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ZAN ARCH AND GARCH APPROACH TO THE IMPACT OF CRUDE OIL PRICE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA

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Abstract

Oil plays a dominant role in the Nigerian economy given its huge contribution to the revenue of the country. However, oil is one of the most variable prices, and it has a substantial influence on the macroeconomic behavior of many industrialized and emerging nations, according to empirical evidence. From 1980 to 2020, this research looked at the impact of crude oil price volatility on Nigerian economic growth. The study employed the expo facto research design. Time-series data were sourced from the Central Bank of Nigeria (CBN), and Nigeria National Petroleum Corporation (NNPC). The data cover a period of 1980–2020. The models used were ARCH and GARCH (Autoregressive Conditional Heteroskedasticity and Generalized Autoregressive Conditional Heteroskedasticity). The result from the study indicated that crude oil volatility has a very strong and negative impact on economic growth in Nigeria. The research concluded that Nigeria's revenue sources should be diversified because the nation has enormous territory for agriculture, suitable climatic conditions for crops and livestock to grow, and a huge population to man the agricultural sector. Other recommendations included the necessity bumpers should be created during periods of rising oil prices, as well as the idea of an excess crude account, which was started by Obasanjo's government in 2004 and should be researched, rebuilt, and maintained when crude prices recover.

Keywords: ARCH, GARCH, Economic Growth, Volatility, Crude Oil Prices

1. INTRODUCTION

Since its discovery in the 1800s, crude oil has been a significant source of energy for the global economy. According to Gronwald (2008), the importance of oil has escalated to the point that, in the event of a world without oil, all major distribution networks that induce commercial transactions on a global scale would fail, and the entire economy would collapse. It is the Nigerian government's primary source of foreign exchange profits and the primary source of income, and its heavy reliance serves as the foundation for revenue distribution, budgeting, and capital allocation in the country. As a result, the upward or downward movement in oil prices (fluctuation) has a multiplier effect on crude oil and Nigerian economic growth.

Given its large contribution to the country's earnings, oil plays a major position in the Nigerian economy. For example, according to the CBN statistics bulletin (2011), oil receipts accounted for 82.1 percent, 83 percent, and almost 90% of the country's foreign exchange profits in 1974, 2008, and 2010. Similarly, the amount of Nigeria's overall export income in 2010 was US$70,579 million, with petroleum export revenue accounting for US$61,804 million, or 87.6 percent of total export revenue.

However, oil is one of the most variable prices, with a considerable influence on the macroeconomic behavior of many industrialized and emerging economies, according to empirical evidence (Guo & Kliesen, 2005). Volatility clustering was discovered in subsequent research by Narayan and Narayan (2007), Mehrara (2008), Salisu and Fasanya (2013), confirming the existence of asymmetries in oil price volatility. As a result, the Nigerian economy's reliance on oil profits as its primary source of revenue raises concerns about the impact of oil price volatility on the country's economic growth.

Oil price volatility introduces vulnerability of economic growth and exerts shocks. Macroeconomic variables such as GDP, inflation, currency rate, interest rate, and others have a propensity to be unstable and poor in terms of shock resistance. It is a condition in which a little economic shock causes macroeconomic indicators to fluctuate with uncertainty. (Abdulkareem and Abdulhakeem, 2016) Given the fact the oil price volatility and exchange rate variability impact government revenues and reserves thereby generating shock to the Nigerian economy, it becomes necessary to embark on further research on this subject matter with the scope of finding out the influence of oil price volatility on economic growth and why the nation is currently experiencing recession considering the global slides in oil price and fluctuations in naira exchange rates with other currencies.

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This paper seeks to examine the impact of Crude oil price volatility on Economic Growth in Nigeria from 1980-2020. The remaining part of the paper is organized as follows: Section 2 reviews relevant works of literature, Section 3 outlines the methodology and model specification, Section 4 deals with the estimation, analysis, and interpretation of empirical results, Section 5 covers conclusion and Recommendation.

