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OIL PRICE SHOCKS, INFLATION AND ECONOMIC GROWTH IN NIGERIA: EVIDENCE FROM SVAR ANALYSIS (1995Q1–2024Q4)

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ABSTRACT
Oil revenue and inflation are the key determinants affecting almost all the sectors of the economy in Nigeria. This study examines the effect of oil price on inflation and economic growth in Nigeria from 1995Q1 to 2024Q4 using a Structural Vector Autoregressive (SVAR) model. The data were drawn from the CBN Statistical Bulletin and World Bank Development Indicators. The ADF unit root test with intercept reveals that the variables are stationary at first difference. The empirical results of the impulse response functions from the SVAR model and variance decomposition indicate that the response of economic growth and inflation to a unit standard deviation shock to oil price are positive and significant. Specifically, the results from variance decomposition reveal that oil price shocks explain approximately 26% of the variation in GDP and 61% of the variation in inflation over a 10-quarter horizon. The SVAR model passed key diagnostic checks: no serial correlation (LM test p = 0.958), homoskedasticity (p = 0.765), and stability (all roots lie within the unit circle). Based on these results, the study recommends that to reduce food imports, encourage economic diversification and lessen the impact of oil price shocks on price level especially food inflation, the Government should intensify its efforts to increase domestic food production by granting more funding support through its agricultural sector intervention schemes. This would help increase country's GDP and stabilize inflation pressures.

Keywords: Oil price, Economic Growth, Inflation and Structural Vector Autoregressive (SVAR)

Introduction

Over the last 70 years, crude oil has continued to be the world's most significant energy source. Its products are used to power homes, businesses, cars, and airplanes. As a result, among the most significant shocks affecting the global economy are abrupt interruptions in oil supply and steep price spikes. Since oil continues to be a vital commodity that propels economic activity worldwide, changes in oil prices have a significant impact on macroeconomic outcomes in various nations (Bala et al., 2020)

Crude oil is the Nigerian government's main source of income and a significant source of foreign exchange revenues. Oil price shocks have had an accompanying multiplier effect on crude oil and economic activity, according to Yuan, Liu, and Huang (2014). Nigeria's economy has been entirely dependent on oil, which also serves as the foundation for capital allocation, income distribution, and government budgeting (Nwanna & Eyedayi, 2016).

Nigeria neglected its robust manufacturing and agricultural industries in favour of an unhealthy reliance on crude oil during the 1970s oil boom. Nigeria's crude oil earnings significantly increased as a result of the 1973 OPEC oil embargo, which drove up oil prices worldwide. Nigeria, a major oil exporter, saw a quick growth in its revenue base, with oil becoming as the main source of foreign exchange profits and government revenue.

The abrupt rise in government revenue resulted in more government spending, public sector expansion, and general pay increases. These spending habits greatly increased aggregate demand by bringing enormous amounts of cash into the economy. However, local output in important industries like industry and agriculture was unable to keep up with the sharp increase in demand. Demand-pull inflation resulted from this mismatch between supply and demand when too much money sought too few products. Dutch disease is a problem that was exacerbated by the oil boom (Sala-i-Martin & Subramanian, 2003).

The price of oil fell dramatically in the middle of 2014. By early 2015, international crude oil prices had dropped from above $100 per barrel to less than $50, severely hurting Nigeria's export profits and government income. Sharp currency devaluation resulted from this circumstance. Cost-push inflation was fueled by the sharp increase in the price of imported commodities, machinery, and raw materials as the naira declined (Sanusi, 2010). Budget cuts and a move toward import substitution policies were the government's response, but the harm to the economy had already begun. Investment declined, growth stalled, and unemployment sharply rose. According to Bawa et al. (2020), Nigeria experienced increased inflation as a result of negative oil price shocks.

While oil remains the backbone of Nigeria's economy, the overdependence on it has created a structural imbalance that hinders sustainable growth. The Structural Adjustment Programme (SAP) introduced in 1986 aimed to reduce the Nigeria's dependence on oil through liberalization and diversification, the aim was to boost non-oil sectors, but Nigeria lacked the infrastructure and investment climate needed to quickly replace oil revenues with other sources. The vulnerability of oil prices brings about macroeconomic instability, often resulting in unstable inflation rates and uncertain levels of economic output. These conditions affect both monetary and fiscal policy effectiveness, especially in managing inflation and stimulating long-term economic growth.

Due to these conditions, it is important to analyze the actual relationship among oil prices, inflation, and economic activity in Nigeria. The IMF (2025) projects that Nigeria's GDP growth will slow to 3.0% in 2025 and 2.7% in 2026, partly due to lower oil revenues, while the World Bank has warned that higher oil prices generate both an export and fiscal windfall but also exert upward pressure on domestic inflation through import costs. Understanding the dynamic transmission mechanisms through which oil price shocks influence inflation and economic growth is therefore critical for designing effective monetary

and fiscal policy responses. This study aims to contribute to this understanding by applying the SVAR framework to quarterly data for Nigeria over the period 1995Q1 to 2024Q4.

Literature Review

Conceptual Framework

1 Oil prices

According to Zivkov, Duraskovic, and Manic (2019), there are two ways that oil price shocks impact domestic inflation in a country: directly through price increases for refined oil roducts that affect the Consumer Price Index (CPI) and indirectly through price changes for goods and services that use oil or oil products as inputs during production.

2 Inflation

One of the most significant economic issues is inflation, which is described as a sharp, persistent, and significant rise in the average level of prices. A moderate amount of inflation can stimulate economic growth even if it is an unwanted phenomenon that has substantial negative effects on the economy and society. The pace of prices, the market mechanism, inflationary expectations, and the nation's economic institutions all influence how a country's economy responds to inflation (Kelesbayev, 2022)

3 Economic Activity

Economic activity encompasses all actions related to the production, distribution, and consumption of goods and services within an economy. It involves the utilization of resources such as labor, capital, and technology to create products and services that satisfy human needs. These activities are fundamental to generating income and wealth in a society. Economic activity is what drives economic growth, employment, and standards of living. It includes both formal (regulated and taxed) and informal (unregulated or untaxed) sectors.

Economic activities are measured using various macroeconomic indicators that reflect the performance and health of the economy. One of the most widely used measures is Gross Domestic Product (GDP), which represents the total monetary value of all final goods and services produced within a country's borders over a specified period. GDP can be calculated using three approaches: the production approach, which sums the value added at each stage of production; the expenditure approach, which aggregates total spending on final goods and services; and the income approach, which totals incomes earned by individuals and businesses in the economy.

