EXAMINING THE EFFECTS OF OIL PRICE FLUCTUATIONS ON THE NIGRERIA'S ECONOMIC GROWTH: A VECTOR AUTO-REGRESSION (VAR) APPROACH

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Abstract:

The study examined the oil price volatility on economic growth in Nigeria. The study employs Vector Autoregression technique to analyze the annual secondary data collected for the study. The preliminary test show that unit root test show that GDP, Foreign Direct Investment (FDI), Oil Price (OLR), and Exchange Rate (EXR) exhibit stationarity, whereas Petroleum Profit Tax (PPT) does not. The VAR analysis reveals intricate interrelationships and dynamic impacts among the variables. Variance decomposition examines the evolving impact of each variable on the variability of GDP across time. The normalized cointegrating coefficients indicate that OLR and FDI have a negative influence on GDP, whereas PPT has a positive impact. The results indicate that fluctuations in oil prices have a substantial impact on Nigeria's economic growth. This underscores the importance of diversifying the economy, implementing stabilization measures, promoting foreign investment, enhancing institutional frameworks, coordinating monetary and fiscal policies, engaging in strategic economic planning, and raising public awareness about the need for economic diversification. By implementing these ideas, Nigeria can effectively reduce the negative impacts of oil price volatility and attain long-term economic growth.

Keywords: Oil Price Volatility, Petroleum Profit Tax, Foreign Direct Investment, Exchange Rate and Gross Domestic Product.

1. Introduction

Crude oil, which was first found in the 1800s, has had a substantial impact on the global economy as a primary energy source and continues to be the largest market for commodities worldwide. The significance of its presence is so significant that an abrupt lack would severely impair worldwide economic networks (Hathaway, 2009). The fluctuation in oil prices presents difficulties for nations that heavily rely on oil, impacting their ability to allocate funds for public expenditure and maintain economic stability (Al-kasasbeh et al., 2022).

Crude oil prices have seen fluctuations throughout the 1950s, primarily as a result of mismatches between supply and demand. Some significant occurrences include the Suez Crisis (1956-1957), the OPEC oil embargo (1973-1974), and the peak price of $140 per barrel in 2008 (Hamilton, 2011; Sanya, 2015). In 2014, a surge of price volatility commenced, resulting in a substantial decline in 2015, which had a devastating impact on economies that rely heavily on oil. The downturn in Nigeria's oil industry had devastating economic consequences for the country, as oil plays a significant role in government revenue, foreign exchange, and GDP (Anyawu, 1997).

The decrease in price was a result of an excess supply from prominent producers like as the United States and Iraq, as well as Saudi Arabia's choice to refrain from reducing output (Maugeri, 2016). The precipitous drop from $140 to below $40 a barrel hindered governments from

effectively minimising its consequences. Nigeria, with the second-largest oil reserves in Africa (36.2 billion barrels), is significantly dependent on oil, which has a significant impact on its economic path and leaves its economy susceptible to swings in the oil market (Omotosho, 2019; Ideh and Olusanya, 2020).

Oil is an essential commodity in the worldwide economy, playing a crucial role as the main energy source for both home and industrial purposes. Oil prices have exhibited higher levels of fluctuation compared to numerous other commodities since World War II, mostly as a result of demand-supply dynamics and the activities taken by OPEC. The significant reduction in crude oil prices since July 2014 has had a detrimental effect on countries that export oil, with Nigeria being notably affected. This has led to a decrease in foreign reserves, currency problems, a decline in government revenue, and financial difficulties. Nigeria's economy is primarily reliant on oil, rendering it susceptible to global oil price swings that impact economic stability and growth.

Despite thorough investigation, there remains a dearth of comprehension on the specific impact of oil price volatility on Nigeria's economic growth. The issues encompass the magnitude and durability of volatility, the channels via which it affects the economy, and the dynamics that differentiate short-term from long-term effects. Price drops can be attributed to several factors, such as the robustness of the US dollar, the activities of OPEC, surplus supply, diminished demand resulting from economic recessions in Europe and developing countries, and the agreement on the Iran nuclear program.