2. LITERATURE REVIEW

Clarification of Concepts

Crude oil: Crude oil is a naturally occurring substance that may be found in differing quantities in many countries across the world. Oil is refined and split into different chemicals that are either used directly or further processed. Because value is linked to end uses, crude oils that produce more valuable by-products (petroleum motor spirit, diesel fuels, jet fuels, petroleum gas, and so on) tend to sell at a higher price than crude oils that produce fewer valuable by-products (petroleum motor spirit, diesel fuels, jet fuels, petroleum gas, and so on) tend to sell at a higher price than crude oils that produce fewer valuable by-products (petroleum motor spirit, diesel fuels

Crude Oil Price: Crude oil prices are used to calculate the spot price of numerous barrels of oil stated on the global oil market. The oil barrels offered include West Texas Intermediate (WTI), Brent Blend, OPEC basket price, and New York Mercantile Exchange (NYMEX) futures price. Nigerian crude is included in the OPEC Basket Price category, which is the average of prices from Nigeria and other OPEC countries including Algeria, Indonesia, Saudi Arabia, Dubai, Venezuela, and Mexico. These countries' oil is of lower grade; thus, it sells for less than WTI and Brent Blend.

Volatility: The dispersion of all possible outcomes of an unknown variable is referred to as volatility. We are interested in the outcomes of commodities and service returns in finance. The sample standard deviation of returns over time is linked to volatility. It's the pace at which the price of crude oil rises or falls in response to a set of returns. The standard deviation of annualized returns over a specific time period is used to calculate volatility. It depicts the price range in which crude oil might rise or fall.

The danger of a crude oil price is measured by volatility. It is utilized in the option pricing formula to calculate the variations in the underlying assets' returns. Volatility is a measure of the crude oil price's pricing behavior and may be used to forecast short-term swings.

High volatility is defined as a fast change in crude oil prices over a short period of time. The price of crude oil is said to have low volatility if it fluctuates slowly over time.

Economic Growth: Economic growth is defined in this article as a rise in a country's Gross Domestic Product (GDP) caused by changes in main macroeconomic factors. The GDP is a simple metric that reflects the market value of final products and services generated in a nation over the course of a year. As a result, in this article, the GDP annual growth rate is used as a proxy for economic growth. It's a measure of GDP's annual percentage growth rate at market prices, computed in constant local currency but aggregated in constant US dollars for 2020.

Empirical Review

Crude oil is vital to the global economy since it is both a source of income and an input element for many countries. As a result, it's not unexpected that economists have investigated price changes and their influence on growth.

Qingzhi (2019) used the VAR Model to investigate the impact of international oil price fluctuations on the Chinese economy. The VAR model is used to provide a dynamic relationship between crude oil price and economic growth, price level, and monetary policy. The Granger cause of economic growth rate, monetary policy, and other economic indicators are variations in oil prices, according to Granger causality research. The main effects of rising oil prices on China's economy, according to the VAR (2) model and impulse response analysis, are: it will raise the pace of economic growth in a short period of time; it will raise the price level via aggregate demand to pull and increase the cost of such two methods; and it will make effective monetary policy implementation more difficult. Despite the fact that the worldwide oil price and China's economic variables are intricate and dynamic, the economic system composed of international oil price, economic growth, price level, and money supply is stable overall.

Yasmeen, Wang, Zameer, and Solangi (2019) In Pakistan, look at the short- and long-term relationships between oil price fluctuations and real sector growth. There are four primary economic sectors (Manufacturing, electricity, transport and communication, and livestock). The association between economic sectors and oil price fluctuations was investigated using traditional normal linear regression models with autoregressive distributed lag (ARDL). Empirical findings show that fluctuations in oil prices have a negative short- and long-term impact on the industrial, livestock, and power sectors, while having a large favorable influence on transportation and communication. As a result, authorities must pay close attention to businesses that are particularly sensitive to swings in oil prices. The government can develop a long-term policy framework to reduce the effect of rising oil prices, while an expansionary monetary policy can be a short-term alternative to offset the effect of rising oil prices.

Boitumelo, Tsoku, and Lebotsa(2020) investigated modeling the oil price volatility and macroeconomic variables in South Africa using the symmetric and asymmetric GARCH models.