Theoretical Framework

The relationship among oil prices, inflation and economic activity can be explained by several theories which includes; structural theory, the Phillips curve and Harrrod-Domar model.

1 Structural Theory of Inflation

The structural theory of inflation posits that inflation in developing countries is often caused by weaknesses in a country's capacity to produce goods or maintain adequate supply, rather than solely by excessive demand or money supply. According to structuralist economists, inflation arises not merely from excess demand but from bottlenecks and inefficiencies in the supply side of the economy. Some of these bottlenecks include limited agricultural productivity, poor infrastructure, foreign exchange constraints, and an overdependence on imports for essential goods. These structural issues restrict the economy’s ability to respond flexibly to increases in demand, causing prices to rise even when there is no excessive demand pressure. In Nigeria, inflation can be explained by these bottlenecks such as heavy reliance on imported goods, vulnerability to exchange rate fluctuations, underdeveloped domestic industries, and inadequate transportation and storage facilities, especially in the agricultural sector. Poor infrastructure and supply chain issues

prevent manufactured goods from efficiently reaching markets, contributing to sustained price increases.

2 Harrod-Domar Model of Growth

The Harrod-Domar Model of economic growth was developed by Sir Roy Harrod and Evsey Domar. It is a foundational theory that explains how the growth rate of an economy depends on the level of savings and the productivity of capital. According to the model, economic growth arises when investments lead to an increase in the capital stock, which in turn raises the economy's productive capacity. Savings finance investment, which adds to the capital stock, while the capital-output ratio measures how much capital is needed to produce one unit of output. If the economy saves a higher portion of its income, more investment can be made, resulting in faster growth. The model also emphasizes that for stable growth, the growth of actual output must match the growth of the economy's productive capacity; otherwise, imbalances such as unemployment or inflation can occur.

Empirical Review

1 Impact of Oil Price on inflation

Aladwani (2025) investigated the influence of oil price fluctuations on inflation uncertainty in order to achieve a comprehensive understanding of how the intricate interconnections between oil price fluctuations, supply chain disruptions and shifting demand patterns collectively shape inflation dynamics within the Chinese economy, especially during critical periods such as the Covid-19 pandemic and geopolitical events like the Russia–Ukraine conflict. He analyzed data from 1994-2023 using the Markov Regime-Switching generalized autoregressive conditional heteroskedasticity (MRS-GARCH) family of models under student's t-distributions to measure the uncertainty of oil prices and the inflation rate. The result of his findings reveals that fluctuations in oil prices exert a noteworthy influence on the inflation rate. These findings indicate a consistent positive impact of oil prices on inflation rate uncertainty, particularly within export-oriented and import-oriented industries.

Vatsa (2025) used a structural vector autoregression model to analyze the links between oil prices, petrol prices, inflation, inflation perceptions, and inflation expectations from the period of March 1995 to December 2023 in New Zealand. His study reveals that inflation perceptions play a key role in shaping inflation expectations. While inflation expectations respond slowly to oil and petrol price changes, they react swiftly and strongly to shifts in inflation perceptions. In contrast, shocks to oil prices, petrol prices, and inflation have temporary and delayed effects on inflation perceptions.

Talimova et al (2025) analyzed macroeconomic annual data from 1996 to 2023 employing Toda-Yamamoto causality and Gregory-Hansen cointegration tests to understand how industrial and agricultural production, alongside oil prices, influence inflation. The result of their findings reveals that oil prices have a direct and statistical significant impact on inflation. Also, a bidirectional causality relationship was identified between industrial production and inflation. However, agricultural production was found to affect inflation in the short term but does not have a significant long-term influence. This shows that agricultural production plays a limited role in the dynamics of inflation. Based on their analysis, the study emphasizes the need to prioritize these factors in economic policy, particularly the impacts of oil prices and industrial production on inflation.

Toni (2024) analyzed panel data of different oil-dependent economies for the period of 20 years (2000 to 2020) to assess the relationship between oil prices and inflation within oil-dependent economies. The result of her findings revealed that 10% rise in oil prices mainly causes an average increase of 0.5% inflation in economies.

Ahmed et al (2023) examined the relationship between inflation and the macroeconomy via crude oil price fluctuations in UK. They analyzed monthly data from

January 2010 to June 2022 using VAR model, time-varying VAR analysis, and time-varying panel model. Their findings reveal that Brent crude oil shocks resulted inflation in the first one month, but inflation shocks is strong in the first quarter but reduces in the long run.

Anyars & Adabor (2023) assessed the impact of oil price changes on aggregate and disaggregate inflation. They applied Nonlinear Autoregressive Distributed Lag (NARDL) Model to analyze quarterly data from the period of 2000Q1 to 2021Q1 in Ghana. According to their findings, oil price changes asymmetrically impacted aggregate and disaggregate inflation. And this asymmetric effect was more pronounced on transport CPI than other CPIs. This result shows that oil price changes affect the transport sector more than other sectors.

Aliyev et al (2023) explored the inflationary effects of oil price rises in Azerbaijan. They used Autoregressive Distributed Lag Bounds testing (ARDLBT), Fully Modified Ordinary Least Squares (FMOLS), and Canonical Cointegration Regression (CCR) simultaneously to estimate the long and short-term impacts while considering "oil price—money supply" interactions. The study covers the period of 1997-2021. According to their findings, oil price is a significant long-term determinant of inflation in Azerbaijan, affecting overall prices directly and indirectly through money supply. Also, the effect happens indirectly and is statistically significant in the short-term, moderated by the money supply; and oil price moderates the impact of the money supply over inflation in the short-term. A major limitation of this study is that it omits the possible moderation impact of oil prices over inflation.

Kelesbayev et al (2022) investigated the effect of oil prices on inflation and real exchange rate in Kazakhstan. Their study uses monthly data for the period of 2015:M1–2021:M11 employing Structural Vector Autoregression (SVAR) model. The results showed that while the Real Effective Exchange Rate mostly affects the Oil Price, the Consumer Price Index variable affects the Real Effective Exchange Rate.

Almgren & Holmberg (2022) examined the effects of oil price shocks on inflation in the G-7 countries analyzing monthly data from 1980-2021 using Structural Vector Autoregressive model. Their result shows that in periods of oil independency, oil price shocks induce a lower response in inflation compared to periods in which the G-7 economies are considered oil dependent.