In Nigeria, oil serves as the primary means of generating foreign cash and revenue. However, the relationship between oil and economic growth is not well understood. Research findings are inconclusive about the causal relationship between fluctuations in oil prices and economic growth. The inconsistency can be attributable to variations in time periods, nations analysed, econometric methodologies, and data specifications. This study seeks to examine the correlation between the volatility of oil prices and the economic growth in Nigeria from 1983 to 2023, with the intention of addressing the intricacies and knowledge gaps around this topic.

The primary aim of the study is to examine the influence of oil price volatility on the economic growth of Nigeria.

2. Literature Review

2.1 Petroleum

Nigeria's crude oil is highly sought after for its favourable attributes, including its sweet and light properties, as well as its low sulphur level. Bonny Light, which is Nigeria's benchmark crude oil, has an API gravity of 33.4. Crude oil, a naturally-occurring substance containing hydrocarbon reserves, can be processed to produce various products including petrol, diesel, and petrochemicals. Due to its finite nature, crude oil cannot be regenerated at a rate that matches its consumption. It is a commodity that is traded worldwide, both in the form of immediate oil and through derivative contracts.

Nigeria relies heavily on oil for its primary source of revenue, employment opportunities, and foreign currency earnings (Jacob and Okon, 2019; Saviour et al., 2022). Nigeria, an OPEC member and a prominent oil producer in Africa, significantly depends on oil exports to drive its economic growth and development (Success and Anthony, 2020). Economists consider crude oil to be a vital and long-lasting global commodity that is essential for the generation of energy.

Crude oil is commonly obtained through the process of drilling, sometimes in conjunction with natural gas and saline water. It is then refined into different products like diesel, aviation fuel, kerosene, petrol, naphtha and liquefied petroleum gas.

2.2 Crude Oil Prices

The pricing of crude oil is influenced by the many grades that are sold in the global market. Bonny Light, which is a low-sulfur oil, is commonly used as a benchmark, particularly when compared to Brent crude. The measurement is influenced by the spot pricing of various types of oil barrels in the global market. West Texas Intermediate (WTI) and Brent North Sea Crude (Brent Crude) are the two most widely acknowledged categories for crude oil. Brent Crude is considered the benchmark for assessing crude oil from Africa, Europe, and the Middle East.

The price of oil is determined by factors such as its quality, geographical location, and sulphur content. However, the main driving forces behind oil prices are the dynamics of supply and demand. Oil demand exhibits a high degree of price inelasticity, indicating that changes in price have a limited effect on the level of demand. An increase of considerable magnitude in oil prices results in elevated outlays on oil, hence diminishing expenditures on non-oil commodities.

2.3 Price Volatility

Price Volatility refers to the degree of fluctuation in prices. Price volatility is the measure of the daily percentage movement in commodity prices. Volatility is determined by the interplay of supply and demand factors, rather than the specific levels of prices. High volatility suggests the presence of extraordinary supply and/or demand characteristics. Oriakhi and Osazee (2013) found that volatility has an immediate detrimental influence on economic growth, while the effects of fluctuations in oil prices become evident after one year. Economic growth is significantly influenced by volatility, rather than the specific level of oil prices.

Volatility, as defined by scholars, pertains to the variations in price of crude oil within a specific timeframe (Ogundipe, 2002 as cited in Busayo, 2013).

2.4 Economic Growth

Economic Growth refers to the increase in the production and consumption of goods and services in an economy over a specific period of time. Economic growth refers to the expansion of a nation's output of goods and services over a period of time, typically quantified by the percentage alteration in Gross Domestic Product (GDP). Gross Domestic Product (GDP) is a measure of a country's economic well-being and advancement, serving as an indicator of its capacity to create wealth and enhance the quality of life. Sustainable economic growth is achieved by the allocation of resources towards the development of infrastructure, technology, education, and research. This, in turn, leads to the creation of employment opportunities and an increase in income levels.

Economic growth arises from the implementation of efficient fiscal policies that improve productivity, encourage investment, and facilitate overall expansion (Aisyah et al., 2024). The concept entails the promotion of sustainable and environmentally aware progress, under the guidance of robust governance and institutions (Degbedji et al., 2024). Economic growth is intricately linked to areas such as the automobile industry, natural resources, and environmental sustainability.