For the period 1990Q1 to 2018Q2, the ARCH, GARCH, and EGARCH models were used to model oil price volatility and macroeconomic factors in South Africa. GDP, inflation, interest rates, and exchange rates are the macroeconomic variables studied. According to the ARCH (1) and GARCH (1, 1) models, the exchange rate and interest rate have a negative impact on the oil price, whereas GDP and inflation have a positive impact. According to GDP and inflation figures, a 1% increase in GDP and inflation might lead to an increase in oil prices. A 1% increase in the interest rate and exchange rate may result in a decline in the price of oil due to the negative

impact of their negative values on the interest rate and currency rate. All macroeconomic variables have a negative impact on oil prices, according to the EGARCH (1, 1) model. This means that a 1% rise in these factors might result in a drop in oil prices. South African oil prices are erratic, according to symmetric and asymmetric methodologies.

Kamasa, Amponsah, and Forson, (2020) investigate the influence of crude oil price fluctuations on Ghana's economic well-being. On an annual time, series data set from 1983 to 2017, the article used the Autoregressive distributed lag (ARDL) estimate approach. The findings demonstrated that, however marginally, fluctuations in crude oil prices had a negative and considerable influence on economic wellbeing in the short and long run. In terms of variables, the data demonstrated that trade openness and gross fixed capital creation have a positive and substantial influence on economic wellbeing in both the short and long run, whereas interest rates have a negative impact. Foreign direct investment had a somewhat beneficial impact.

Nwanna and Eyedayi (2016) examine the influence of crude oil price fluctuation on Nigeria's economic growth. The research uses secondary data from a variety of sources and spans the years 1980 to 2014. Multiple regressions were employed to analyze the data, and the results demonstrated that oil price and economic growth had a positive and substantial association. According to the findings, oil price volatility does not have a beneficial influence on the economy (contrary to the conclusions of several previous studies), but oil price itself does.

Umoru, Ohiomu, and Akpeke (2018) uses the Vector AutoRegressive (VAR) methodology to carry out regression analysis, impulse response function, and factor error variance decomposition for robust policy recommendations on the impact of oil price volatility on Exchange Rate Variability, External Reserves, Government Expenditure, and real Gross Domestic Product. The study's findings reveal that fluctuating oil prices have varied degrees of negative impact on exchange rate fluctuation, foreign reserves, government spending, and real gross domestic product (GDP).

Aigheyisi (2018) the influence of oil price volatility on the Nigerian business cycle (as defined by changes in real GDP) was investigated while other factors such as inflation, currency rate, money supply, trade openness, and foreign direct investment were controlled for. The EGARCH mechanism generates volatility in real GDP and oil prices. For the examination of data spanning the years 1970 to 2015, the ARDL approach to cointegration and error correction modeling is used. Oil price volatility has a positive and strong short-run influence on real GDP volatility, but no meaningful long-run effect, according to the study. Other factors' short- and long-run effects on the Nigerian business cycle (real GDP volatility) are not statistically significant. This shows that oil price volatility is the primary cause of short-run real GDP variations. This might be attributable to the country's shaky reliance on oil exports.

Taofik (2018) from 1970 to 2015 investigates the association between oil price changes and Nigerian output performance. By extending the normal production function to include oil price as one of the production variables, and then superimposing the enlarged production function on the Keynesian national income identity, it combines the basic neoclassical growth model and the Keynesian national income identity. The researchers employed the Two-Stage Least Square (2SLS) estimation method, which takes into consideration the likelihood of endogeneity. The ADF unit root and Johansen cointegration tests were used to establish the time-series properties of the data used in the study. Oil price fluctuations have a positive impact on aggregate output but a negative impact on the agricultural, manufacturing, and service sectors, implying that oil price fluctuations create uncertainty in productive sector production capacity and undermine the effectiveness of government financial management of crude oil revenue.

