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I. Title page
II. Abstract (150-250 words)
III. Keywords (3-5)
IV. Introduction
V. Literature Review
VI. Methodology
VII. Results and Discussion
VIII. Conclusion and Recommendations
IX. References (APA 7th Edition)
X. Appendices (if necessary)
XI. Author Biographies (optional)

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OIL PRICE VOLATILITY AND STOCK MARKET RETURN: EVIDENCE FROM NIGERIA.

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ABSTRACT

Oil price volatility and stock market has been a debated phenomenon among various scholars. This is due to the important of these two to a country's economic activities. However, oil price volatility across different sectors varies, due to the uniqueness of each sector in terms of their operations, rules and regulations and policies guiding them. Against these backdrops, this study seeks to investigate the oil price volatility effects on the sector stock market return. The specific objectives are to: (i) examine oil price volatility on banking sector stock returns in Nigeria; and (ii) examine the oil price volatility of oil price on the oil and gas sector return in Nigeria. The study made use of daily secondary data sourced from Nigeria stock exchange and the Energy Information Administration (EIA), Spanning from 2008 to 2018. Exponential Generalized Autoregressive conditional Heteroscedasticity model was used to examine the volatility of oil price on the two sector returns. The result revealed that oil price volatility is statistically significant at 5% level in influencing banking sector stock returns and the oil & gas sector returns. Also, the study found out that there is presence of positive and significant information asymmetry in the oil and gas sector, such that good news in the oil price markets has more propensity of increasing oil and gas sector return volatility than bad news. While, there is presence of negative and significant information asymmetry, which implies that bad news in the oil price markets has more propensity of increasing banking sector return volatility than good news. Based on the findings, the study recommends that management of listed oil and gas companies in stock market should closely monitor the exposure of their companies to the oil price fluctuation by diversifying their investment. While banks should tie their bank capitalization to oil price shocks, in order to mitigate procyclical bank lending and allow banks to use their capital cushions created during boom periods.

Key Words: *Oil Volatility, Stock Price, Stock Volatility, Economy Growth & Procyclical Bank.*

1.0 Introduction

Globally, oil price is considered to be highly important to both an importing and exporting country. This is due to its contribution to economy growth of any county. Oil price fluctuation in past few decades has been identified to be one of the outcome of disparity between supply and demand of oil, and some other contributing factors like war, weather, stock levels, GDP growth, political issues and even people's psychological expectations leading to a strongly fluctuating crude oil market (Poured and Watkins, 2008).

Volatility of stock price has become increasingly important for market participants, regulators and academicians. Stock volatility could mean the effect, arrival of news and unanticipated Information could have on expected return of a stock price and as such, the changes in the price volatility of the stock market would simply be a mere reflection of changes in the

local and global business environment (Sauter @ Awerbuch, 2003). Anecdotal evidence suggest that, a rising oil price and volatility has tendency to suppress economic activities and reduce asset value. It is also shown that countries that engage in oil trade are more exposed to the elements of price shocks on global commodity markets (Rentschler, 2013). Pindyck(1991) argues that changes in energy price create ambiguity about future energy prices, causing firms to postpone irreversible investment decisions in reaction to the outlook for profits.

Last decade witnessed a very volatile oil market, as well as the highest-ever record of oil price of US$147 per barrel in July 2008 (Jafarian and Safari, 2015). Various events added to the disparity of supply and demand in this period. Some of the notable significant events are the invasion of Iraq by the US, severe strikes and unrests in Venezuela maturity of several oil fields around the world (e.g., the North Sea, Mexico's Cantarell, and Saudi's Ghawar), oil supply disruptions in Syria, Sudan, and Yemen, and ongoing sanctions on Iran's oil export. On the demand side continuous economic growth of China and India caused an upward trend in demand for oil in this period. However, shortly after the start of the global financial crisis in the late 2008, the demand for oil dropped significantly, which led to a sharp decline in the oil price. Oil price rises are also attributed to several geopolitical factors such as middle East tensions, concerns over Iran's nuclear program, and instabilities in Iraq and Nigeria (Atousa and Meysam, 2015). The financial sector serves as the backbone of the Nigeria market, constitutes over 40% of the total market capitalization and 60% of the trade volume (NSE, 2017). More importantly, the Banking sector holds larger percentage of the total market capitalization and are known to be exposed to instability in the oil prices. In a report given by Asset Management Company of Nigeria (AMCON) (2011); banks, oil and gas debt for instant make up 47% of the total loan books. Also, a breakdown of the top five sectors in which eligible bank assets (EBAs) originated from, the oil and gas sector make up 27.23% of AMCONs total loans portfolio. Hence, banks are often vulnerable to persistence volatility in the oil market.