Abatcha (2021) investigated the impact of oil price changes on inflation in Nigeria using monthly data from 1991 to 2019, employing the Autoregressive Distributed Lag (ARDL) model. According to his findings, oil price increases exert a positive influence on inflation rates in both the short and long run. Also, exchange rates and lagged inflation values also positively impacted inflation. The study concluded that oil price changes are a significant driver of inflation in Nigeria.

Arku et al. (2021) examined the impact of crude oil prices on inflation and interest rates in Ghana. Using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for stationarity and Autoregressive Distributed Lag (ARDL) bounds testing for cointegration, they found a positive long-run relationship between crude oil prices and inflation. Short-run analysis revealed a negative but insignificant first lag of inflation and a positive, significant second lag. Furthermore, crude oil prices negatively affected interest rates.

Bawa et al (2020) assessed the impact of oil price shocks on inflation in Nigeria. A Non Linear Autoregressive Distributed Lag (NARDL) approach was applied on quarterly data spanning from 1999Q1 to 2018Q4 their results revealed that headline, core and food measures of inflation in Nigeria increased as oil prices increased. But as the price of oil dropped, the marginal cost of production also dropped, which led to a moderation in domestic inflation. Also, negative oil price shocks led to higher inflation in Nigeria when

exchange rate was dropped from the models, indicating that exchange rate absorbed the impact of oil price declines earlier, as lower oil prices culminated in lower external reserve, depreciation of the naira and ultimately higher inflationary pressures.

Bilgin & Adali (2020) analyzed the impact of changes in oil prices on consumer inflation in Turkey. They used both linear and non-linear ARDL models to estimate the inflationary effects of changes in crude oil and gasoline prices on the consumer prices for the period of 2009:01-2020:04. According to their findings, changes in both oil and fuel prices have asymmetric effects on inflation in the short run. Both models explain the changes in consumer inflation with the increases in oil prices in the long run. The result indicates that the decreases in oil prices are not taken into account in pricing decisions.

Shahriyar et al (2019) investigated the relationship between inflation, oil prices and exchange rate in Azerbaijan from 1995-2017 using Vector Error Correction Model (VECM) they found that oil prices and exchange rate have positive and statistically significant impact on inflation in the long-run. This implies that 1% increase in oil prices and exchange rate increases inflation by 0.58% and 1.81%, respectively.

Bala & Chin (2018) investigated the asymmetric impacts of oil price changes on inflation in African OPEC member countries (Algeria, Angola, Libya, and Nigeria). They analyzed annual data from 1995-2014 using panel Autoregressive distributed lag (ARDL) and they found that the long-term coefficient of oil price, money supply, exchange rate, and GDP positively affected inflation, while the long-term coefficient of food production adversely influenced inflation.

2 Effects of oil prices on Economic Growth

Magaji et al (2025) explored the link between oil price fluctuations on selected macroeconomic variables in Nigeria for the period of 42 years by analyzing quarterly data from 1980 to 2022. The selected macroeconomic indicators include Real Gross Domestic Product, Consumer Price Index, and Real Exchange Rate. They employed Vector Error Correction Model (VECM) for the analysis; the results indicated long-term interdependencies, where oil price shocks significantly influence the Real Gross Domestic Product, Consumer Price Index, and Real Exchange Rate in Nigeria. This study reveals that most macroeconomic indicators are directly or indirectly affected by oil price fluctuations, given that Nigeria lacks control over oil prices.

Metieh & Chukunalu (2025) investigated the tradeoff between inflation and unemployment and its implications on the growth of the Nigerian economy for the period 1981 – 2024. The data were analyzed using the auto-regressive distributed lag (ARDL) model. According to their findings, inflation rate negatively affected economic growth but not significantly; unemployment rate negatively affected economic growth of Nigeria significantly for the period under review while the tradeoff between inflation and unemployment had positive but not significant effect on growth of the Nigerian economy. Their study concluded that the initial proposition of the Philips curve was applicable to Nigeria as there was an inverse relationship between inflation, unemployment rate and economic growth in the long run. This means that increase in unemployment stunts Nigeria's economic growth in the long run and at the same time, inflation rate decreased economic growth.

Belkhaoui (2025) used autoregressive distributed lagged (ARDL) approach to evaluate empirically the impact of oil price fluctuations on the relationship between banking sector development and economic growth in oil-importing Middle East and North America(MENA) countries. The results of his research show that in the long term, oil prices have a one-way impact on economic growth and banking sector development in oil-importing countries. Furthermore, a well-developed banking sector not only fosters

economic growth directly but also helps mitigate the effects of oil price fluctuations on the economy.

Anakwue et al (2025) employed Vector Error Correction Model (VECM) and variance decomposition analysis for the period of 1995-2024; to assess how changes in oil prices impact overall economic growth, the performance of the agricultural and manufacturing sectors, and government revenues. According to their findings, Oil prices moderately influence Nigeria's economic growth, contributing 2.36% to long-term real GDP fluctuations. The agricultural sector remains robust against oil price shifts, with diminishing sensitivity over time. Conversely, manufacturing's vulnerability to oil price changes grows, with a 9.49% impact on output variations. Government revenues are significantly affected by oil price swings, especially in the medium term, accounting for 38.17% of fluctuations.

Akintunde & Adebanjo (2024) investigated the impact of inflation and oil price fluctuations on the US economic performance, considering factors like unemployment, exchange rates, and manufacturing output. Using secondary data from 1990 to 2023, the Johansen co-integration test and Vector Error Correction Model (VECM) revealed a significant correlation between oil prices, inflation, and economic performance in both the short and long run. The OLS regression model shows that crude oil prices and exchange rates positively impacted the US economy, while inflation and manufacturing output had negative effects. The FMOLS model confirms the long-term detrimental impact of inflation and manufacturing output on economic performance.

Uju et al (2024) examined the impact of oil price fluctuations on Nigeria's economy from 1970Q1 to 2014Q4 using the Vector Autoregression (VAR) technique and Johansen cointegration test. Their findings revealed a long-run relationship between oil prices and key macroeconomic variables, including real GDP, inflation, unemployment, exchange rate, and government expenditure. However, the study found that oil price fluctuations had insignificant positive impacts on inflation and unemployment, and insignificant negative impacts on real GDP, government expenditure, and exchange rate. The results suggest that Nigeria's economy is not highly susceptible to oil price fluctuations, likely due to government subsidies on crude oil products over these years.