The Dutch disease theory is considered the most suitable framework for this research as it elucidates the impact of increasing oil prices on the industrial sector of oil-exporting nations, leading to a heightened focus on the oil industry and non-trade sectors. The theory elaborated on the relationship between large oil revenues and the appreciation of the local currency, resulting in an increase in imports of consumer items. Consequently, the heavy dependence on imports diminishes the competitiveness of local producers. According to the "Dutch Disease Theory", it is widely recognized that an increase in oil prices does not have a positive impact on the economy of a country that exports oil.

Several studies have examined the effects of crises and market dynamics on crude oil prices and their wider economic consequences. Bouazizi et al. (2024) discovered that occurrences such as COVID-19 and past crises have a significant impact on the prices of oil. Brueckner et al. (2023) discovered a notable correlation between controlled gasoline costs and the economic growth of China, as measured by GDP. In their study, Cheng et al. (2024) provided evidence that machine learning algorithms surpass conventional models in accurately forecasting fluctuations in oil prices. Choi & Hong (2020) detected alterations in the dynamics of the oil and stock markets with the emergence of shale gas by utilizing volatility indices. Corbet et al. (2021) demonstrated a notable transfer of volatility when oil prices experienced negative shocks. Devpura and Narayan (2020) emphasized the exceptional instability in hourly oil prices caused by the COVID-19 pandemic. In their study, Duong et al. (2024) discovered a substantial influence of global oil price shocks on Vietnam's economic performance. Ewing et al. (2024) observed significant transfer of volatility across the energy industries located upstream and midstream. Gazzani et al. (2024) highlighted the swift influence of oil price shocks on economic dynamics, whereas Geman & Ma (2023) observed diverse consequences of oil storage shocks, particularly with regards to WTI during the COVID-19 epidemic.

3. Methodology

3.1 Description of Data

The data used in this analysis consist of time-series observations of oil production levels, institutional quality indices, and economic growth indicators for Nigeria within a specific time period. Data sources are esteemed institutions such as the Nigerian National Petroleum Corporation (NNPC), World Bank, and International Monetary Fund (IMF).

3.2 Model Specification

The model for this study was adapted from (Agility et al. 2023) VAR model for this study includes five main variables. The lag length for each variable is determined based on statistical criteria such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC). Additionally, exogenous variables such as oil prices and government policies may be included in the model to capture their potential effects on the endogenous variables.

The VAR model with dependent variable GDP, and independent variables OPR, PPT, EXR, and FDI can be specified as:

$$GDP_t = c_1 + A_{11}GDP_{t-1} + A_{12}OPR_{t-1} + A_{13}FDI_{t-1} + A_{14}EXR_{t-1} + A_{15} * PPT_{t-1} + e_{1t}$$

$$OPR_t = c_2 + A_{21}GDP_{t-1} + A_{22}OPR_{t-1} + A_{23}FDI_{t-1} + A_{24}EXR_{t-1} + A_{25} * PPT_{t-1} + e_{2t}$$

$$FDI_t = c_3 + A_{31}GDP_{t-1} + A_{32}OPR_{t-1} + A_{33}FDI_{t-1} + A_{34}EXR_{t-1} + A_{35} * PPT_{t-1} + e_{3t}$$

$$EXR_t = c_3 + A_{41}GDP_{t-1} + A_{42}OPR_{t-1} + A_{43}FDI_{t-1} + A_{44}EXR_{t-1} + A_{45} * PPT_{t-1} + e_{4t}$$

$$PPT_t - c_5 + A_{51}GDP_{t-1} + A_{52}OPR_{t-1} + A_{53}FDI_{t-1} + A_{54}EXR_{t-1} + A_{55} * PPT_{t-1} + e_{5t}$$

Where:

GDP_t = Gross Domestic Product which represents the value of GDP in time period t

OPR_t = Oil production as a proxy for oil price volatility which represents the value of OPR in time period t

FDI_t =Foreign Direct Investment which represents the value of FDI in time period t

EXR_t = Exchange Rate which represents the value of EXR in time period t

PPT_t = Petroleum Profit Tax which represents the value of PPT in time period t

c_1, c_2, c_3, c_4 and c_5 are the intercepts of the equations.

