*International Journal of Innovative Finance and Economics Research 12(2):207-217, April-June, 2024*
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# Oil Price Volatility And The Nigeria Economy

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**ABSTRACT**
There is a vast literature establishing robust results across many countries on the connection between oil price volatility and economic growth. This implies that connections should also exist between oil price volatility and economic growth in Nigeria. This study examined oil price volatility on economic growth in Nigeria during 2000-2016, using a VAR analysis. The study concluded from the findings that oil price volatility has significant influence on economic growth although a negative impact. This constitutes serious implication for the management of the country economy because crude oil price is a major determinant of the budget formulation in Nigeria while GDP is a key macroeconomic policy target. If these variables are influenced by a change, almost unpredictable exogenous variable like crude oil prices, then the economy becomes highly vulnerable to unpredictable external shocks.
**Keywords**: Economic growth, oil price volatility

## INTRODUCTION

Economic growth plays a key role in industrial innovation (Malatyali, 2016). The first fluctuations in crude oil prices that occurred in the 1970s have made economists to view sudden movements in the oil price as a fundamental source of economic fluctuations, for example, Hamilton (2005) argued that, nine of the ten recessions in the USA were preceded by large positive increases in crude oil price. Moreover, the very recent highs registered in the crude oil market are causing concern about slowing in the economies of many developing countries including Nigeria. The price of a barrel of Brent crude oil in European countries fell from than $100 p/b in Sept 2014 to less than $46 p/b in January 2015. Besides, the decline which was the third largest over the past 30 years, has particularly interesting parallels with the episode in 1985-86, thus, the renewed interest in the impacts of fluctuating oil prices on the economy. This relation has captured increasing attention of academic researchers such as: (Hamilton, 2009; Kilian and Vigfusson, 2011; Edirneligil and Mucuk, 2014; Ftiti et al., 2016) the most influential articles in the field, and others. The impact of fluctuations in oil prices on economic growth and their mechanism in oil-exporting countries differ from those in the oil-importing countries (Moshiri and Banihashem, 2012).

Over the years, concerned economists have examined the possible factors that lead to oil price fluctuations. For instance, shocks to the supply arising from political events such as wars and revolutions in OPEC member countries, improvements in the technology of extracting crude oil, and the discovery of new fields. In addition, a shock to the demand for crude oil associated with unexpected movements in the global business cycle as well as demand shock for above ground oil inventories, reflect shifts in expectations about future shortfalls of supply relative to demand in the oil markets (Hamilton (2008)). The period 2000-2016 includes a lot of fluctuations and two severe occurrences. One, crash in recent months of 2008, the so-called worst financial crisis since the great depression. Due to the expansion of

financial derivative instruments, which have often been held accountable for giving rise to the financial crisis in 2008 (Ulusoy, 2011).

The second crash experienced in the oil price was a sharp decline from over $100 per barrel of crude oil since June 2014 to around $30 per barrel recently. The decline in oil price poses considerable challenges for fiscal, monetary and structural policy. However, the shocks in oil price create uncertainty and undermine effective fiscal management of oil revenues. Changing oil prices have an effect on the global economic performance and the economy level of any country. The effect of this is positively or negatively dependent on the nature of the relation between oil-exporting economy and oil-importing economy (Le and Chang, 2015). Oil price increase contributes to a transfer of wealth from oil importing to oil-exporting countries as noted by Balcilar and Ozdemir (2013). Studying the relationship between crude oil price shocks and economic performance is significant for investors to take necessary investment decisions and for policy makers to regulate financial markets more effectively.

It is no more news that the recent fall in crude oil prices that began in July 2014 is seriously affecting economic activities in Nigeria, especially in the areas of foreign reserves, currency crisis, declining government revenue, and this majorly constitutes a threat to meeting financial obligations at the right time. The implication of this is that it brings a large outpour of policies from policy makers and contributions from the academia. These policies have brought about the need to diversify our economy towards the once thriving sectors in the economy, removal of subsidy, the war on corruption and reduction of government activities and government related cost. It is against this background that the researcher seeks to examine the impact of oil price volatility on Nigeria economy from the year 2000-2016.