Oil price volatility and stock market return has been a debatable phenomenon among various scholars. This is due to the important of these two to a country's economic development. A key issue that has attracted considerable attention among academic researchers and partitioners is oil price volatility and stock market return. Inspite of the elaborate and detailed literature on oil prices and stock market, divergent views still exist. Some studies indicate negative relationship between rising oil prices and stock prices (Managi and Okimoto, 2013; Tsai, 2015: Ponka, 2016). A few others find a positive relationship (Chortareas and Noikokyris, 2014; Fang and You, 2014; Chen and Lv, 2015).

There are still some outstanding issues requiring further investigations. For instance, a growing literature have highlighted that international oil market may pose challenges for firms' costs, profit and stock valuation and hence, create uncertainties for investors. This challenges follow that since oil is a crucial input in most firms' production, increases in oil prices enter the firms' cost of production to dampen profits and cash flows and then in turn have adverse effect on market value and stock prices (Ramos and Veiga, 2013; Rafailidis and Katrakilidis, 2014; Cai, Tian, Yuan and Hamori, 2017).

Consequently, some other studies posited that oil price is sensitive to socio-political and economic instabilities as well as changes in both global supply of and demand for energy, such as factors as market regulation, oil crises, technological changes in the renewable energy sector, and modifications in the storage and logistics infrastructure of international oil markets (Charles and Darne, 2009).

Therefore, oil price volatility in an oil-dependent nation like Nigeria could lead to huge losses or gains to government which could result to economic instability. It could also lead huge losses or gains to independent investors in the oil markets, who are therefore confronted with greater uncertainty. Thus, both the government and profit-maximizing investors are keenly interested in the extent of volatility in oil price to make policy/ investment decisions. Hence, the study envision to empirically investigate the volatility persistence of oil price on the sectoral stock return in Nigeria.

A plethora of studies have extensively explored oil price volatility and stock market in Nigeria. Some of this studies include the works of (Effiong, 2014; Obi, Oluseyi and Evans, 2018; Ekong and Effiong; 2015). Other studies went further to assert that industry market react differently to instability in oil price, through its effect on corporate cash flow, discount rates, and operation of the these firms. (Arouri, Jouini

and Nguyen, 2012; Mohamed, 2012; Nadha and Brooks, 2009). However, all the studies earlier mentioned or conducted in Nigeria failed to account for other important characteristics of the variables of interest such as volatility persistence and conditional hetroscedasticity. Therefore it will be of great interest to show how positive and negative changes in oil prices can affect daily sectoral stock returns, which may be undermined by other low frequencies.

Thus, we explore persistence and asymmetric conditional volatility effect of oil price on sectoral stock returns, with emphasis on the Nigeria stock market.

Research Questions

In line with the issues raised in the problem statement, the following research were generated:

I) Is there any oil price volatility effect on the Nigeria banking sub- sector stock returns?

II) Is there any oil price volatility effect on the Nigeria oil and gas sector stock returns?

Research Objectives

The main objective of this study is to investigate oil price volatility in the Nigeria stock market, however the specific objectives are to:

I) examine oil price volatility effect on the banking sub-sector stock return

II) evaluate oil price volatility effect on the oil and gas sector stock return.

Research Hypotheses

The following research hypothesis were stated in null form in order to provide a framework for the study:

Ho1: There is no oil price volatility effect on the banking sub-sector stock return

Ho2: There is no oil price volatility effect on the oil and gas sector stock return

Justification For The Study

The recent oil price instability, traced largely to supply disruptions, surging demands and financial speculations, renders investigation on their relationship and their contribution to economic growth in Nigeria imperative. This is in addition to the growing sophistication and increasing role of the Nigeria stock market and the increasing integration of the economy to the global market. The improved availability of the stock market data for emerging and developing economies is another compelling reason for this study, especially given it's relevance and usefulness for the effective and efficient decision making processes of portfolio managers. The motivation of this study is to provide broad understanding of Oil Price volatility and sector stock market Return. Understanding the effect of the oil price volatility and sector stock market return will help the major stakeholders, particularly the foreign and local investors in hedging, building optimal and well diversified portfolio. This will proffer them with the opportunity to take best investment decisions.

Scope Of The Study

Daily data of oil price and stock market indices were used. The study covers the period from 4 January 2008 to 12 December 2021. This period can be categorized in to two important period of the market. The first period (2008-2009), reflected the period of the Global financial crises, which recorded a considerable decline in the price of crude oil (US$34.0 per barrel), coupled with a crash in the stock prices across the globe. And the second phase was the post-global financial crises (2010 to 2021) that witnessed sluggish recovery in the global economy particularly stock and oil prices, and the reclassification of the stock market.

2.0 Literature Review

Oil Price Volatility and Stock Market Sector Return

Nigeria is ranked by the US Energy Information Administration (Ela, 2015) as the highest crude oil producer in Africa with an estimated proven crude oil reserves of 37.2 billion barrel as at 2013, the second largest in Africa, after Libya. Recently, there has been fluctuation in oil production in Nigeria. This downward trend in the contribution of oil to trade and the economy, is a reflection of the declining crude oil production (upstream) and refining (downstream), which has persistently suffered serious disruptions over the decades.