Diep et al (2024) using a sample of 45 countries for the period 2010 – 2021 examined inflation situation and its effect on economic growth after the COVID-19 pandemic. They applied Ordinary least squares (OLS), fixed effects and random effects models across two groups of countries including developed countries and developing countries. Their findings provided evidence that inflation rate not only has a negative but also a positive impact on the economic growth rate and the results were robust in all groups of countries.

Seif & Stella (2024) explored the relationship between crude oil price fluctuations and economic growth in Tanzania employing a Vector Error Correction Model (VECM) to capture both short-run and long-run relationships for the period of 1988 to 2022. The result of their findings revealed that in the short run, the relationship between crude oil price fluctuation and GDP is insignificant, indicating that immediate fluctuation in oil prices does not significantly impact economic growth. However, there is a negative relationship between crude oil prices and GDP in the long run, reflecting the adverse impact of prolonged increases in crude oil prices on economic growth.

Tony (2023) analyzed the relationship between inflation and economic growth in Burundi and to determine whether there is an inflation threshold or not to allow monetary authority to adopt the optimal policies to deal with shocks. With annual data from 1990 to 2020, the ARDL approach was adopted to assess the short and long run relationship between inflation and economic growth. His results showed a negative and significant

relationship in the short run between inflation and economic growth, and a positive and significant relationship between investment, household consumption, and exchange rate with economic growth in the long run. Moreover, with the conditional least square (CLS) method used to determine the threshold, an inflation threshold of 13% above which inflation is harmful to growth by 3.7% was found. In addition, two stage least square (2SLS) was used for robustness checking and yielded the same results.

Rasoulinezhad (2016) provides a detailed study of the impact of financial and non-financial sanctions on Iran-Russia foreign trade and relation of oil price and Iran-Russia foreign trade. He analyzed annual data spanning from 1994–2013 employing VECM using the Gravity Model. The result of his findings shows that the oil price shock has negative effect on trade which means any increase or decrease of oil price decreases affect Iran-Russia trade adversely.

Based on the review of various related theoretical and empirical studies carried out within and outside Nigeria, several studies have examined the relationship between oil prices, inflation, and economic growth using diverse methodologies including ARDL (Abatcha, 2021; Bawa et al., 2020), NARDL (Anyars & Adabor, 2023), and VECM (Anakwue et al., 2025). While Adelowo & Saibu (2025) applied SVAR to Nigerian data covering 1985–2022 and found significant positive effects of macroeconomic variables on the real sectors, their study predates the 2022–2024 period of heightened exchange rate volatility and post-COVID inflationary dynamics. Similarly, Atasie et al. (2026) found cointegration between oil prices, inflation, and GDP in Nigeria but did not employ an SVAR framework. This study therefore extends the SVAR analysis to the period 1995Q1–2024Q4, offering more recent quarterly evidence on the dynamic impulse responses of GDP and inflation to oil price shocks, and explicitly distinguishing the relative contributions of oil price versus exchange rate in explaining inflation and growth variation in Nigeria.

Methodology

1 Sources of Data and Variables

The study employs quarterly time series data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Bank Development Indicators (WDI). The variables include Gross Domestic Product per capita (GDPpc) as a proxy for economic activity, Brent crude oil prices (OIP) as the measure of oil prices, the Consumer Price Index (CPI) as a proxy for inflation, and the exchange rate (RER) as a control variable. GDP per capita is preferred over total GDP because it accounts for population changes and provides a more accurate measure of living standards and economic welfare over time. The data cover the period from 1995Q1 to 2024Q4, yielding 120 quarterly observations. It should be noted that the lag order selection criteria (Table 2) indicate an optimal lag of 6, which, after adjustment for lags, reduces the effective sample size. To preserve sufficient degrees of freedom for a 4-variable SVAR, the estimation proceeds with a reduced lag of 2 or 3, following standard practice for quarterly data with limited observations.

2 Model Specification

The models can be specified as:

Gross Domestic Product per capita $= f$ (oil prices, consumer price index and exchange rate).

$GDPpc_t = f\ (OIP_t, CPI_t, RER_t)$……(3.1)

The mathematical form for the first model can be expressed as;

$GDPpc_t = \beta_o + \beta_1 OIP_t + \beta_2 CPI_t + \beta_3 RER_t$……(3.2)

But equations above are exact or deterministic in nature. In order to allow for the inexact relationship among the variables as in the case of most economic variables, the stochastic error term "μ_t" is added to the equation and logarithm of some variables. Thus, the study expresses the econometric form of the models as:

$LGDPpc_t = \beta_o + \beta_1 LOIP_t + \beta_2 CPI_t + \beta_3 RER_t + \mu_t$……………………………………………(3.3)
Where, $LGDPpc_t$, = is the Gross Domestic Product per capita proxy to Economic activities OIP_t = oil prices, CPI_t= consumer price index, RER_t= real exchange rate, β_i = coefficients of the variables, L = logarithm of the variables, μ_t= stochastic error term.

3 Structural VAR Model

The study adopts a Structural Vector Autoregression (SVAR) model to examine how shocks to oil prices, particularly Brent crude oil prices, affect key macroeconomic variables in Nigeria, including GDP per capita (as a proxy for economic activity), inflation (measured by the Consumer Price Index), and the exchange rate (used as a control variable). The SVAR model allows for an in-depth analysis of the dynamic interactions and transmission mechanisms between oil price fluctuations and macroeconomic performance. This approach is structured around the objective of analyzing the pathways through which oil price shocks influence inflation and economic activity in Nigeria over the period 1995Q1 to 2024Q4.