$A_{11}, A_{12}, A_{13}, A_{14}$, and A_{15} represent the coefficients of the lagged values of GDP in the equation for GDP_t

$A_{21}, A_{22}, A_{23}, A_{24}$, and A_5 represent the coefficients of the lagged values of OPR in the equation for OPR_t

$A_{31}, A_{22}, A_{33}, A_{34}$, and A_{35} represent the coefficients of the lagged values of FDI in the equation for FDI_t

$A_{41}, A_{42}, A_{43}, A_{44}$, and A_{45} represent the coefficients of the lagged values of EXR in the equation for EXR_t

$A_{51}, A_{52}, A_{53}, A_{54}$, and A_{55} represent the coefficients of the lagged values of PPT in the equation for PPT_t $e_{1t}, e_{2t}, e_{3t}, e_{4t}$ and e_{5t} are the error terms of the equations.

3.3 Model Estimation

A unit root test is a statistical method used to ascertain whether a time series variable is non-stationary and contains a unit root. Unit root tests are useful in assessing the stationarity of time series data for oil prices and economic growth indicators for analysing the impact of oil price volatility on economic growth in Nigeria. Two often used tests are the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Spurious regression findings can occur when dealing with non-stationary data, hence it is essential to verify stationarity before continuing with any research. Correlation The result measures the magnitude and direction of the correlation between two variables, such as changes in oil prices and economic growth in Nigeria, indicating whether they have a positive or negative relationship. Lag Selection entails selecting the most suitable amount of lagged observations for models such as Vector Autoregression (VAR) in order to effectively capture the dynamic correlation between oil price volatility and economic growth. This is done by evaluating metrics such as AIC, SBC, and HQC. VAR Estimation is a statistical technique that examines the linear connections between different time series, specifically investigating how changes in oil prices affect economic growth over time. The AR-Root Table

evaluates the stability of the VAR model by verifying that all roots lie within the unit circle, which guarantees dependable forecasts and impulse responses. Variance decomposition is a method used to analyses the extent to which fluctuations in oil prices contribute to changes in Nigeria's economic growth. It involves breaking down the forecast error variance for each variable in the VAR model. Finally, standardized Cointegrating The coefficients in cointegration analysis capture the stable and long-term relationship between non-stationary variables, such as oil prices and economic growth in Nigeria. Normalization is used to improve the interpretability of these coefficients.

4. Results and Discussion

Table 4.1 Unit Root Test

Variables	GDP	OLR	PPT	FDI	EXR
P-Value	0.0000	0.0000	0.9987	0.0000	0.0009
ADF Statistic	-12.03304	-7.180663	2.891311	-11.02889	-4.425098
1st Differences					
(1%)	-3.577723	-3.584743	-2.618579	-3.577723	-3.577723
(5%)	-2.925169	-2.928142	-1.948495	-2.925169	-2.925169
(10%)	-2.600658	-2.602225	-1.612135	-2.600658	-2.600658
Stationarity Status	**Stationary**	**` Stationary**	**Stationary**	**Stationary**	**Stationary**

Source: Researcher's Compilation 2024.

The unit root test results in Table 4.1 indicate the stationarity status of various variables. Gross Domestic Product (GDP) Foreign Direct Investment (FDI) showed strong evidence of stationarity with statistically significant p-values of 0.0000 and highly negative Augmented Dickey-Fuller (ADF) statistics of -12.03304 and -11.02889, respectively. Oil Price (OLR) demonstrated stationarity as well, with a p-value of 0.0000 and an ADF statistic of -7.180663. However, Petroleum Profit Tax (PPT) appeared to be non-stationary, as indicated by a high p-value of 0.9987 and an ADF statistic of 2.891311. Exchange Rate (EXR) was also found to be stationary, with a p-value of 0.0009 and an ADF statistic of -4.425098. The critical values at different confidence levels (1%, 5%, 10%) further supported the stationarity status of the variables. Overall, the results suggest that GDP, OLR, FDI, and EXR exhibit stationarity, while PPT does not conform to the stationary assumption.