Some of the daunting challenges confronting the oil sector in Nigeria include, but not limited to significant decline in global demand, especially from the US, persistent attacks and vandalism of oil infrastructure, massive oil theft, aging infrastructure, poor maintenance, natural gas flaring, incessant fire outbreaks, surging security challenges, and militancy and youth restiveness in the Niger Delta region. Consequently, domestic crude oil production, which peaked at a decade high of 2.44million barrels per

day (mbl/d) in 2005, consistently declined to about 1.8 mbpd in 2009, while the refineries' operating capacity similarly dwindled (Ela, 2014).

Theoretical Framework

The theoretical link between oil price volatility and stock market return stem from two perspectives: The classical theory and Irreversible theory of investment.

In the classical theory, asset prices depend on expected discounted cash flows (Fisher, 1930; Williams, 1938). According to this theory it was assumed that the combination of endogenous and exogenous factors with a potential impact on expected discounted flows can affect asset prices traded in markets. Therefore, a positive shock in oil prices should lead, ceteris paribus, increase the cost of production, reduction of potential profit. For the holders of the securities (excluding the holders of the shares of oil companies), this shock may lead to reduction of capitalization of the shareholders. Then, we can assume that a positive shock in oil prices may lead to a drop in the stock price (Filis et. al., 2011).

Irreversible Theory of Investment postulated by Black and Scholes (1973). The basic tenets of the theory is the assumption that uncertainty shocks do not only inherently truncate investment decisions but also constrain firms' ability to re-deploy capital since capital, once installed, becomes largely irrecoverable (Beenanke, 1983). It follows by implication that uncertainty is countercyclical to business cycles such that it rises during business downturns and declines during booms. Uncertainty is essentially forward looking and is represented by several proxies in the literature including the dispersion in aggregate stock market since it cannot be measured directly and is generally assumed to be higher for developing economics.

Due to the ability of this model to generate stochastic volatilities relative to adjustment cost and irreversibility of investment with the degree of the measure of uncertainty depending on the share of real oil price in investment making decisions process, this study is however anchored on the irreversible Theory of Investment as used by (Ronald, 2014)

Empirical Review

Effiong (2014) investigated the impact of oil price shock on stock market for the period 1995 to 2011 using a SVAR model. The impulse response results showed that stock's market response to oil supply shocks is significantly negative but significantly positive to aggregate demand and oil specific demand. Furthermore, the cumulative effect of the oil price shocks account for about 47 per cent of the variation in stock prices in the long term.

Taking into consideration combined effect of exchange rate volatility and oil price shocks, Lawal, et al 2016) examined the impact of both the exchange rate volatility and oil price volatility on stock market volatility in Nigeria. They employed EGARCH estimation techniques to ascertain if either the volatility in exchange rate, oil price volatility or both exerts on stock market volatility in Nigeria. Their result exposed that share price volatility is induced by both the exchange rate volatility and oil price volatility and it was recommended that policymakers should pursue policies that tend to stabilize the exchange rate regime on the one hand, and guarantee the net oil exporting position for the economy, that market practitioners should formulate portfolio strategies in such a way that volatility in both exchange rates and oil price will be factored in time when investment decisions are being made.

Adaramola (2017) examined the long-run and short-run dynamic effects of oil price on stock returns in Nigeria within the period of 1985 to 2009 using the Johansem Co-integration tests. The study found out that there is a significant positive stock returns to oil price in short run and negative effect of stock return to oil price in the long run. The study posited that variations in oil prices are explained by oil price volatility.

Uzo-Peters, Laniran and Adenikinju (2018) examined the impact of Brent oil price shocks on oil related stocks in Nigeria, using Vector Autoregressive (VAR) model with the impulse response function and the forecast variance decomposition error. Findings revealed that oil price shocks have negative effect on Nigeria oil and gas company stocks.

Studies particularly focused on the Nigeria stock markets reveal that asymmetric oil price changes tends to affect stock returns; nevertheless, the exact relationship depends on the sector. In particular, oil-related stock market sectors tend to appreciate in the event of a positive oil price change, whereas the

reverse holds for oil-intensive sectors (Babatunde et al. (2012); Dasauki, Awolaja and Oladapo(2019).

Gap Identified in Literature

From the review of existing literatures, the oil price volatility and stock market have been investigated across the globe, of which findings are mostly generalized on stock market return. Kilan and Park, 2009; Effiong, 2014; Ekong and Effiong, 2015; Ronald, 2012, Lawal et al, 2016). This study extends the existing literature in two distinct ways. First, the study provides, to the best of our knowledge, the first examination of the asymmetric effect of oil price volatility on stock market sector returns, concentrating on the exploration of the transmission of the effect of oil price volatility to sector price return and volatility. Since industries react differently towards oil price changes, this study analysed the impact of oil price volatility on sectoral stock returns (Banking Sector, Oil and Gas Sector stock return).
This study however bridge existing gap by examining the impact of oil price volatility on the Banking

Sector stock return and Oil & Gas Sector stock return using the Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model. Hence, this study identified sectoral and methodological gaps in literature.