The main objective of this study is to examine the impacts of oil price volatility on Nigeria economy from the year 2000-2016. The specific objectives are: to understand the reasons for oil price volatility in the international market from the year 2000-2016, to examine the influence of oil price volatility on Nigeria economy from the year 2000-2016.

To achieve this objective, this paper has been structured into six sections with the introduction as section one, section two presents the literature review, section three is the theoretical framework and the empirical studies, while section four, five and six presents the methodology, result and discussion and conclusion and recommendation respectively.

## LITERATURE REVIEW

### Nature of Oil and the Oil Market

Crude oil is a naturally occurring substance which is found in widely differing amounts in various countries throughout the world. Oil is not used directly for any important purpose, rather it is refined and split into different products which are either used directly for final consumption or are in turn further processed. Different crude oils yield different proportions of these refined products, and since the value is related to the end uses, those crude oils yielding higher proportions of valuable by-products (petroleum motor spirit, diesel fuels, jet fuels, petroleum gas etc.) will tend to sell at a premium relative to other crude oils.

### Supply Side

The supply of crude oil is divided into two main categories, OPEC and non- OPEC suppliers. OPEC (Organization of Petroleum Exporting Countries) is a permanent, intergovernmental organization, established in Baghdad, Iraq, with the signing of agreement in September 1960 by five countries. OPEC now comprises fourteen members: Indonesia, Gabon, Algeria, Angola, Ecuador, Islamic Republic of Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. The Organization has its headquarters in Vienna, Austria. Its objectives are to coordinate and unify petroleum policies among member countries in order to secure a steady income to the producing countries; establish an efficient, economic and regular supply of petroleum to consuming nations; and generate a fair return on capital to those investing in the petroleum industry. OPEC is in many ways a cartel, a group of producers that attempt to restrict output in order to raise prices above the competitive level (Erdogan

2011). Decision-making by OPEC occurs at a conference, comprising national delegations at the level of oil ministers, which meet twice each year to decide overall oil output and thus prices and to assign output quotas for the individual members. The quotas set upper limits on the amount of oil each member is allowed to produce. The conference also may meet in special sessions when deemed necessary, particularly when downward pressure on prices becomes acute. The main non-OPEC oil producers are; Russia, the United States, China, Mexico, Canada, Norway, and Brazil. Oil producers operating outside OPEC are responsible for producing sixty per cent of the world's oil, yet they do not have much power over oil pricing. This is because non-OPEC oil reserves are only 18.67% of the world crude oil reserve therefore their current production level is deemed unsustainable in the long run due to their relatively small reserves and it is expected to decline sharply in the future.

As countries develop, industrialization, rapid urbanization, and higher living standards increase their demand for oil (Kizgin and Benli, 2013). Currently oil demand growth is highest in developing countries. Nonetheless, the United States remains the world's largest oil consumer. According to the US Energy Information Agency (EIA), transportation accounts for two third of oil consumed in the US. The second largest oil consumer is China. China's oil consumption growth accounted for half of the world's oil consumption growth in 2011 (EIA, 2011). China's oil consumption is distributed among power generation, transportation sector shifts, economic growth and trade, and refining capabilities. This suggests an oil addiction on the part of these economies. In fact, more than the need for transportation purposes, this addiction is partially explained by their industrial needs. Industrial demand for oil to produce chemicals, manufacture plastics, and for power generation affects demand for oil. Most advanced economies are built on a substantial industrial sector and rely heavily on transportation powered by internal combustible engine; hence, why they have higher oil demand than less industrialized economies. Finally, factors such as Population growth, subsidies, taxes and other regulations play a role in the overall demand for petroleum. Investors, traders, hedgers, speculators also affect oil demand.

**The Dutch Disease Syndrome**

One of the impacts of oil price shocks on economic growth and performance of oil exporting countries like Nigeria is the Dutch Disease Syndrome. Windfalls from sharp surge in oil price cannot sweep through a developing economy that is yet to be diversified and large enough to absorb the inflow without causing inflation. Resource pull effect and spending effect result when large inflow from oil export hits a less diversified economy (Mieiro and Ramos, 2010). The booming export sector (trading internationally) experiences rise in marginal productivity and thus pay factors employed relatively more than other sectors do. As a result, factor inputs/resources are pulled to the booming sector (oil/export sector) at the expense of other tradable sectors (agriculture and manufacturing) and the non-tradable sector. This results in direct de-industrialization of the economy.