$$\Delta LGDPpc_t = \sum_{i=1}^{L} \alpha_{11}^{i} \Delta LGDPpc_{t-i} + \alpha_{12}^{0} \Delta LOIP_t + \sum_{i=1}^{L} \alpha_{12}^{i} \Delta LOIP_{t-i} + \alpha_{13}^{0} \Delta CPI_t + \sum_{i=1}^{L} \alpha_{13}^{i} \Delta CPI_{t-1} + \sum_{i=1}^{L} + \alpha_{15}^{0} \Delta RER_t + \sum_{i=1}^{L} \alpha_{15}^{i} \Delta RER_{t-i} + \varepsilon_{1t} \quad (3.6)$$

$$\Delta LOIP_t = \sum_{i=1}^{L} \alpha_{21}^{i} = \Delta LOIP_{t-i} + \alpha_{22}^{0} \Delta LGDPpc_t + \sum_{i=1}^{L} \alpha_{22}^{i} \Delta LGDPpc_{t-i} + \alpha_{23}^{0} \Delta CPI + \sum_{i=1}^{L} \alpha_{23}^{i} \Delta CPI_{t-i} + \alpha_{25}^{0} RER_t \sum_{i=1}^{L} \alpha_{25}^{i} \Delta RER_{t-i} + \varepsilon_{2t} \quad (3.7)$$

$$\Delta CPI_t = \sum_{i=1}^{L} \alpha_{31}^{i} \Delta CPI_{t-i} + \alpha_{32}^{0} \Delta LGDPpc_t + \sum_{i=1}^{L} \alpha_{32}^{i} \Delta LGDPpc_{t-i} + \alpha_{33}^{0} \Delta LOIP_t + \sum_{i=1}^{L} \alpha_{33}^{i} \Delta LOIP_{t-i} + \sum \quad + \alpha_{35}^{0} \Delta RER_t + \sum_{i=1}^{L} \alpha_{35}^{i} \Delta RER_{t-i} + \varepsilon_{3t} \quad (3.8)$$

$$\Delta RER_t = \sum_{i=1}^{L} \alpha_{51}^{i} \Delta RER_{t-i} + \alpha_{52}^{0} \Delta LGDPpc_t + \sum_{i=1}^{L} \alpha_{52}^{0} \Delta LGDPpc_{t-i} + \alpha_{53}^{0} \Delta LOIP_t + \sum_{i=1}^{L} \alpha_{53}^{i} \Delta LOIP_{t-i} + \alpha_{54}^{0} \Delta CPI_t + \sum_{i=1}^{L} \alpha_{54}^{i} \Delta CPI_{t-i} + \varepsilon_{4t} \quad (3.9)$$

GDPpc is Gross Domestic Product per capita; RER; Real Exchange Rate, CPI is Consumer Price Index; and OIP is Oil Prices. The variables are time series variables and the data will be sourced from CBN bulletin and U.S Energy Information Administration.
A just-identified SVAR model will be constructed, and maximum likelihood estimation will be employed to obtain reliable estimates of the relationships among the variables.

$$By_t = B_0 + \Gamma_i y_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.10)$$

Here a reduced form VAR specification is presented to enable specification of the SVAR; SVAR model exhibits the features of a reduced-form statistical model of the data generating process. The starting point of SVAR analysis is the reduced form of VAR Gottschhalk (2001).

Reduced VAR

$$y_t = C + \emptyset y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.11)$$

Where;

$$y_t = \begin{pmatrix} y_{1t} \\ y_{2t} \\ \vdots \\ y_{nt} \end{pmatrix} = vector\ of\ variables$$

$c = \beta^{-1}, \beta_{0,}$
$\emptyset = \beta^{-1}\Gamma,$
$E_t = \beta^{-1}\mu_t$

$$B = \begin{bmatrix} 1 & \beta_{12}\beta_{13} & \beta_{14} \\ \beta_{21} & 1\ \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32}\ 1 & \beta_{34} \\ \beta_{41} & \beta_{42}\beta_{43} & 1 \end{bmatrix}$$

The short-run restrictions are to be imposed on B

The variance covariance matrix is;

$$\begin{bmatrix} \delta_{11}^2 & \delta_{12}^2\delta_{13}^2 & \delta_{14}^2 \\ \delta_{21}^2 & \delta_{22}^2\delta_{23}^2 & \delta_{24}^2 \\ \delta_{31}^2 & \delta_{32}^2\delta_{33}^2 & \delta_{34}^2 \\ \delta_{41}^2 & \delta_{42}^2\delta_{43}^2 & \delta_{44}^2 \end{bmatrix}$$

$$\delta_{11}^2 = \delta_{22}^2 = \delta_{23}^2 = \delta_{34}^2 = \delta_{44}^2 = 1$$

$$\begin{bmatrix} LGDPpc_t \\ \text{LOIP}_t \\ \text{CPI}_t \\ \text{RER}_t \end{bmatrix} \begin{bmatrix} \varphi_1 \\ \varphi_2 \\ \varphi_3 \\ \varphi_4 \end{bmatrix} = \sum_{i=1}^{k} = \begin{bmatrix} a_{11} & a_{12}a_{13} & a_{14} \\ a_{21} & a_{22}a_{23} & a_{24} \\ a_{31} & a_{32}a_{33} & a_{34} \\ a_{41} & a_{42}a_{43} & a_{44} \end{bmatrix} \begin{bmatrix} LGDPpc_t \\ \text{LOIP}_t \\ \text{CPI}_t \\ \text{RER}_t \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix} \quad (3.12)$$

Where the column vector on the left hand side of each equations denotes the vector of our variables employed, the optimal lag order of the VAR specification is *k*, the intercept is $\Psi' s$, that is, vectors of constants, $\alpha' s$ are the coefficients of the variables of the model that is, the matrix of coefficients on the variables lagged *j* periods, $v' s$ are the VAR errors, that is, vectors of serially uncorrelated disturbances that have zero mean, unit-variance and zero-co-variance matrix.

4.1 Identification by Short-Run Restrictions

The crucial issue in estimation of structural model is always the identification of the empirical model.

Consider a K- dimensional time series y_t t=1,…T. We postulate that y_t can be approximated by a vector autoregression of finite order *p*. Our objective is to learn about the parameters of the structural vector autoregressive model

$$B_o y_t = B_1 y_{t-1} + \ldots + B_p y_{t-p} + \mu_t \quad (3.13)$$

where μ_t denotes a mean zero serially uncorrelated error term, also referred to as a structural innovation or structural shock. The error term is assumed to be unconditionally homoskedastic, unless noted otherwise. All deterministic regressors have been suppressed for notational convenience. Equivalently the model can be written more compactly as

$$B(L)_{y_t} = \mu_t \quad (3.14)$$

Where $B(L) = B_0 - B_1L - B_2L^2 - \ldots - B_pL^p$ is the autoregressive lag order polynomial. The variance-covariance matrix of the structural error term is typically normalized such that:

$$E(\mu_t \mu_t{}^i) = \sum_{\mu} = I_k \quad (3.15)$$

This means, first, that there are as many structural shocks as variables in the model. Second, structural shocks by definition are mutually uncorrelated, which implies that $\sum_{\mu}$ is diagonal. Third, we normalize the variance of all structural shocks to unity. The latter normalization does not involve a loss of generality, as long as the diagonal elements of B_0remain unrestricted.