3.0 Methodology

This study is carried out on the theoretical framework of the Irreversible Theory of Investment which postulated that uncertainty shocks (volatility) do not only inherently truncate investment decisions but also constrain firms' ability to re-deploy capital since it becomes largely irrecoverable once installed. This can be represented in a mathematical form;
Stock Index= f(oil price shocks)…… (1)
Where stock returns is given as:

$$rt = \ln\left(\frac{yt}{yt-1}\right) 100 \quad \text{.....(2)}$$

Where:
r_t= is the return of sectoral return at day t; yt=is the daily Sector Stock Index at day t;
y_t-1 - is the daily Sector Stock Index at day t-1;

Model Specification

A time series exhibiting conditional heteroscedasticity-or autocorrelation- in the squared series is said to have autoregressive conditional heteroscedastic (ARCH) effects. To test the probable existence of ARCH effects in the respective exchange rate series under consideration, the study will explore the ARCH Lagrangian Multiplier (LM) test procedure developed by Engle (1982) which begins with a univariate model as specified below:

rt = λ + X k I δrt-i+ εi;i = 1, ..., k, t = 1, .., T; ε1 ~ iid(0, σ2); |δt| < 1…… (3) where rt denote sectoral stock returns and is measure in this paper as:

$R\ BNK_t = 100 \times [\hat{}\ \log (BNK)]$ (4a)
$R\ OILG_t = 100 \times [\hat{}\ \log (OILG)]$ (4b)
rt = λ + £δr-i+ εi; i = 1,.., k, t = 1, .., T; ε1 ~ iid(0, σ^2); |δt| < 1

Where R BNKt in equation (2a) denotes Banking Sector return, while R OILt is Oil and Gas Sector return and ^ is a first difference operator.

In this section, we consider different plausible symmetric and asymmetric GARCH modeling frameworks to capture volatility and persistence in both the oil price and the stock markets. Starting with the symmetric GARCH model, our mean equation following the standard GARCH (1, 1) procedure is as follow:
$rt = \eta + \delta r_t\text{-}1 + \alpha_1 D_1,t + \alpha_2 D_2,t + \varepsilon t$

Where rt represents the Banking Sector return or Oil and Gas sector return as the case may be.

Di,t = $Oil_t \geq BKi$ and zero otherwise; BKi (i = 1, 2) denote the selected break dates. Given that εt = σtet, and et ~ (0, 1) However, while the mean equation (3) is applicable to all the models used in this paper,
The variance for the GARCH (1,1) model can be expressed as below:
$\sigma_t^2 = \alpha + \beta\varepsilon^2_{t-1} + y\sigma^2_{t-1}\text{-}$; α > 0, β≥ 0, y ≥ 0 (6)

Equation (3.4) typically expresses the conditional variance dependent on information about volatility observed in the previous period (the ARCH term, ε2

t-1) and forecasted variance from last period (the GARCH term,σ^2_{t-1}). The persistence of of is captured by $\beta + y$ and covariance stationarity requires that $\beta + y < 1$.

The model is consistent with volatility clustering where large changes in returns are likely to be followed by further large changes and small values of variance from last period will be followed by small values of conditional variance in current period (Mandelbrot, 1963). The pattern of the volatility clustering may vary if bad and good news are received.

Zivot (2008) argued that the signs of the residuals or shocks have no effect on conditional volatility in the basic GARCH model because the observed volatility in the previous period enters in squared value. The study also noted the fact that bad news (negative shocks) tends to have a larger impact on volatility than good news (positive shocks) of the same magnitude. In other words, volatility tends to be higher with negative shocks than with positive shocks. Black (1976) inferred that this effect increases the leverage effect and causes more volatility. Based on this conjecture, the asymmetric news impact on volatility is commonly referred to as the leverage effect. This asymmetric effects is demonstrated in this study with the use of EGARCH (1,1). The EGARCH model was developed by Nelson (1991) to specifically capture asymmetries in the volatility. It is typically represented as follows:

$\ln(\sigma^2 t) = \varphi + \psi$

4.0 Results And Discussion Of Findings

This section presents the results which include preliminary analysis such as the descriptive statistics, unit root test, and ARCH LM test. Also, the inferential statistics as well as the post estimation results were also presented, form which findings were discussed in line with the stated objectives.

Descriptive Statistics

The descriptive statistics results of the dependent and independent variables of the study were presented in table 1. Key figures, including Mean, Standard Deviation, Minimum and Maximum values are reported in order to give the overall description about data used in the model. The skewness, kutosis and the Jarque-Berra results were also presented in order to test for normality of data.