**Theoretical Review**

Oil revenues play a key role in the economic structure of the oil exporting countries. In most of these countries, the oil revenues are an important source of financing the budget and the government budget dependence on oil revenues is very high. It is expected that volatility of the oil market influences aggregate demand, because the government budget constitutes a significant portion of aggregate demand (Abrishami et al., 2008). Nigeria as one of the major exporters of oil is not an exception on this matter among OPEC countries. On the one hand, Nigeria's oil exports is rationed by OPEC, on the other hand, the oil price is determined by the global supply and demand. So, the macroeconomic variables are influenced by the change of the oil revenues following the global changes of the oil prices. The dependence of the macroeconomic variables on oil affected the economic growth so that the impact of declining oil price is reflected much broader on the economic activities.

As the oil revenues are in foreign currencies in the economy, the exchange rate volatility affects economic activities. Exchange rate is the value of the foreign currency in terms of domestic currency, which is considered one of the macroeconomic variables and represents the strength of a country's economy to compete with other countries in the international economic environment. On one side, the economic and

foreign policies are greatly influenced by the exchange rate. On the other side, the exchange rate can affect a country's economic performance and indicators. Thus, studying the effect of the exchange rate volatility on macroeconomic variables in Nigeria is important.

Theoretically, export is a function of the exchange rate and domestic price level. The exchange rate can affect the price level through the export, import and thus production channels. Increasing the exchange rate or decreasing the national currency makes import become more expensive, thus the government will reduce the amount of imports and instead of imports, domestic production will be absorbed. On the other hand, the cheaper export goods attract the most of the markets of other countries and thus increase the competitiveness and export rate (Hosseini and Mirkazemi, 2010). Of course, the net effect of import and export depend on the elasticity of export and import. According to Marshall Lerner condition, if the sum of the elasticity of export and import are >1, then depreciation of the domestic currency (increase the exchange rate) will improve the trade balance and the GDP consequently, but if the sum of the elasticity of export and import are less than 1, then the trade balance is better by increasing the value of money (exchange rate appreciation) (Delavari et al., 2008).

Overall, theoretically, the oil price and the exchange rate volatility move in opposite direction and have different effects on economic growth and the total effects depend on the outcome of both negative and positive effects.

**Empirical Studies**

Hamilton (1983) examined the impact of the oil price shocks on the America's economy by using Granger Causality test for the period 1949:2 to 1972:4. He obtained a meaningful relationship between oil price changes and real GDP growth for America's economy. The final result of this study shows a unidirectional causality relationship from the produced oil prices toward production. Cunado and Gracia (2003) studied the relationship between the oil price and industrial production index and inflation by using quarterly data in some European countries during 1960-1999. They concluded that price shocks have permanent effects on inflation but only positive oil price shocks have negative short run influence on industrial production.

Hadian and Parsa (2006) investigated the impact of the oil price volatility (OPV) on a number of macroeconomic variables (GDP, the general level of prices and employment) in Iran by using Vector error correction model (VECM) during 1961-2005. Based on the result, the model coefficients were not significant and could not explain the impact of the oil price on the macroeconomic variables. However, examining the relationship between OPV on the macroeconomic variables showed that the oil price shocks are one of the main sources of fluctuations in macroeconomic variables in Iran.

Olomola and Adejumo (2006) analysed the effects of oil price shocks on output, inflation, real exchange rate and the money supply in Nigeria over the period 1970-2003. The vector autoregressive (VAR) method was employed to analyse the data. Their findings indicated that the oil price shocks did not affect output and inflation but had strong effect on money supply and exchange rate. The implication is that a high real oil price may give rise to wealth effect that appreciates the real exchange rate. This may squeeze the tradable sector, giving rise to the "Dutch disease.

Abrishami et al. (2008) evaluated the effects of oil price asymmetry on the macroeconomic variables (the real effective exchange rate, inflation rate, long run interest rate and short run interest rate) in some of the oil importing developed countries such as France, Italy, Japan and USA during 1960-2002 by using VECM method. The results of the study showed that although decreasing of the oil price did not have a significant impact on the GDP growth in these countries but increasing of the oil price had a significant impact on the GDP growth. In other words, oil price volatility has the asymmetric effect on GDP growth in these countries.