Table 4.2 Correlation Result

	EXR	FDI	GDP	OLR	PPT
EXR	1	0.19818	-0.06619	-0.04512	-0.03109
FDI	0.19818	1	-0.10258	0.25414	-0.10836
GDP	-0.06619	-0.10258	1	0.28294	-0.18434
OLR	-0.04512	0.25414	0.28294	1	0.07067
PPT	-0.03109	-0.10836	-0.18434	0.07067	1

Source: Researcher's Compilation 2024

The correlation results in Table 4.2 show the relationships between Exchange Rate (EXR), Foreign Direct Investment (FDI), Gross Product (GDP), Price (OLR), and Petroleum Profit Tax

(PPT). The strongest positive correlation is observed between FDI and OLR at 0.254, while the relationship between GDP and OLR is also notable at 0.283. Conversely, there are weaker correlations between EXR and the other variables, indicating limited or negative associations (-0.066 with GDP, -0.045 with OLR, -0.031 with PPT). This suggests that FDI and OLR have the most significant impact on each other, whereas EXR's relationships with the other variables are less pronounced. Further analysis may be needed to understand the implications of these correlations on the overall dataset or model under consideration.

Table 4.3 Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-790.5946	NA	3.49e+09	36.16339	36.36614	36.23858
1	-587.5108	350.7811*	1075004.*	28.06867*	29.28517*	28.51981*
2	-574.1078	20.10448	1906066.	28.59581	30.82605	29.42289
3	-553.2521	26.54357	2595110.	28.78419	32.02817	29.98721
4	-521.1563	33.55479	2407262.	28.46165	32.71937	30.04062

Source: Compiled by the author, 2024

In Table 4.3, the lag selection results display the log likelihoodLogL), Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ) values for different lag values. The log likelihood value notably increases from -790.5946 at lag zero to -587.5108 at lag one, indicating a better fit for the model with one lag. The significant LR value of 350.7811 at lag one surpasses the critical threshold, emphasizing the superiority of this model. Additionally, the FPE, AIC, SC, and HQ values decrease at lag one, indicating improved model performance compared to higher lag values. These findings suggest that including one lag in the model enhances its explanatory power and predictive accuracy, highlighting the importance of lag selection in the analysis.

Table 4.4.1 Trace Statistic

Hypothesized		**Trace**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.521389	95.11139	69.81889	0.0001
At most 1 *	0.407312	61.21553	47.85613	0.0017
At most 2 *	0.352099	37.15348	29.79707	0.0059
At most 3 *	0.205679	17.18867	15.49471	0.0275
At most 4 *	0.133592	6.596347	3.841465	0.0102

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Researcher's Compilation 2024

Table 4.4.2

Max-Eigen Statistic

Hypothesized		**Max-Eigen**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.521389	33.89586	33.87687	0.0498
At most 1	0.407312	24.06204	27.58434	0.1326
At most 2	0.352099	19.96482	21.13162	0.0722
At most 3	0.205679	10.59232	14.26460	0.1759
At most 4 *	0.133592	6.596347	3.841465	0.0102

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Researcher's Compilation 2024

In Table 4.4.1, the Trace Statistic results indicate presence of cointegrating equations among the variables. The test statistics for each number of common trends (No. of CE)) are compared against

critical values at a significance level of 0.05. The hypothesis of no cointegration (None) is rejected in favor of at least 1 cointegrating equation based on the significant statistic values: 95.11139 for None, 61.21553 for At most 1, 37.48 for At most 2, 17.18867 for At most 3, and 6.596347 for At most 4. The Trace test indicates the presence of 5 cointegrating equations at the 0.05 significance level. Moving to Table 4.4.2, the Max-Eigen Statistic presents similar results with rejected hypothesis of no cointegration (None) in favor of at least 1 cointegrating equation, as confirmed by the significant statistic values compared to critical values. The Max-Eigenvalue test indicates 1 cointegrating equation at the 0.05 significance level. These findings suggest the presence of long-term relationships among the variables, implying that they move together over time despite short-term fluctuations.