Table 1: Summary of Descriptive Statistics of Variables

	OILPRICE	BNK	OILGAS
Mean	81.26088	369.9488	303.7978
Median	78.67000	384.2300	312.4200
Maximum	128.1400	619.1400	525.2900
Minimum	26.01000	204.2500	143.3600
Std. Dev.	27.02435	75.03081	75.70631
Skewness	-0.077198	0.205841	-0.184841
Kurtosis	1.562084	2.856950	2.703871
Jarque-Bera	193.7196(0.000000)	17.59364(0.000151)	20.78109(0.000031)
Observations	2223	2223	2223

Source: Author's Computation, 2024

The OilPrice has daily average of 81.26, while the standard deviation stood at 27. 02 indicating a minimal variation from the period. The maximum OilPrice sector in a day is 128.14 and the minimum data is 26.01. The skewness has a negative value of -0.077198 which indicates the data are negatively skewed not normally distributed. Also, the kurtosis has a 1.5620 which equally indicates OilPrice is not normally distributed. Jarque-Bera statistic further confirms that the data is not normally distributed with its significant value is 193.71 and p-value of 0.000, indicating a rejection of null hypothesis of normality.

The Banking sector has daily average of 369.9488, while the standard deviation stood at 75.03081 indicating a minimal variation from the period. The maximum Banking sector in a day is 619.1400 and the minimum data is 204.2500. The skewness has a positive value of 0.205841 which indicates the data are normally skewed. Also, the kurtosis has a 2.856950 which indicates Banking is mesokurtic as the test is close to 3. However, Jarque-Bera statistic confirms that the data is not normally distributed with its significant value of 17.59 and p-value of 0.000151, indicating a rejection of null hypothesis of normality.

The OILGAS sector has daily average of 303.7978, while the standard deviation stood at 75.70631 indicating a minimal variation from the period. The maximum OILGAS sector in a day is 525.2900 and the minimum data is 143.3600. The skewness has a negative value of -0.184841 which indicates the data are negatively normally skewed. Also, the kurtosis has a 2.703871 which indicates OILGAS is mesokurtic. However, Jarque-Bera statistic confirms that the data is not normally distributed with its significant value of 20.781 and p-value of 0.000031, indicating a rejection of null hypothesis of normality

Unit Root Test

Table 2 Augmented Dickey Fuller Unit Root Test

Variables	t-stat	Critical value	P-value	Order of Integrtion
OilPrice	-46.05500	-3.433096	0.0001	1(0)
OilGas	-60.88136	-3.433096	0.0001	1(0)
Banking	-31.91563	-3.43309	0.000	1(0)

Source: Author's Computation, 2024

The test statistics of the estimated coefficient of Yt was used to test the null hypothesis that the series is non-stationary (has unit root). If the absolute value of the test statistics is higher than the absolute value of the critical T value (which could be at 1, 5, or 10 percent) then he series is said to be stationary, therefore we reject the null hypothesis, otherwise it has to be differentiated until is stationary.

The Unit Root result showed evidence of presence of stationarity, as all the variables were stationary at level.

ARCH LM Test

Essentially, Engle (1982) proposes three steps for the implementation of ARCH test: the first step is to estimate OLS and obtain the fitted residuals; the second step is to regress the square of the fitted residuals on constant and lags of the squared residuals, i.e., estimate equation (1) below:

$$\varepsilon^2_t = \rho_0 + \rho_1\varepsilon^2_{t-1} + \rho^2\varepsilon^2_{t-2} + \text{----------} + \rho_p\varepsilon^2_{t-p} + \mu_t;$$

and the third and final step is to use the LM test option to evaluate the validity or otherwise of the null hypothesis of no ARCH effects,

H_0: $\rho_1=\rho_2=$ --------- $P_p=$

Table 3: ARCH LM TEST

OILPRICE			
F-statistic	60.55376	Prob.F(1,2220)	0.0000
Obs*R-squared	58.99902	Prob. Chi-Square(l)	0.0000
BANKING			
F-statistic	145809.0	Prob.F(1,2220)	0.0000
Obs*R-squared	2188.677	Prob. Chi-Square(l)	0.0000
OILGAS			
F-statistic	74334.88	Prob.F(1,2220)	0.0000
Obs*R-squared	2157.565	Prob. Chi-Square(l)	0.0000

Source: Author's Computation, 2024

Table 3 presents results of the ARCH LM test for the Oil Price and other Sector Indices. In the case of OilPrice, the Obs*R-squared statistic which is Engle's LM test statistic shows a value of 60.55376 and has a probability limit of 0.000. Similarly, obs*R-squared for Banking sector is 2188.677 and has a probability limit of 0.000. Other sector return equally has significant probabilistic. This clearly suggests that we reject the null hypothesis of homoscedasticity and confirm the presence of ARCH effects in all the data variable series. Thus, this necessitates the modelling of oil price volatilities under symmetric and asymmetric scenarios in all the markets for better understanding of oil price dynamics for meaningful policy formulation and investment decisions.