Lardic and Mignon (2008) studied the long run relationship between the oil price and economic activity on USA, G7, Europe and Euro area economies. The results indicated that the impact on GDP is bigger for rising of the oil price than for declining it.

Oriakhi and Iyoha (2013) examined the consequences of oil price volatility on the growth of the Nigerian economy within the period 1970-2010. Using quarterly data and employing the VAR methodology, the study found that among six variables employed, oil price volatility impacted directly on real government expenditure, real exchange rate and real import, while impacting on real GDP, real money supply and inflation through other variables, notably real government expenditure. This implies that oil price changes determine government expenditure level, which in turn determines the growth of the Nigerian economy. This result seems to reflect the dominant role of government in Nigeria. Considering the destabilizing effects of oil price fluctuations on economic activity and government spending in Nigeria, the study made some recommendations. Some of these include; fiscal prudence, reform in budgetary operations, export diversification, revival of the non-oil sector of the economy, accountability and corporate governance.

Mgbame et al. (2015) based on empirical review, found that there is a significant and positive relationship between oil price volatility and Nigeria economic growth. He believes that oil price changes determine government expenditure level, rate of inflation, level of unemployment, which in turn determines the growth of the Nigerian economy. Considering the destabilizing effects of oil price fluctuations on economic activity and government spending in Nigeria, the study made some recommendations which include that the country should diversify its export revenue base as a means of minimizing reliance on crude oil and petroleum product thereby diversifying to agriculture, operations of budgetary, fiscal prudence, corporate governance, encourage savings and proper accountability. This will further protect the economy from the impact of oil price volatility on the economy, and thus prevent the effect of the shocks from attaining a statistical significance level.

## METHODOLOGY

### Data Definition and Source

The data for this study which includes data for Crude Oil Price (COP), Oil Revenue (OREV) and Gross Domestic Product (GDP) were sourced from the Central Bank of Nigeria Statistical Bulletin and from the World Bank Indicators for Nigeria (various issues) for the period of 2000 to 2016

### Method of Analysis

In order to ascertain the volatility in oil prices and its influence on the level of economic growth, an unrestricted Vector Auto-Regression (VAR) Model was adopted. The VAR model provides a multivariate framework where changes in a particular variable (oil price) are related to changes in its own lags and to changes in other variables as well as their lags. The VAR treats all variables as endogenous and does not impose *a-priori* restriction on structural relationships (Gujarrati, 2003). The VAR estimates the relative importance of a variable in generating variations in its own value and in the value of other variables which can be accessed via Forecast Error Variance Decomposition (VDC). There was also a co--integration test as well as a normality test, which helped to determine if the error term of the variables under consideration were normally distributed.

### Model Specification

The econometric model considered in this study takes Crude Oil Prices, Oil Revenue and Oil Price Volatility as the independent variables and Gross Domestic Product as dependent variable. These variables are used at constant prices. This is used to obtain a reliable parameter estimates in the time series VAR model. Generally, a VAR model is specified as:

$$Yt = m + A_1Y_{t-1} + A_2Y_{t-2} + ... + A_pY_{1-p} + €t \text{……..(1)}$$

Equation (1) specifies VAR (P) process, where $A_i$($_i$=1,2,_p) are K x K matrices of coefficients, m is a K x 1 vector of constants and $€_t$ is a vector of white noise process. Therefore, a model for the analysis can be stated explicitly as follows

GDP = F(OPV, OREV, COP)…….. (2)

Where:

GDP = Gross Domestic Product
OPV = Oil Price Volatility
OREV = Oil Revenue

COP = Crude Oil Price

In order to estimate equation (1 and 2), we can translate this into equation 3 as stated below:

$GDP = m_0 + A_1OPV_{t-1} + A2OREV_{t-2} + A3COP\ t\text{-}3 + €t$ … (3)

## RESULTS AND DISCUSSION

The tests were conducted in order of priority. The ADF Unit Root Test came first which was closely followed by the Co-integration Test, Over-parameterized and Parsimonious Error Correction Test and Diagnostic Test came next which was concluded by the Variance Decomposition Test.