Table 4.5 VAR Estimation

	GDP	OLR	PPT	FDI	EXR
GDP(-1)	0.092674	-0.220893	-0.097243	0.043866	0.363126
	(0.17317)	(0.22568)	(0.09116)	(0.02903)	(0.59642)
	[0.53517]	[-0.97878]	[-1.06672]	[1.51110]	[0.60884]
GDP(-2)	0.133762	0.218001	-0.009730	0.048220	0.389212
	(0.16667)	(0.21722)	(0.08774)	(0.02794)	(0.57405)
	[0.80253]	[1.00360]	[-0.11089]	[1.72581]	[0.67801]
OLR(-1)	0.015520	0.504547	-0.018673	-0.050233	-0.250677
	(0.13473)	(0.17558)	(0.07092)	(0.02259)	(0.46402)
	[0.11520]	[2.87354]	[-0.26328]	[-2.22416]	[-0.54023]
OLR(-2)	-0.158728	-0.249174	0.047898	-0.009977	-0.044137
	(0.14057)	(0.18319)	(0.07400)	(0.02356)	(0.48414)
	[-1.12920]	[-1.36016]	[0.64728]	[-0.42338]	[-0.09117]
PPT(-1)	-0.232349	0.239732	0.954989	0.026145	-0.510954
	(0.32896)	(0.42872)	(0.17317)	(0.05515)	(1.13299)
	[-0.70631]	[0.55919]	[5.51462]	[0.47410]	[-0.45098]
PPT(-2)	0.176387	-0.294454	0.013092	-0.037876	0.824123
	(0.31883)	(0.41552)	(0.16784)	(0.05345)	(1.09811)
	[0.55323]	[-0.70864]	[0.07800]	[-0.70866]	[0.75049]
FDI(-1)	2.017754	0.687227	0.216056	0.252728	-2.351510
	(0.99142)	(1.29207)	(0.52191)	(0.16620)	(3.41460)
	[2.03522]	[0.53188]	[0.41397]	[1.52066]	[-0.68866]
FDI(-2)	0.681498	1.792961	0.303173	0.212635	-2.968469
	(1.03401)	(1.34757)	(0.54433)	(0.17334)	(3.56127)
	[0.65909]	[1.33052]	[0.55697]	[1.22673]	[-0.83354]
EXR(-1)	0.002838	0.084086	0.098642	-0.000503	1.128339
	(0.04644)	(0.06053)	(0.02445)	(0.00779)	(0.15995)
	[0.06111]	[1.38926]	[4.03471]	[-0.06455]	[7.05417]
EXR(-2)	0.044775	-0.097347	-0.022167	0.003466	-0.232546
	(0.05894)	(0.07681)	(0.03103)	(0.00988)	(0.20300)
	[0.75968]	[-1.26732]	[-0.71444]	[0.35084]	[-1.14557]
C	1.012681	8.373197	-0.693365	1.312284	11.95768
	(2.35127)	(3.06429)	(1.23778)	(0.39415)	(8.09812)
	[0.43070]	[2.73251]	[-0.56017]	[3.32936]	[1.47660]
R-squared	0.413319	0.504130	0.999006	0.488999	0.983133
Adj. R-squared	0.245696	0.362453	0.998722	0.342998	0.978314
Sum sq. resids	761.0333	1292.584	210.9030	21.38616	9027.512
S.E. equation	4.663026	6.077087	2.454750	0.781686	16.06017

F-statistic	2.465765	3.558307	3518.286	3.349295	204.0041
Log likelihood	-129.8100	-141.9936	-100.2946	-47.65553	-186.6972
Akaike AIC	6.122174	6.651896	4.838895	2.550240	8.595529
Schwarz SC	6.559458	7.089179	5.276178	2.987524	9.032812
Mean dependent	3.151451	12.84263	56.13335	1.179883	96.40467
S.D. dependent	5.369015	7.610960	68.67245	0.964382	109.0579

Determinant resid covariance (dof adj.)	553336.9
Determinant resid covariance	141104.4
Log likelihood	-599.0727
Akaike information criterion	28.43795
Schwarz criterion	30.62436
Number of coefficients	55