The Information Criteria for Model Selection

Presented in table 4 is the information criteria for model selection which shows Akaike, Schwarz and Hann-Quinn information criteria for the banking and oil sector on models such as GARCH, TGARCH and EGRACH. The result revealed that EGARCH is the most appropriate model to extract volatility of the data series of stock returns for both sectors. This is evident from the fact that all information criteria have least values for EGARCH than the values for TGARCH and GARCH.

Table 4 Information Criteria for Model Selection

Sector	Info Criterion	Garch	Tgarch	Egarch
Banking	Akaike	10.10642	10.10660	10.08838
	Schwarz	10.11926	10.12200	10.10378
	Hannan-Quinn		10.1 1222	10.09400
Oil Sector	Akaike	10.08916	10.08916	10.05646
	Schwarz	10.10199	10.10457	10.07186
	Hannan-Quinn	10.09384	10.09479	10.06208

Source: Author's Computation, 2024

The results in Table 3 and 4 are suggestive of extracting the volatility series of stock returns and carrying out volatility and persistence asymmetry effect of oil price on the banking and oil sector stock returns in Nigeria, through the Exponential GARCH (EGARCH) model. The volatility series generated for oil price and stock returns of each of these sectors are presented in figure I to reveal the existence of volatility and persistence asymmetry effect in each of the variables.

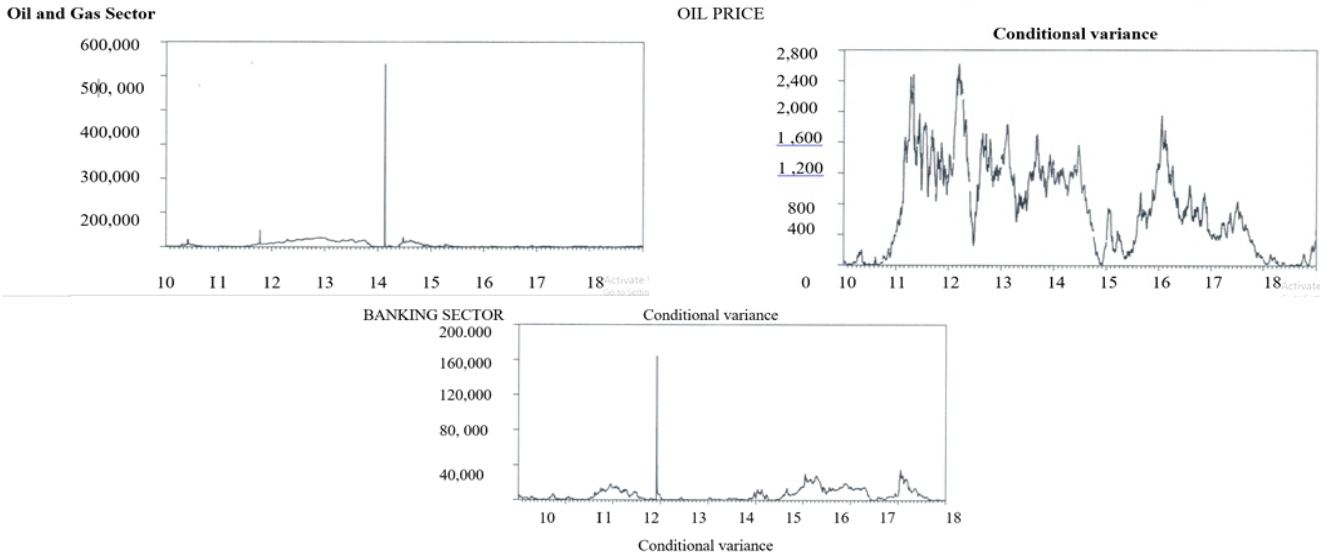

Fig 1. Volatility Series of Oil Price and Sector Stocks Returns in Nigeria

The volatility series presented in figure 1 above showed that there is evidence of volatility in each of the sector stock returns. In addition, oil price showed evidence of more pronounced volatility persistence within the period. Haven confirmed the existence of volatility in oil price and stock returns, the results of the volatility models are presented in Table 5 and 6 respectively.

1. Volatility persistence of Oil Price on Oil and Gas sector stock returns.

This subsection presents the result of EGARCH model employed to investigate the volatility persistence and asymmetry effect of oil price on stock return of the banking sector and the oil sector. The ARCH results presented in Table.3 indicates that there is presence of ARCH effect in the banking and the oil and gas sector, and here is presence of volatility in both sectors. We therefore proceed to investigating volatility persistence in the two markets

Table 5: EGARCH (1,1) Model Results- OilGas Sector

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob
c	-0.001567	9.93E-05	-15.78196	0.0000
OILPRICE	-0.061362	0.003217	-19.07149	0.0000
Variance Equation				
Constant	-8.609111	0.181927	-47.32186	0.0000
Innovation	1.489485	0.025677	58.00893	0.0000
Asymmetry	0.281344	0.026279	10.70598	0.0000
Leverage	0.210567	0.0191 13	11.01678	0.0000
Oil Price Volatility	4.88E-05	3.93E-05	1.240929	0.0214

Source: Author's Computation, 2024

The mean equation of the oilgas sector presented in table 4.5 revealed a statistically significant negative influence of oil price volatility on oil and gas sector volatility, this is shown by its very low p-value of 0.000.