### ADF Unit Root Test

Table 1. Summary of ADF Unit Root Test

| Variables | Level date | 1st diff | 1% CV | 5% CV | 10% CV | Order of Integration |
|---|---|---|---|---|---|---|
| OREV | -2.07 | -5.46* | -3.69 | -2.97 | -2.62 | I(1) |
| OPV | -4.20* | -6.38 | -3.69 | -2.97 | -2.62 | I(0) |
| COP | 0.66 | -2.86*** | -3.69 | -2.97 | -2.62 | I(1) |
| GDP | 1.37 | -5.08* | -3.69 | -2.97 | -2.62 | I(1) |

* Statistically significant at 1% level

*** Statistically significant at 10% level

Source: Author's computation using Eviews 9

The Augmented Dickey Fuller (ADF) unit root test was used to test whether the variables are stationery or not and their order of integration. The result of the ADF unit root test is shown in table I above. The result of the ADF unit root test followed expectations. All the variables except Oil Price Volatility (OPV) were non-stationery. They however became stationary after taking the first order difference. The oil price volatility was stationary at the level probably because it is computed in ratio. This set the pace for the next stage of the analysis which is a test of co-integration.

### Co-integration Test

The Johansen co-integration test was used to test for the long run relationship among the variables. The results of the Johansen co-integration test are shown in tables 2a and table 2b below.

Table 2a. Summary of Johansen Co-integration Test Result

| Hypothesize No. of CE(s) | Eigenvalue | Trace Statistic | 5 Per cent Critical Value | 1 Per cent Critical Value |
|---|---|---|---|---|
| None ** | 0.640692 | 77.78483 | 68.52 | 76.07 |
| At most 1 * | 0.602173 | 48.10118 | 47.21 | 54.46 |
| At most 2 | 0.431028 | 21.37075 | 29.68 | 35.65 |
| At most 3 | 0.143147 | 5.016967 | 15.41 | 20.04 |
| At most 4 | 0.018340 | 0.536789 | 3.76 | 6.65 |

Table 2b. Summary of Johansen Co-integration Test Result

| Hypothesize No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 5 Per cent Critical Value | 1 Per cent Critical Value |
|---|---|---|---|---|
| None | 0.640692 | 29.68365 | 33.46 | 38.77 |
| At most 1 | 0.602173 | 26.73042 | 27.07 | 32.24 |
| At most 2 | 0.431028 | 16.35379 | 20.97 | 25.52 |
| At most 3 | 0.143147 | 4.480178 | 14.07 | 18.63 |
| At most 4 | 0.018340 | 0.536789 | 3.76 | 6.65 |

Source: Author's computation using Eviews 9

The results of the Johansen co-integration test in tables 2a and 2b above showed that a long run relationship exists among oil price volatility, oil revenue, crude oil prices and economic growth. The trace test indicated two co-integrating equation while the Max-Eigen statistic indicated one co-integrating equation. Once there is co-integrating vector, a long run relationship is concluded (Gujarati, 2003). The existence of at least one co-integrating equation permits us to estimate over parameterized and parsimonious error correction mechanism (ECM).

**Over-parameterized and Parsimonious Error Correction Mechanism**

The Over-parameterized and Parsimonious Error Correction Mechanism (ECM) test are shown in tables 3a and 3b below.

Table 3. Summary of Over-parameterized ECM result

Dependent Variable: DLGDP

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| DLCOP | 0.483866 | 0.105695 | 4.577960 | 0.0001 |
| DLCOP(-1) | 0.300630 | 0.293394 | 1.024661 | 0.3184 |
| DLCOP(-2) | 0.023727 | 0.281602 | 0.084259 | 0.9337 |
| DLOREV | 0.291112 | 0.116558 | 2.497571 | 0.0219 |
| DLOREV(-1) | 0.492357 | 0.116026 | 4.243516 | 0.0004 |
| DLOREV(-2) | 0.029815 | 0.163759 | 0.182066 | 0.8575 |
| OPV | -0.889766 | 0.181262 | -4.908717 | 0.0000 |
| ECM(-1) | -0.454316 | 0.167069 | -2.719327 | 0.0105 |
| C | 0.068255 | 0.169144 | 0.403534 | 0.6911 |