The purpose of estimating the reduce form VAR is to solve the identification problem. Apart from resolving the problem of contemporaneous correlation and the recursive structure of the VAR has to do with variable ordering. The restrictions will be based on past empirical findings and economic theory. According to Bernanke (1980) improved by Amisano and Gianni (1997/1998), the exact identification is given by $n(n-1)/2$ identification scheme.

n = number of variables. Hence we have:

$$\frac{4(4-1)}{2} = \frac{4(3)}{2} = \frac{12}{2} = 6$$

This implies we should have at least six (6) restrictions.

The economic justification for these short-run restrictions is as follows. Oil prices (OIP) are ordered first because Nigeria is a price-taker in global crude oil markets —

domestic GDP, inflation, and exchange rate do not contemporaneously affect world oil prices. This small open economy assumption is consistent with Adelowo & Saibu (2025) and standard SVAR practice for oil-exporting developing countries. GDP per capita (GDPpc) is ordered second: real output is assumed not to respond to domestic inflation or exchange rate movements within the same quarter, reflecting production rigidities. The Consumer Price Index (CPI) is ordered third, as inflation can respond contemporaneously to oil price shocks (through fuel and energy costs) and output gaps, but not to exchange rate changes within the same quarter due to pricing-to-market behaviour. Finally, the exchange rate (RER) is ordered last because it adjusts to all other shocks in the short run — oil revenue windfalls, inflationary pressures, and output changes all influence the naira's external value contemporaneously. The model is just-identified, with exactly six (6) zero restrictions imposed on the lower triangle of the B matrix, satisfying the order and rank conditions for identification.

$$=\begin{bmatrix}1 & a_{12} & a_{13}a_{14}\\ 0 & 1 & 0\ 0\\ 0 & 0 & 1\ a_{34}\\ 0 & a_{42} & 0\ 1\end{bmatrix} Vt \begin{bmatrix} v_t\mathrm{LGDPoc}_t \\ v_t\mathrm{LOIP}_t \\ v_t\mathrm{CPI}_t \\ v_tRER_t \end{bmatrix} B=\begin{bmatrix} b_{11} & & & \\ & b_{22} & & \\ & & b_{33} & \\ & & & b_{44} \end{bmatrix} \begin{bmatrix} e_t\mathrm{LGDPpc}_t \\ e_t\mathrm{LOIP}_t \\ e_t\mathrm{CPI}_t \\ e_tRER_t \end{bmatrix} \quad (3.16)$$

Results

1 Unit Roots Tests

The Augmented Dickey Fuller (ADF) unit root tests with intercept was used to assess and determine the stationary of the variables used in order to prevent model misspecification and spurious regressions. The results of the ADF tests shown that all variables in the model are stationary at first difference, that is, I(1). The ADF test results are reported in Table 1.

Table 1: Unit Roots Tests

	ADF Unit Root Test at Level		ADF Unit Root Test at FirstDifference		
Series	**T statistic**	**Probability**	**T statistic**	**Probability**	**Diagnosis**
GDP	-2.390280	0.1467	-3.344427	0.0153**	I(1)
OIP	-1.676974	0.4397	-3.905212	0.0029**	I(1)
CPI	-0.051214	0.9510	-5.377977	0.0000***	I(1)
RER	-3.396336	0.0131	-3.161633	0.0251**	I(1)

*Note: **p < 0.05 and ***p < 0.001 denote significant at 5% and 1% respectively.*
Source: Authors Computation

2 VAR Lag Order Selection Criteria

In order to ascertain a good result of the VAR model, the lag order selection criteria were estimated in order to arrive at appropriate/optimal lag to be used in the model. Table 2 presents the lag order selection criteria in which all of them selected lag 6 as the appropriate lag to be used in estimating VAR model.

Table 2: Tests for Optimal Lag Order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1361.022	NA	8443785.	27.30045	27.40465	27.34262
1	-933.5395	812.2173	2252.095	19.07079	19.59182	19.28166
2	-848.7237	154.3648	569.5914	17.69447	18.63234	18.07404
3	-837.7047	19.17309	631.7566	17.79409	19.14878	18.34236
4	-831.5110	10.28153	774.3662	17.99022	19.76174	18.70718
5	-709.6509	192.5390	94.33759	15.87302	18.06136	16.75868
6	-661.7500	71.85135*	50.74401*	15.23500*	17.84017*	16.28936*
7	-656.0235	8.131594	63.91101	15.44047	18.46247	16.66353
8	-651.5136	6.043275	83.21182	15.67027	19.10910	17.06203

Source: Authors Computation

The Table 3 present the results of SVAR Forecast Error Variance Decomposition of economic growth. In the first period, economic growth i.e (shock I) accounts for 100% variation to itself and from there it fell fairly to 51% in the 10th period horizons. Oil price/revenue (shock II) accounts the moderate variation in economic growth in Nigeria, as is accounts for less than 1% in the second period and closely 27% in the 10th period. Inflation (shock III) accounts for less than 1% in the second period and more than 6% in the last period respectively of the variation in GDP. However, exchange rate (shock IV) accounts for less than 1% in second period but more than 15% variation in GDP in 10th period horizon. The figure 2 below present the depicted impulse Response functions.