The variance equation result revealed that constant, innovation, asymmetry and leverage are statistically significant with p-values of 0.000 each. The significant positive coefficient of information asymmetry indicates that there is evidence of information asymmetry, i.e. the effect of good news is significantly different from the effect of bad news, and that the good news exert great influence on the volatility of oil and gas sector return. The significant and positive effect of leverage effect indicates that past volatilities affect future volatility and increase in current volatilities also increases future volatilities. Also, the result showed that oil price volatility is statistically significant in influencing oil and gas sector return, this implies that increase or decrease in prices of oil affects the oil and gas sector returns

The answer to the question as to whether oil and gas sector return is more volatile after bad or good news (negative or positive shocks) is provided by the sign and significance of the coefficients of asymmetry in the table 4.5 above. The coefficient of asymmetry for EGARCH (1, l) in Table

4.5 is positive and statistically significant. This suggests that in the oil price market, positive shocks have the penchant of increasing volatility more than negative shocks of the same magnitude. In other words, good news in the oil price markets has more propensity of increasing oil and gas sector return volatility than bad news. Hence, the study rejects the null hypothesis that there is no volatility persistence effect of oil price on oil and gas sector stock returns.

Volatility persistence of Oil Price on Banking Sector Stock Returns.

Table 6 EGARCH (1,1) Model Results- Banking Sector

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob
c	0.000129	0.000135	0.952004	0.341 1
c_oilprice	0.031638	0.005274	5.998481	0.0000
Variance Equation				
Constant	-4.698805	0.219818	-21.37592	0.0000
Innovation	0.823514	0.034093	24.15507	0.0000
Asymmetry	-0.191258	0.023037	-8.302270	0.0000
Leverage	0.586797	0.021970	26.70848	0.0000
Oil Price Volatility	5.69E-05	2.43E-05	2.337621	0.0194

Source: Author's Computation, 2024

The mean equation of the banking sector presented in table 4.6 revealed a statistically significant influence of oil price volatility on the banking sector return, this is shown by its very low p-value.

The variance equation result revealed that the constant, innovation, information asymmetry and leverage are statistically significant with p-values of 0.000 each. This further buttress the fact that there is ARCH effect in the banking sector stock returns and also indicates that there is presence of information asymmetry and that past volatilities influence current volatilities. The significance and the positive coefficient of innovation is consistent with the outcome of the ARCH effect conducted earlier. The significant negative coefficient of information asymmetry indicates that there is evidence of information asymmetry, i.e. negative shock has a greater impact on volatility rather than the positive shocks of the same magnitude. This implies that investors are more prone to the negative news in comparison to the positive news. The significance and positive effect of leverage effect indicates that past volatilities affect future volatility and increase in current volatilities also increases future volatilities. Also, the result showed that oil price volatility is statistically significant in influencing banking sector return, this implies that increase or decrease in prices of oil affects the banking sector returns.

The answer to the question as to whether banking sector return is more volatile after bad or good news (from the oil price) (negative or positive shocks) is provided by the sign and significance of the coefficients of asymmetry in the EGARCH model. The coefficient of asymmetry for EGARCH (1,1) in Table 4 is negative and statistically significant. This suggests that in the oil price market, negative shocks have the penchant of increasing volatility more than positive shocks of the same magnitude. In other words, bad news in the oil price markets has more propensity of increasing banking sector return volatility than good news. Hence, the study rejects the null hypothesis that there is no volatility persistence effect of oil price on banking sector stock returns.

Post Estimation Test

Table 7 Correlogram Squared Residuals for Autocorrelation - EGARCH

	Oil and Gas		Banking	
Lag	Q-Stat	Prob*	Q-Stat	Prob*
1			0.0761	0.783
2	0.0269	0.870	0.2034	0.903
3	0.0422	0.979	0.2240	0.974
4	0.051 1	0.997	0.2751	0.991
5	0.0552	1.000	0.2751	0.998
6	0.0589	1.000	0.2784	1.000
7	0.0604	1.000	0.3059	1 .ooo
8	0.0620	1.000	0.3121	1 .ooo
9	0.0981	I .OOO	0.3282	1.000
10	o. 1039	1.000	O.3484	1.000

Source: Author's Computation, 2024

Table 7 above presents the correlogram squared residual result to test for autocorrelation in the residuals of the EGARCH models. The Q-statistics and respective p-values for different lag periods up to 10 lags are reported for the oil and gas sector and banking sector respectively. Results showed that, none of the Q-statistics reported is statistically significantly. This is shown by their low statistics and high p-values. This indicates non-rejection of null hypothesis which states that there is no serial correlation in the residuals for each lag period. Therefore, there is absence of serial correlation in the models.