Jelilov, Abdullahi, Bila,and Abdurrahman (2020). In Nigeria, researchers looked at short-run empirical evaluations of the influence of oil price fluctuations on monetary instruments (exchange rate, inflation, and interest rate). By using the TY Modified Wald (MWALD) test technique to causality, Forecast Error Variance Decomposition (FEVD), and Impulse Response Functions, was investigated the widely used Toda–Yamamoto model (TY) (IRFs). The MWALD test revealed that there is a unidirectional causality between the log of oil price (lnOILPR) and the log of the exchange rate (lnEXCHR) at a 10% level of significance, as well as a contemporaneous response between the log of a consumer price index (lnCPI) and the log of the exchange rate (lnEXCHR) at a 10% level of significance. Positive changes in lnOILPR and lnEXCHR induce lnINTR at a 5% level of significance, and they cause lnINTR together at a 5% level of significance. The results of our FEVD and IRF studies contribute to this picture. According to empirical estimates, the price of oil has a substantial influence on the currency rate, the cost of borrowing, and inflationary or deflationary tendencies in Nigeria.

Kanu and Nwadiubu (2020) examined Global Oil Price Shocks and Effects on Economic Growth, An Econometric Investigation of Nigeria. Secondary data was used in the study, which covered the years 1990 to 2019. For preliminary analysis, the Augmented Dickey-Fuller unit root test was utilized; for short-run estimations, ordinary least square (OLS) regression analysis was performed. Long run estimate was done using a mixture of the Johansen Co-integration test, Vector Auto Regression analysis, Granger causality test, Variance Decomposition, Impulse Response testing, and ARCH/GARCH modeling approaches. All of the testing confirmed the accuracy of our models. The study's findings suggest that, in the near run, there is enough evidence to establish that fluctuations in oil prices have a major impact on economic growth. Shocks account for 71.31 percent of the variation in economic growth over a ten-year timeframe, whereas fluctuations in the worldwide price of crude oil account for the remaining 28.69 percent. In other words, the Nigerian economy's development is determined by the economy itself, as well as, to some extent, swings or volatility connected with global oil price shocks. The ARCH/GARCH study revealed that there is a first-order ARCH impact, as well as a strong GARCH in mean term. To put it another way, the aforementioned findings imply that, while unpredictable, there is evidence

of oil price volatility clustering on economic development in Nigeria.

Similar studies exist in the literature; however, the current study is unique in that it explores each sector's relationship with changes in oil prices. The study will use annual time series data from chosen industries from 1980 through 2020. The link between economic growth and crude oil price volatility was studied using classical, ARCH, and GARCH models.

3. METHODOLOGY

Ex post facto design was used in this investigation. This design aids in determining how a pre-existing independent variable influences a dependent variable. A good research design must be able to control independent factors that are unrelated to the investigation but may have an impact on the study's dependent variables (Asika, 2006). In light of the foregoing, the study used the ARCH and GARCH approaches.

The goal of this research is to see how crude oil volatility affects Nigeria's economic development from 1980 to 2020. The data came from the Nigerian National Petroleum Corporation (NNPC) and the Central Bank of Nigeria (CBN) (NNPC). The data is yearly and covers the years 1980 through 2020.

4. THEORETICAL FRAMEWORK

The Structuralist Theory will be applied to this research. The Structural Theory contends that macroeconomic fluctuations are to blame for structural shocks such as major price shifts in food and oil (Sommer, 2002). The amplitude effect of structural shocks, however, is a point of contention among structuralist theorists. One school of thought contends that supply shocks are only temporary and have a short-term impact on the macro-economy (Ball and Mankiw, 1995). They also believe that, because policymakers' duty is to guarantee a favorable economic climate in the long run, they should not respond to short-term pressures such as food and oil prices, which are extremely volatile, in order to avoid driving the economy into recession (Armando, 2009). They argue that policymakers should instead concentrate on preventing "the second-round impact," which is likely to last longer and culminate in an economic downturn (Inflation Report, 2006). According to Fischer (1985), supply shocks do not necessitate a policy response if there is no meaningful wage resistance among employees. Another school used data from Latin America and emerging nations to illustrate that structural shocks may be long-lasting and are caused by inelastic supply constraints in the agriculture and oil industries (Watcher, 1979). Agriculture, oil, international commerce, and government sectors, they believe, suffer from institutional rigidities that lead prices to rise in response to economic changes. They argued that fiscal authorities should eliminate such institutional rigidities as a way to mitigate the negative impacts of structural shocks. The rational expectation theory has been used by some researchers to refute the foregoing viewpoints. They claim that the supply-side amplitude is determined by expectation behavior (Sommer, 2002). When agents assume that the consequences of shocks will last forever, shocks feed into their expectations, resulting in a high level of shock persistence. Similarly, when agents assume that shock effects are merely transitory, economic fundamentals swiftly recover to their original state Ujunwa (2015). The theoretical underpinning for this investigation was largely inspired by this idea.

