while oil price shocks create short-run instability, the economy eventually adjusts back toward equilibrium. The results therefore confirm Nigeria's vulnerability to external oil shocks in the short run, but also show that the effects do not remain permanent.

Figure 3: VAR Model Impulse Response Function
Source: Author's computations using EViews 12

CONCLUSION

The study concludes that Nigeria's macroeconomic stability is largely shaped by the interdependence of oil price shocks, inflation, interest rates, and RGDP, reflecting the dynamic responses examined in the study's objectives. Empirical results show that in the short run, inflation dampens economic growth, while interest rates adjust to past output performance, indicating policy responses aimed at stabilization. Oil price shocks, driven by lagged RGDP, heighten macroeconomic volatility and validate both the Dutch Disease hypothesis and Resource Dependence Theory, as oil-led growth inflates domestic demand, fuels inflation, and undermines non-oil sectors, thereby fostering cyclical instability rather than inclusive development. The recent removal of fuel subsidies, though fiscally sound, has intensified inflationary pressures and revealed structural vulnerabilities within the economy. Consequently, the study recommends accelerated economic diversification, reinvestment of subsidy savings into productive sectors, and the implementation of stabilization mechanisms supported by coordinated fiscal and monetary policies to promote price stability, resilience, and sustainable long-term growth.

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