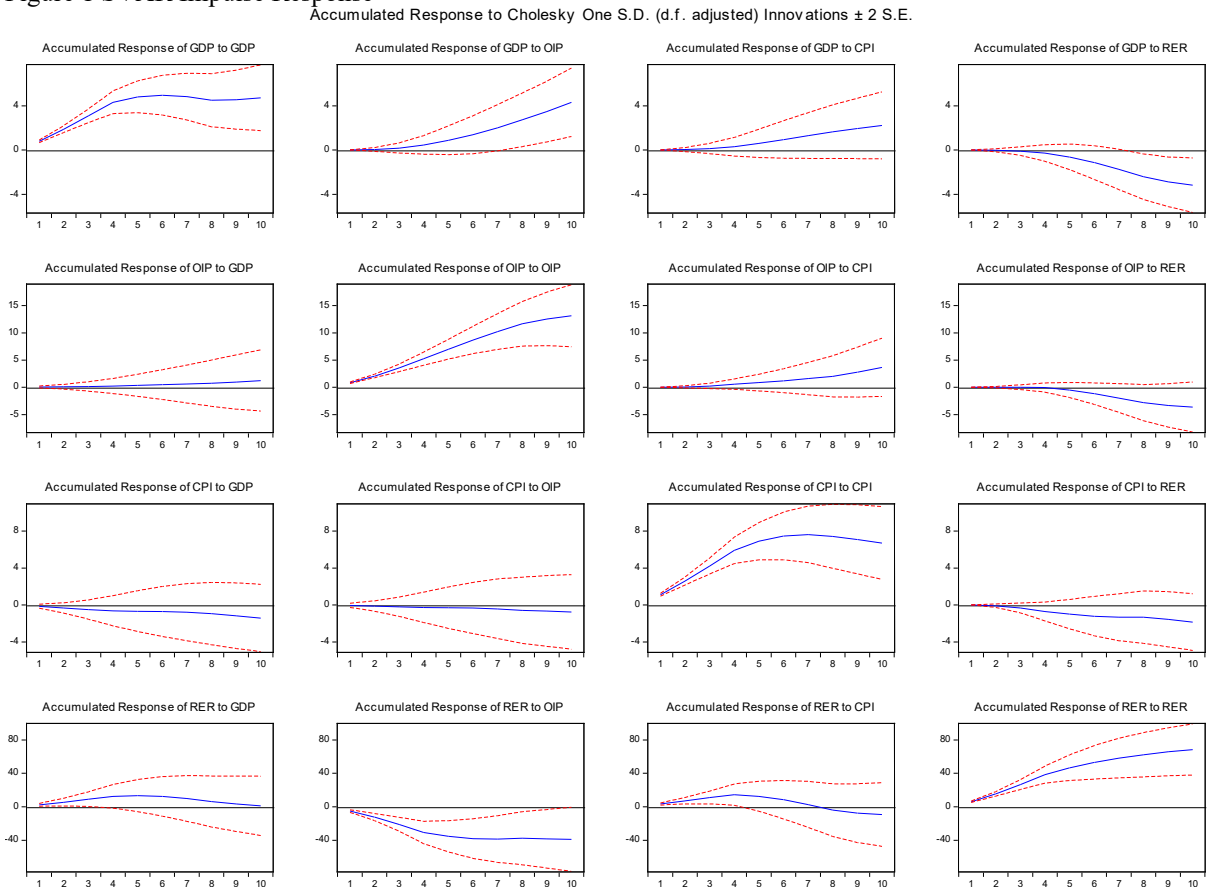
Table 3: Variance Decomposition of GDP (Economic Growth)

Period	Standard.Error.	Shorck I	Shock II	Shock III	Shock IV
1	0.784805	100.0000	0.000000	0.000000	0.000000
2	1.352868	99.79 241	0.091855	0.077567	0.038164
3	1.825545	98.84715	0.628222	0.310909	0.213720
4	2.223273	96.54683	2.048429	0.745446	0.659295
5	2.363735	89.92090	4.819701	2.338591	2.920811
6	2.500849	80.66224	8.509120	4.076601	6.752040
7	2.676515	70.62345	12.84951	5.371287	11.15576
8	2.891151	61.86616	17.24153	5.988329	14.90399
9	3.034489	56.18122	21.72517	6.338337	15.75527
10	3.179025	51.45593	26.67815	6.570391	15.29553

Source: Authors Computation

Figure 1 shows the results of the SVAR Impulse Response and the main of objective of our study is to ascertain the response of Economic Growth on itself as well as other variables. The response of GDP to one-unit standard deviation shock to itself is positive and significant throughout the period horizons. Moreover, the response of GDP to one-unit of standard deviation shock to oil price and inflation are positive in all period horizons. However, the response of GDP to one-unit standard deviation to exchange rate is negative.

Figure 1 SVAR Impulse Response



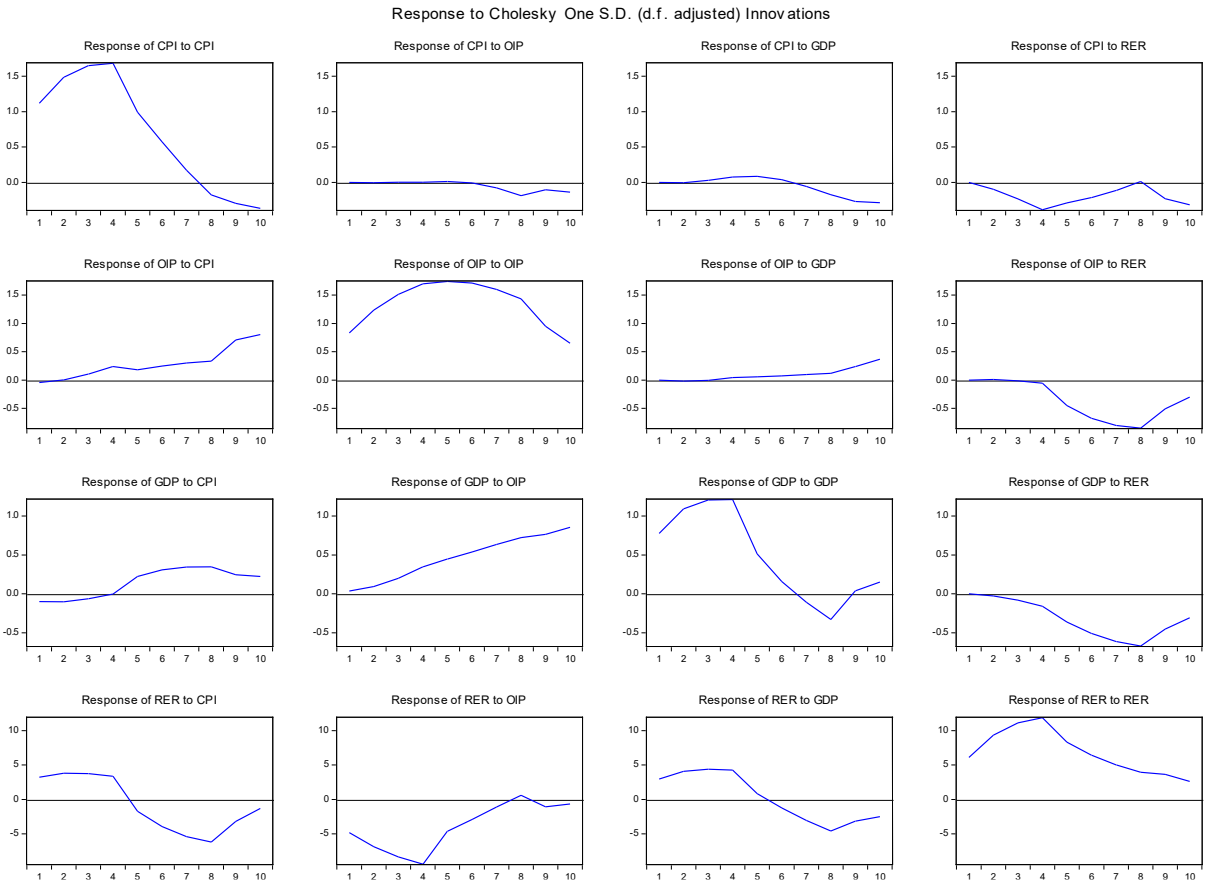
The Table 4 reveals the results of SVAR Forecast Error Variance Decomposition of Consumer price index (inflation). In the first period, inflation i.e (shock I) accounts for 100% variation to itself and from there it fell fairly to 93% in the 10th period horizons. Oil price (shock II) accounts least variation in inflation in Nigeria, as is accounts for less than 1% in the second period and more than 61% in the 10th period. However, exchange rate (shock IV) accounts for less than 28% in second period but more than 40% variation in inflation in 10th period horizon. The figure 3 below present the depicted impulse Response functions.