Source: Researcher's Compilation using Stata 2024

In Table 4.5, the Vector Autoregression (VAR) results provide insights into the relationships among Gross Domestic Product (GDP), Oil (OLR), Petroleum Profit Tax (PPT), Foreign Direct Investment (FDI), and Rate (EXR) over lagged periods. The coefficients indicate the corresponding effects of each lagged variable on the current values of the variables, revealing both short-term and long-term dynamics within the system. Noteworthy coefficients include the positive impact of GDP (-1) on EXR, the negative impact of OLR (-2) on GDP, and the positive impact of PPT (-1) on GDP. The R-squared values suggest the percentage of variance explained by the model, with F-statistics aiding in evaluating the overall model significance. Furthermore, the Akaike Information Criterion (AIC) and Schwarz Criterion assist in model selection and adequacy assessment. The diagnostics, such as determinants of residual covariance and log likelihood, offer additional measures to evaluate the model's performance and robustness. The results highlight the complex interrelations among the variables and provide a comprehensive understanding of their interactions and impacts within the system under consideration.

Table 4.6 Variance decomposition

Variance Decomposition of GDP: Period	S.E.	GDP	OLR	PPT	FDI	EXR
1	4.663026	100.0000	0.000000	0.000000	0.000000	0.000000
		(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	5.001874	87.54689	0.927945	2.719532	8.797741	0.007895
		(9.54867)	(4.80195)	(5.31748)	(6.58155)	(2.81719)
3	5.296049	79.44861	5.530137	2.601422	11.83927	0.580559
		(10.1490)	(7.09990)	(5.01489)	(7.14339)	(3.91479)
4	5.597477	73.06103	9.878108	3.351794	12.84105	0.868023
		(11.8881)	(9.31669)	(5.27537)	(6.94466)	(5.44726)
5	5.761528	70.35343	11.93234	3.939549	12.63847	1.136224
		(12.9692)	(10.2009)	(5.62867)	(7.20161)	(6.93414)
6	5.860588	68.76942	12.76434	4.359529	12.36720	1.739502
		(13.7624)	(10.4522)	(6.09288)	(7.35251)	(8.11163)
7	5.928164	67.56430	13.11701	4.643271	12.11587	2.559551
		(14.4680)	(10.6482)	(6.27956)	(7.51166)	(9.00487)
8	5.976193	66.68781	13.27268	4.809747	11.92236	3.307406
		(14.9910)	(10.7082)	(6.44396)	(7.64036)	(9.66082)
9	6.006605	66.12512	13.31656	4.901799	11.82619	3.830336
		(15.4263)	(10.7510)	(6.47203)	(7.77621)	(10.1160)
10	6.023768	65.79459	13.30862	4.941654	11.81275	4.142386
		(15.7755)	(10.7609)	(6.47752)	(7.83295)	(10.4562)

Source: Researcher's Compilation

In Table 4.6, the results of the Variance Decomposition for Gross Domestic Product (GDP) are over different periods. The table shows the percentage variance of GDP explained by itself and the other variables - Oil Price (OLR), Petroleum Profit Tax (PPT), Foreign Direct Investment (FDI), and Rate (EXR) - up to the specified period. For instance, in the first period, GDP explains 100% of its own variance. As the periods progress, the decomposition reflects the changing contributions of each variable to the variance of GDP. Notably, the percentage contribution of each variable varies over time, providing insights into the relative importance of different factors in explaining the fluctuations in GDP. The standard errors are also provided to indicate the uncertainty associated with these variance decomposition values. These results offer valuable information on the dynamic interactions and influences among the variables within the system over the specified time horizon.

Table 4.7 Normalized Cointegrating Coefficients

GDP	OLR	PPT	FDI	EXR
1.000000	-0.526389	0.070731	-2.112440	-0.305504
	(0.25300)	(0.09198)	(1.83144)	(0.07305)
Adjustment coefficients (standard error in parentheses)				
D(GDP)	-0.049131			
	(0.09343)			
D(OLR)	0.194225			
	(0.12074)			
D(PPT)	-0.214154			
	(0.04151)			
D(FDI)	0.023807			
	(0.01531)			
D(EXR)	-0.288176			
	(0.29920)			

Source: Researcher's Compilation

In Table 4.7, the normalized cointegrating coefficients reveal the long-term relationships among the variables - Gross Domestic Product (G), Oil Price (OLR), Petroleum Profit Tax (PPT), Foreign Direct Investment (FDI), and Rate (EXR). The coefficients demonstrate the relative impact of each variable on the cointegrating relationship, with GDP as the base variable showing a coefficient of 1. The results indicate that OLR has a negative impact on GDP (-0.526389), while PPT has a positive impact (0.070731). Moreover, FDI (-2.112440) and EXR (-0.305504) also show negative relationships with GDP. The adjustment coefficients further illustrate how deviations from the long-term relationship are corrected in the short term for each variable. These statistical findings provide valuable insights into the equilibrium and adjustment mechanisms of the variables, enriching the understanding of their interdependencies over time.