Model specification

To measure the impact of crude oil price volatility on economic growth in Nigeria, this study followed Subair (2009). The model takes the form;

$$GDP=f(COP, EXR) \quad (1)$$

$$LGDP_t = \beta_0 + \beta_1 LCOPVOL_t + \beta_2 LEXR_t + \varepsilon_t \quad (2)$$

Where: LGDP is a gross domestic product, LCOPVOL is the volatility of the crude oil price

In the following model, LEXR stands for the exchange rate, t for the error term, and L for natural logs.

To assess the data features, many tests were used, including descriptive statistics, the ARCH test, and the unit root test. This was done to ensure that the estimation method used was suitable for the data. To assess the model adequacy, post-diagnostic tests such as normality, heteroscedasticity, and autocorrelation: Q-statistic Test are utilized.

5. RESULTS PRESENTATION AND DISCUSSION OF FINDINGS

Descriptive statistics

To see if the GDP, COP, and EXR had time-varying volatility and leptokurtosis features, descriptive statistics were used. The study's two key variables are investigated since they determine the study's estimating approach. The GDP COP and EXR series figures are presented in Table 1 below.

Table 1 Descriptive statistics

Parameters	GDP	COP	EXR
Mean	33761.27	41.99175	100.6398
Median	7515.810	28.62000	107.0243
Maximum	158630.2	109.4500	349.5000
Minimum	144.8300	12.28000	0.610000
Std. Dev.	45833.72	29.25320	100.1575
Skewness	1.299089	8.049845	0.862125
Kurtosis	3.483558	20.913831	2.909907
Jarque-Bera	11.64059	7.360201	4.968588
Probability	0.002967	0.025220	0.083384
Sum	1350451.	1679.670	4025.593
Sum Sq. Dev.	8.19E+10	33374.25	391229.1
Observations	40	40	40

Source: Authors Computation, 2021 (Eview-10)

The Jarque-Bera values of 11.64, 7.36, and 4.97 for GDP, COP, and EXR, respectively, departed from a normal distribution, according to Table 1. Skewness and kurtosis, on the other hand, describe the kind of deviation from normalcy. The COP value for skewness is 8.05, which indicates positive skewness, while the COP value for kurtosis is 20.91, indicating that the COP has peaked. It can be seen from this that the COP variable deviates significantly from normalcy. The kurtosis coefficient is 20.91, which is more than three. There is a lot of lerptokurtosis in this picture. A leptokurtic distribution has a coefficient more than 3, whereas a platykurtic distribution has a value less than 3. With a value of 1.299,

the GDP variable displays positive skewness, indicating that the GDP variable is asymmetric.

ARCH effect investigation

According to Brooks (2008), computing the ARCH test first ensures that this class of models (GARCH) is acceptable for the data. The ARCH test was performed to check for ARCH effects on the residuals in this case. Table 2 below summarizes the findings.

Table 2 Shows the results of the ARCH test.

F-statistic	0.761360	Prob. F (3,37)	0.0015
Obs*R-squared	0.786334	Prob. Chi-Square (1)	0.0015

Source: Authors Computation, 2021 (Eview-10)

The ARCH test of autocorrelation in the squared residuals is shown in Table 2 as the statistic labeled "Obs*R-squared." The p-value (0.0015) shows that we can rule out the null hypothesis of no residual heteroscedasticity. In other words, the presence of homoscedasticity in the residuals is clearly indicated by the zero-probability value.

Performing stationarity tests

The series is stationary if the mean and variance remain constant across time. Standard econometric theory requires stationarity. The Augmented Dickey-Fuller and Phillip Perron tests were used to determine the unit root. Both indicated that all variables were not stable in levels, but that after initial differencing, they became stationary. Table 3 shows the results of the Augmented Dickey-Fuller and Phillip Perron tests.