$R^2 = 0.73$, $R^2 = 0.61$, AIC = 1.96, SC = 2.38, Dw = 2.07

Source: Author's computation using Eviews 9

The over-parameterized error correction mechanism (ECM) model includes various lags of the variables. The parsimonious ECM model or preferred model is gotten by deleting the insignificant variables from the over parameterize ECM model. The Schwarz criterion and the Akaike information criteria were used to select the appropriate lag length. The parsimonious ECM result was gotten by deleting insignificant variables from the over-parameterize ECM model. The parsimonious ECM result was used to test whether oil price volatility have influence on the level of economic growth using the desirable variables based on applicable decision rule.

Table 4. Summary of Parsimonious ECM result Dependent Variable DL GDP

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| DLCOP | -0.685214 | 0.077328 | -8.861098 | 0.0000 |
| DLCOP | 0.642603 | 0.149431 | 4.300324 | 0.0001 |
| DLOREV | 0.250244 | 0.111010 | 2.254250 | 0.0340 |
| DLOREV(-1) | 0.495617 | 0.108928 | 4.549924 | 0.0001 |
| ECM(-1) | -0.721014 | 0.304142 | -2.370651 | 0.0242 |
| C | -0.052484 | 0.121754 | -0.431063 | 0.6704 |

$R^2 = 0.78$, $R^2 = 0.77$, AIC = 1.86, SC = 2.15, Dw = 2.07

Source: Author's computation using Eviews 9

The t-value result (t-cal 8.86 > t-crit 2.052) indicates that oil price volatility negatively affects economic growth. The result showed an additional factor. The negative sign attached to the coefficient of oil price volatility signifies that in Nigeria, volatility in oil prices have negative effect on the level of economic growth. The result showed that an increase in oil price volatility by 1 unit actually reduced the level of economic growth by 0.69 units. Also, the t-test in this regard has a value of 2.25 at levels and 4.55 at the first difference which are greater than the t-critical of 2.052. This is an indication that oil revenue has significant impact on the level of economic growth in Nigeria. This result has special significance because both the previous level of oil revenue and the current level of oil revenue were statistically significant.

This is an indication of the Nigerian government over-reliance on revenue from the oil sector. Furthermore, the t-test in this regard has the value of 4.30 which is greater than the t-critical (2.052) suggesting that crude oil price has significantly influenced the level of economic growth in Nigeria. This is not surprising however since the Nigerian economy relies almost entirely on crude oil revenue. The Nigerian case is so severe that the budget of the country is tied to particular price of crude oil. This was why a sudden drop in the oil price in 2008 as a result of the global financial crisis led to a downward readjustment of the budget.

**Vector Error Correction (VEC)**

The portion of the VEC result that is of most significance is shown in table 4 below:

Table 5: Summary of Vector Error Correction Results

| Co-integrating Eq: | Co-integrating Eq 2 | | | |
|---|---|---|---|---|
| LGDP(-1) | 1.000000 | | | |
| LCOP(-1) | 47.35423 | | | |
| LOREV(-1) | (14.2973) | | | |
| OPV(-1) | [3.31212] | | | |
| OREV(-1) | 248.5813 | | | |
| C | (30.0155) | | | |
| | [8.28177] | | | |
| | -848.8212 | | | |
| | (91.2922) | | | |
| | [-9.29785] | | | |
| | -0.003367 | | | |
| | (0.00043) | | | |
| | [-7.91601] | | | |
| Error Correction: | D(LGDP) | D(LCOP) | D(LOREV) | D(OPV) |
| CointEq! | -0.000966 | -0.407183 | -0.000314 | -0.173256 |
| | (0.00086) | (0.05926) | (0.00111) | (0.05639) |
| | [-1.12841] | [-6.87080] | [-0.28369] | [-3.07275] |

Source: Author's computation using Eviews 9

The result of the VEC showed that COP equation and the OPV equation represent the co-integrating equation. The others are statistically flawed. They have the right sign but were not significant.

**Diagnostic Test**

The diagnostic test is used to test whether the errors are normally distributed, whether the variance is constant or not and whether the errors are serially correlated. The test of stability also forms part of the diagnostic test. Table 5 presents the first part of the diagnostic test.