Table 4 Variance Decomposition of CPI (Inflation)

Period	Standard.Error.	Shorck I	Shock II	Shock III	Shock IV
1	1.119598	100.0000	0.000000	0.000000	0.000000
2	1.863848	99.72765	0.000292	0.000276	0.271781
3	2.499582	98.96663	0.000265	0.013813	1.019291
4	3.038322	97.61499	0.000390	0.069890	2.314730
5	3.209928	96.98672	0.002339	0.133288	2.877649
6	3.268212	96.65929	0.002661	0.144095	3.193953
7	3.276168	96.46699	0.059198	0.174200	3.299610
8	3.290598	95.90958	0.374083	0.444269	3.272064
9	3.324427	94.76143	0.461211	1.092239	3.685122
10	3.374109	93.15896	0.612049	1.773138	4.455850

Source: Authors Computation

Figure 2 SVAR Impulse Response



5 Post-Estimation Statistical Diagnostic Tests

Having estimated our VAR model at lag 6, we proceeded to conduct diagnostic tests in order ensure the model is free from misspecification and biased estimates such tests includes serial correlation test, heteroscedasticity tests and stability test. Based on the statistically insignificant results of the diagnostic tests, the model has constant error term variance (homoscedasticity) and no serial correlation problem.

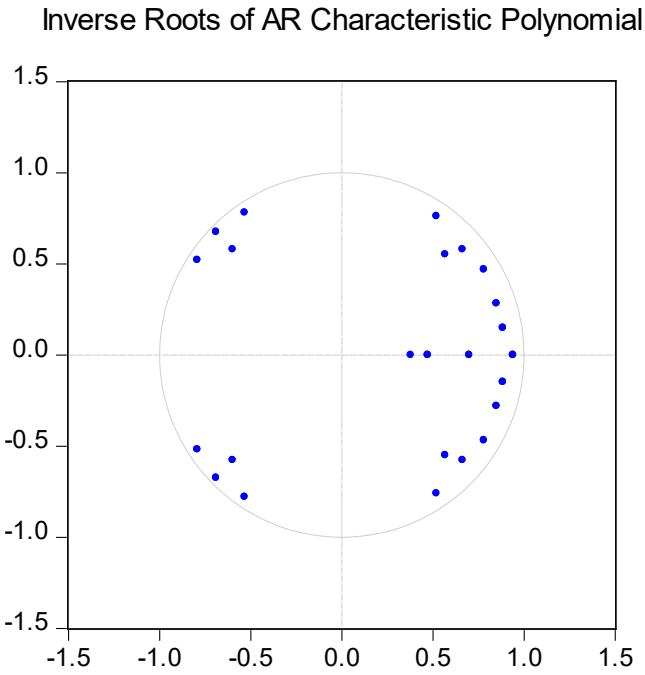
Table 4.6 Diagnostic Tests

VAR Residual Serial Correlation LM Tests					
LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
7.659050	16	0.9584	0.471670	(16, 214.5)	0.9584
VAR Residual Heteroskedasticity Tests					
Chi-sq	Df	Prob.			
457.2907	480	0.7652			

Source: Authors Computation

Figure 3 presents the results of stability test as none of the root lies outside the unit circle which satisfies the condition of stability.

Figure 3 VAR Stability Test



Conclusion

The results of this study reveal that oil price shocks are a significant driver of both price level dynamics and economic growth fluctuations in Nigeria. The impulse response functions indicate that the response of economic growth to a unit innovation in oil price is positive, implying that higher oil production and revenue translate into stronger GDP per capita growth. However, the results from the Forecast Error Variance Decomposition draw an important distinction: oil price shocks explain approximately 61% of the variation in inflation over a 10-quarter horizon, but only about 26% of the variation in GDP. This asymmetry indicates that Nigeria's inflationary process is considerably more sensitive to oil price movements than its growth trajectory — a finding consistent with Nigeria's structural dependence on imported refined petroleum products, which transmit global oil price increases directly into domestic consumer prices. The study therefore concludes that oil price is the primary determinant of inflation dynamics in Nigeria, while its influence on growth, though significant, is moderated by other structural and macroeconomic factors including exchange rate fluctuations, which account for over 15% of GDP variation in the 10th period horizon.

Recommendations

In line with the findings, the following were recommended:

1. The Government should intensify its efforts to increase domestic food production by granting more funding support through its agricultural sector intervention schemes. This would help increase the country's GDP and stabilize inflation pressures.
2. Given that oil price shocks explain 61% of Nigeria's inflation variation, monetary policy should prioritize price stability through a credible inflation-targeting framework that responds promptly to external oil price movements.
3. The Central Bank of Nigeria should enhance exchange rate management, since exchange rate fluctuations also account for over 15% of GDP variation and over 4% of inflation variation.
4. Furthermore, in line with the World Bank's recommendation, higher oil revenues should be treated as a temporary windfall — prioritizing fiscal buffer rebuilding over permanent increases in recurrent expenditure.

5. The anticipated expansion of domestic refining capacity through the Dangote refinery and similar investments should help decouple domestic fuel prices from global crude oil shocks, thereby moderating the inflationary pass-through of oil price increases over the medium term.

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