Table 3 Stationarity Tests

Variables	ADF Test	p-value	Order of Integration	PP test	p-value	Order of Integration
GDP	*-7.469969 (-2.943427)*	*0.0000*	*I (1)*	*-7.963484 (-2.943427)*	*0.0000*	*I (1)*
COP	*-5.277035 (-2.938987)*	*0.0001*	*I (1)*	*-5.144675 (-2.938987)*	*0.0001*	*I (1)*
EXR	*-4.255665 (-2.938987)*	*0.0018*	*I (1)*	*-4.218650 (-2.938987)*	*0.0020*	*I (1)*

Source: Authors Computation, 2021 (Eview-10)

Using levels, all variables were not stationary, as seen in Table 3. (0). At levels, the p-values of the variables were all more than 0.05, indicating that the null hypothesis of the presence of a unit root in levels could not be rejected for all variables. After differencing the variables, however, they become stationary (1). The p-values are significant (less than 0.05), showing that the variables are stationary at first difference.

The hypothesis of interest is how closely changes in the conditional mean of the variables are linked to changes in GDP. The findings of the calculated normal GARCH (1.1) model. presented in Table 4.

Table 4 GARCH (1.1) mode results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-6912.136	625.5887	-11.04901	0.0000
COP	21.2.2756	24.61960	8.622218	0.0000
EXR	-27.63162	12.78317	-2.161562	0.0000
	Variance Equation			
C (4)	2.03E+08	1.48E+10	0.013695	0.9891
C (5)	0.998527	0.114535	8.718102	0.0000
C (6)	0.282424	1.207341	0.233922	0.8150
C (7)	0.900414	1.099578	0.818872	0.4129
C (8)	-0.061598	1.058829	-0.058176	0.9536
T-DIST. DOF	7.162793	4.858669	1.474229	0.1404
R-squared	0.813748	Mean dependent var		33761.27
Adjusted R-squared	0.803681	S.D. dependent var		45833.72
S.E. of regression	20307.98	Akaike info criterion		20.87833
Sum squared resid	1.53E+10	Schwarz criterion		21.25833
Log-likelihood	-408.5667	Hannan-Quinn criteria.		21.01573
Durbin-Watson stat	2.089416			

Source: Authors Computation, 2021 (Eview-10)

The sign of the crude oil price is positive e; a one percentage point increase of crude oil price (COP) increases economic growth (GDP) by 2.23 percent. The findings revealed that the price of crude oil and economic growth had a favorable link. Several investigations, including those by Taofik (2018), Kanu and Nwadiubu (2020), and Aigheyisi (2020), have found this (2018) Oil price volatility has a positive and strong short-run influence on real GDP volatility, but no meaningful long-run effect, according to the study. In addition, Qingzhi (2019) The main effects of rising oil prices on China's economy, according to the VAR (2) model and impulse response analysis, are: it will increase economic growth rate in a short time; it will increase the price level through aggregate demand to pull and increase the cost of such two ways; it will make it more difficult to implement monetary policy effectively. In research on the influence of crude oil price variations on economic wellbeing in Ghana, Kamasa, Amponsah, and Forson (2020) found a similar conclusion. The findings demonstrated both short- and long-term variations in crude oil prices had a negative and considerable influence on economic wellbeing. EXR has a negative and statistically significant coefficient, showing that an increase in the exchange rate reduces economic growth. An increase in the exchange rate leads to a decrease in economic growth. Boitumelo, Tsoku and Lebotsa (2020

Variance equation

The GARCH model is represented by the variance equation, and it is in this equation that the crude oil price volatility and EXR were captured. The following is the interpretation: Economic growth is reduced by 0.998527 percentage points for every one percentage point rise in COP volatility. This demonstrates that crude oil volatility has a significant and negative influence on Nigeria's economic growth. The conclusion of a negative COP volatility sign is consistent with findings from earlier research that looked at the link between these two factors. This study's findings are consistent with those of Yasmeen, Wang, Zameer, and Solangi (2019). Their empirical findings show that fluctuations in oil prices have