Table 6. Diagnostic Test Result: Jarque-Bera

| | | |
|---|---|---|
| Jarque-bear 0.59 | Probability | 0.75 |
| White Heteroskedasticity test | | |
| f-statistic 1.01 | Probability | 0.30 |
| Breusch Godfrey Serial Correlation LM test | | |
| f-statistic 0.14 | Probability | 0.87 |

Source: Author's computation using Eviews 9

The result of the Jarque-Bera normality test shows that the errors are normally distributed. The white heteroscedasticity test shows that the errors are homoscedastic and the result of the Breusch Godfrey Serial Correlation LM test indicated no evidence of serial correlation in the residuals.

**Variance Decomposition**

The variance decomposition tests the proportion of changes in the dependent variable that has been explained by the changes in the independent variables. The result of the variance decomposition is shown in table 6 below:

Table 7. Summary of Variance Decomposition Result

| Period | S.E. | Variance GDP | COP | OPV | OREV |
|---|---|---|---|---|---|
| 1 | 1780142. | 100.0000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 3285982. | 34.58371 | 40.52078 | 7.103264 | 17.79225 |
| 3 | 3832300. | 45.29962 | 33.98349 | 5.222418 | 15.49447 |
| 4 | 4242651. | 50.02630 | 31.11930 | 6.006581 | 12.84782 |
| 5 | 4504541. | 46.23058 | 35.98962 | 5.371077 | 12.41773 |
| 6 | 4817001. | 48.99059 | 34.53738 | 5.031366 | 11.44066 |
| 7 | 6063125. | 67.07404 | 22.47035 | 3.186895 | 7.268716 |
| 8 | 6932526. | 64.99905 | 20.03120 | 3.634832 | 11.33491 |
| 9 | 8244110. | 59.17076 | 21.23684 | 3.578833 | 16.01357 |
| 10 | 9332918. | 61.39760 | 20.41590 | 3.188355 | 14.99814 |

Source: Author's computation using Eviews 9

The result indicated that oil price volatility did not explain significantly the changes in the level of economic growth during the first period. Oil price volatility explained 7 per cent of the changes in level of economic growth in the second period and this reduced to 6 per cent in the fourth period and 3 per cent in the tenth period, reflecting the problem caused by oil price volatility to economic growth. Crude oil price however explained a significant percentage of changes in economic growth. It explained 41 per cent of changes in economic growth in the second period and this reduced to 35 per cent in the fifth period and declined further to 20 per cent in the tenth period. This indicated the over-reliance of the country on the price of crude oil in the world market. Oil revenue on the other hand, explained by 17 per cent of changes in economic growth and this reduced to 16 per cent in the ninth period and fell to 14 per cent in the tenth period.

## CONCLUSION AND RECOMMENDATION

There is a vast literature establishing robust results across many countries on the connection between oil price volatility and economic growth. This implies that connections should also exist between oil price volatility and economic growth in Nigeria. This study examined oil price volatility on economic growth in Nigeria during 2000-2016, using a VAR analysis. The study concluded from the findings that oil price volatility has a significant negative impact on economic growth. This constitutes serious implication for the management of the country's economy because crude oil price is a major determinant of the budget formulation in Nigeria while GDP is a key macroeconomic policy target. If the later is influenced by an almost unpredictable exogenous variable like crude oil prices, then the economy becomes highly vulnerable to unpredictable external shocks.

Based on the above, the following recommendations were made:

1. There is a strong need for policy makers to focus on policy that will strengthen/stabilize the structure of the economy with specific focus on alternative sources of government revenue. The way to minimize this volatility in oil prices is to diversify the economy so as to make it less oil dependent;
2. There should be reduction in monetization of crude oil receipts (fiscal discipline), aggressive saving of proceeds from oil booms in future in order to withstand vicissitudes of oil price volatility in future. Policy makers should design the optimal policy mix that would help the nation cope efficiently with the economic and social costs of the external shocks accompanying higher oil prices and the country need to establish and enforce prudent fiscal rules in the management of surplus export receipts over time, invest them for future growth and minimize wasteful spending.

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