Discussion Of Findings

The study provide evidence of volatility persistence of oil price to banking and oil & gas sector return and found significant evidence of volatility persistence of oil price on the two sectors.

Study revealed strong evidence of volatility persistence of oil price on banking sector stock returns in Nigeria. This can be associated to the effect of oil price fluctuation on oil and gas sector production and prices, which often affects the banking sector non -performing loans and thus their profitability. This is contrary to the findings of Babatunde and Adenikiju (2012) and Musa Dasuki, 2019, who posited that there is no evidence of short-run and long-run asymmetry between positive and negative oil price shocks and stock prices in Nigeria. This study found that there is significant volatility asymmetry effect of oil price on the oil and gas sector. This phenomenon may be true as an increase in the oil price (i.e., cost of energy) may result in a reduction in the amount of consumption, or an increment in the total cost of production. In both cases, the earnings of oil consumers will be adversely affected. Anyalechi et al. (2019) argued that the spillover analysis of crude oil transmission showed that the oil futures have a matching volatility on th e stocks of some oil sectors and a volatility-dampening effect on the stocks of others.

On the other hand, oil price fluctuation exerts a significant impact on the shares of financial institutions, particularly banking sector. Oil price volatility affects bank profitability directly via increased oil-related lending, business activity or excess liquidity in the banking system. The study found a significant volatility persistence effect of oil price on banking sector return, such that bad news in the oil price markets has more propensity of increasing banking sector return volatility than good news. This phenomenon may be caused by various issues faced by banks such as revenue shortfalls, increase in their non-performing loans, layoff of staff, decrease in the bank deposit base, deterioration of the bank's asset quality, and reduction in the volume of transactions.

Our findings aligns with the findings of Park and Rattia (2007) who posited that, oil price volatility exerts a significant impact on the stocks of financial institution.

5.0 Summary Conclusion and Recommendations

Summary

This study empirically examined oil price volatility on the banking sector and oil & gas sector return in Nigeria. The study used daily sector returns of each of the selected stock returns as the dependent variable following the Irreversible Theory of Investment, and the oil price volatility generated from the EGARCH series as the explanatory variable.

The study carried out descriptive statistics to test for normality of the data and unit root test using Augmented Dickey Fuller to check for stationarity of the data. In addition, the study carried out ARCH LM test to check for existence of volatility among the variable of concern and lastly the study made use of EGARCH model based on the information criteria for model selection to carry out the volatility persistence of oil price on sector returns of the banking and oil and gas sector.

The estimation results show evidence of volatility persistence of oil price on ba nking sector return and oil & gas sector return. We also found evidence of leverage effects in both models; oil prices and oil sector return; oil price and banking sector return, indicating how investors in the stock market react to news. Specifically, we found that bad news in the oil market has the potential of increasing volatility in the banking sector than good news. Comparatively, good news in the oil market has the potential of increasing volatility in the oil and gas sector than bad news. More specifically, the EGARCH model gives the best fit and therefore, we propose that it should be considered when dealing with oil price volatility.

Conclusion

Based on our findings, the study concluded that, volatility persistence effect of oil price on oil and gas

sector return is significant and prominent. This could be as a result of an increase in the oil price (i.e., cost of energy), which may result in a reduction in the amount of consumption, or an increment in the total cost of production. Also, volatility persistence effect of oil price is prominent on the banking sector return. This can be attributed to the effect it has on bank profitability directly via increased oil-related lending, business activity or excess liquidity in the banking system.

A measure of volatility in oil price provides useful information to actors in the market particularly about the uncertainty or risk in the market. To the oil dependent nations, variability in the oil price implies huge losses (gains) and therefore, lower revenue (higher reserves) to meet developmental goals. As a profit maximizing investor also, particularly where such an investor is risk averse, the incidence of persistent high volatility may influence diversification of portfolio in favour of less risky assets. Thus, examining the volatility of oil price on sectoral stock return has some policy relevance and that was the motivation for this study. The study also concluded that, past volatilities of the banking sector and oil and gas sector affects present volatilities. In addition, asymmetry information particularly the impact of bad news in the oil market exert great influence on the banking sector returns in Nigeria

Recommendations

Based on the foregoing conclusions, we recommend that management of listed oil and gas companies in stock market should closely monitor the exposure of their companies to the oil prices fluctuation by diversifying their investment and take appropriate measures to curtail against systematic risk in the sector. Study also recommends that tying bank capitalization to oil price shocks can help to mitigate procyclical bank lending and allow banks to use their capital cushions created during boom periods for lending purposes during downturns.

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