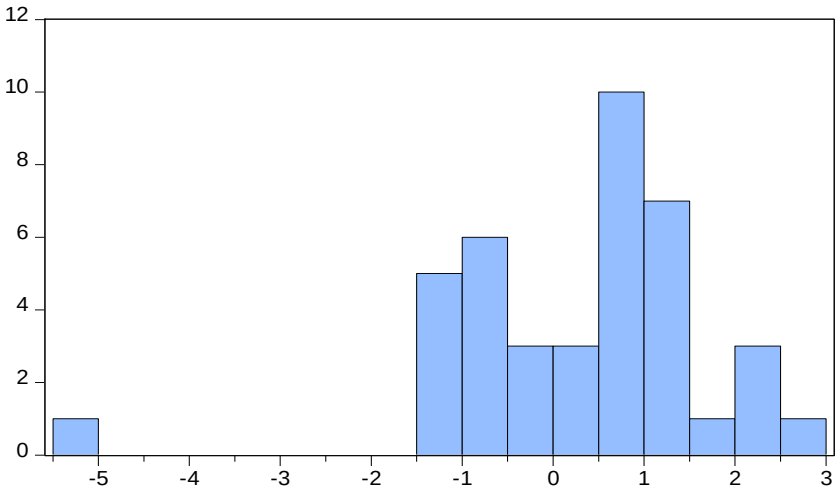
a negative short- and long-term impact on industry, livestock, and power, but have a large favorable influence on transportation and communication. As a result, authorities must pay special attention to industries that are vulnerable to oil price fluctuations. In addition, Kanu and Nwadiubu (2020) discovered that there was adequate data to prove that oil price variations had a major influence on economic growth in the near run.

Diagnostic Test

Gujarati (2004) says that diagnostic tests should be carried out to ensure that the final model chosen is satisfactory in the sense that all estimated coefficients have the correct signs and are statistically significant based on t and F tests. The Histogram and Normality test, the Correlogram of Squared Residual Test, and the Heteroscedasticity2 test are used as diagnostic tests in this work.

A normality test was performed on the residuals to ensure that they were normal. The residuals should be regularly distributed, according to economic theory. The Normality Test is shown in Table 5.

Table 5 Test for Normality



Series: Standardized Residuals
Sample 1981 2020
Observations 40

Mean	0.299382
Median	0.677638
Maximum	2.747259
Minimum	-5.389945
Std. Dev.	1.420473
Skewness	-1.480443
Kurtosis	7.486376
Jarque-Bera	48.15734
Probability	0.000000

Ho: The sample results do not deviate considerably from a normal population.

H1: The sample results deviate considerably from those of a normal population.

The null hypothesis is accepted if the probability is greater than 0.05. The null hypothesis is rejected if the probability is less than 0.05. As a result, the null hypothesis is accepted since the probability is 0.0000, which is more than 0.05 at a 5% threshold of significance. In this scenario, the residuals are normally distributed.

Heteroscedasticity test

The ARCH test was used to determine if the residuals were heteroscedastic. The ARCH test after employing the GARCH model is shown in Table 6.

Table 6 shows the results of the ARCH test.

F-statistic	0.159805	Prob. F (1,37)	0.6916
Obs*R-squared	0.167718	Prob. Chi-Square (1)	0.6821

Source: Authors Computation, 2021 (Eview-10)

The ARCH test results are shown in Table 6. According to Engle's LM test, there are no further ARCH effects. The Obs*R-squared p-value is not significant; it is larger than 0.05, implying that there is no ARCH present. The p-value of 0.6916 indicates that the residual has no heteroscedasticity.

Table 7 shows that all p-values are greater than 0.05, indicating that the null hypothesis of no serial connection is not rejected. This demonstrates that the residuals have no association. This demonstrates that the mean equation was provided appropriately. All Q-statistics of standardized residuals should be negligible with no detectable autocorrelation, according to Uh (2005), assuming the mean equation (conditional variance equation) is appropriately defined.