5. Summary, Conclusion and Recommendations

5.1 Summary

In Chapter Four, a comprehensive study and interpretation of the results on the influence of oil price volatility on economic growth in Nigeria is provided. The findings of the unit root test show that GDP, Foreign Direct Investment (FDI), Oil Price (OLR), and Exchange Rate (EXR) exhibit stationarity, however Petroleum Profit Tax (PPT) does not. Correlation research indicates a strong positive association between Foreign Direct Investment (FDI) and Overall Labour Requirement (OLR), as well as between Gross Domestic Product (GDP) and OLR. However, the Exchange Rate (EXR) exhibits modest correlations with the other variables. The findings of the lag selection indicate that incorporating a single lag into the model enhances its fitness and prediction precision. Cointegration tests detect the existence of long-term connections between the variables,

with both the Trace and Max-Eigen tests verifying the presence of cointegrating equations. The Vector Autoregression (VAR) analysis elucidates intricate interconnections and dynamic impacts among the variables. The variance decomposition results demonstrate the fluctuating contributions of each variable to the variance of GDP over time. Additionally, the normalised cointegrating coefficients reveal the existence of long-term associations. Specifically, OLR and FDI have a negative impact on GDP, whereas PPT has a positive effect.

5.2 Conclusion

This study highlights the substantial influence of oil price fluctuation on the economic growth of Nigeria. The stability of GDP, FDI, OLR, and EXR enables dependable analysis, however the lack of stability in PPT indicates the necessity for additional inquiry. The direct association between GDP and OLR demonstrates that higher oil prices often stimulate economic expansion, but this connection is intricate and impacted by additional variables. Identifying long-term cointegrating correlations suggests that these variables exhibit a consistent movement across time, even in the presence of short-term volatility. The VAR analysis and variance decomposition offer a more profound understanding of the dynamic interactions and impacts among the variables, highlighting the crucial impact of oil prices and foreign investments on Nigeria's economic trajectory.

5.3 Recommendations

Nigeria should give priority to economic diversification in order to decrease its reliance on oil earnings. To offset the negative impacts of oil price volatility, the government can diversify its investments into industries such as agriculture, manufacturing, and services.

Economic policies aimed at maintaining stability and preventing fluctuations in key economic indicators. Employ stabilization policies to effectively mitigate the effects of oil price volatility. This encompasses the activities of accumulating foreign exchange reserves, creating sovereign wealth funds, and implementing counter-cyclical fiscal measures to protect the economy from the negative impact of oil price fluctuations.

Facilitating Foreign Investment: Foster a favorable climate for foreign direct investment by the enhancement of infrastructure, the guarantee of political stability, and the implementation of laws that are favorable to investors. This will facilitate the attraction and preservation of foreign capital, which is vital for fostering economic expansion.

Enhancing the structures and systems of institutions: Enhance the organizational frameworks and governance systems to enable efficient administration of oil revenues and promote transparency in the petroleum industry. This measure will bolster accountability and mitigate corruption.

Enhance the coordination between monetary and fiscal policy to effectively manage the exchange rate and regulate inflation. This measure will contribute to the stabilization of the economy and facilitate the promotion of sustainable growth.

Strategic Planning: Formulate economic strategies that consider the possibility of oil price volatility in the long run. Utilizing scenario planning and forecasting enables policymakers to anticipate and strategies for a range of potential future scenarios, therefore facilitating well-informed decision-making.

Enhance public awareness and education regarding the significance of economic diversification and the potential hazards linked to reliance on oil. This will cultivate widespread public endorsement for essential reforms and initiatives.

Nigeria can enhance its ability to handle the effects of oil price fluctuations and foster sustainable economic growth by adopting these suggestions.

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