Table 7 The Q-statistic Test is used to check for autocorrelation

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |*** |	. |*** |	1	0.367	0.367	5.8023	0.016
. |*** |	. |** |	2	0.354	0.254	11.356	0.003
. |** |	. |*. |	3	0.266	0.094	14.579	0.002
. |*. |	. |. |	4	0.172	-0.013	15.958	0.003
. |*. |	. |. |	5	0.124	-0.013	16.697	0.005
. |*. |	. |*. |	6	0.162	0.090	17.994	0.006
. |*. |	. |. |	7	0.103	0.007	18.535	0.010
. |. |	.*|. |	8	-0.009	-0.129	18.539	0.018
. |. |	.*|. |	9	-0.044	-0.090	18.644	0.028
.*|. |	. |. |	10	-0.083	-0.049	19.028	0.040
**|. |	**|. |	11	-0.321	-0.307	24.984	0.009
.*|. |	. |. |	12	-0.140	0.060	26.158	0.010
***|. |	**|. |	13	-0.398	-0.302	35.991	0.001
**|. |	. |. |	14	-0.230	0.065	39.400	0.000
**|. |	. |. |	15	-0.211	0.026	42.403	0.000
**|. |	. |. |	16	-0.226	-0.053	45.973	0.000
**|. |	.*|. |	17	-0.256	-0.069	50.771	0.000
**|. |	. |. |	18	-0.208	-0.016	54.069	0.000
**|. |	.*|. |	19	-0.256	-0.109	59.308	0.000
**|. |	. |. |	20	-0.211	-0.007	63.032	0.000

**Probabilities may not be valid for this equation specification.*

Source: Authors Computation, 2021 (Eview-10)

6. CONCLUSION

Crude oil is one of the most crucial driving forces in the world economy. Crude oil price volatility, on the other hand, has a huge impact on global economic growth and people's well-being. Oil price volatility and its impact on economic growth is a major issue that a rising number of countries are grappling with. The link between oil prices and economic activity has been a point of contention for some time, with empirical research on the subject abounding during the last several decades. The influence of COP volatility on Nigerian economic growth was explored in this study. The Central Bank of Nigeria provided time-series data on GDP and crude oil price from 1980 to 2020, which was utilized for this purpose. The ARCH and GARCH algorithms were also used to extract the COPV time series. According to the findings, crude oil volatility has a significant and negative influence on Nigeria's economic growth.

7. RECOMMENDATION

Based on the conclusion above, the following recommendation was made;

1. The need for Nigeria's revenue streams to be diversified is more apparent than ever before, and it must be pursued with renewed determination. The country is equipped with enormous agricultural territory, favorable climatic conditions for crops and cattle, and a huge population to staff the agricultural industry. As a result, the government should use these areas of strength to diversify in that way. Policies should be oriented to reviving the agricultural sector by putting monies into the system in ways that farmers can easily access. In order to generate new crops with larger yields, research and development efforts need be scaled up. Furthermore, investors should be encouraged to build sound storage facilities in order to promote the production of perishable goods. A well-developed agricultural sector can help offset the effects of fluctuations in crude oil prices, which the country has become unduly reliant on
2. The Nigerian economy's vulnerability to swings in oil prices emphasizes the necessity for buffers to be constructed during periods of high oil prices. When oil prices improve, the notion of an excess crude account proposed by Obasanjo's government in 2004 should be reconsidered, constructed, and maintained.
3. Given the exchange rate's sensitivity to oil prices and the Nigerian economy's interconnectedness with the rest of the world, the implementation of a floating exchange rate is required to absorb oil price shocks. The floating exchange rate policy allows market forces to set the exchange rate and discourages foreign currency hoarding, particularly among Bureau de change operators. To do so, the government must develop its manufacturing base in order to broaden the range of commodities available for export.
4. A rigorous import-substitution plan is required to assess the exchange rate's sensitivity to external variables. The country's excessive reliance on imported commodities at the expense of domestically produced items puts undue pressure on foreign money, causing the naira to depreciate versus major international currencies. As a result, the government should step up efforts to reduce the country's reliance on imported commodities by building firms that can manufacture such things in Nigeria and emphasizing the importance of economic patriotism among Nigerians. A portion of the recovered plundered cash should be utilized to supplement development budgeted resources.

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