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Oil Price Volatility and the All-share Index: Evidence from Nigeria

[*I] Kanu, Success Ikechi (PhD), [2]Nwaimo, Chilaka Emmanuel (PhD) and [3] Chimezirim Augustina Ogechi
[*1&3] Department of Financial Management,
[2] Department of Management Technology
School of Management Technology.
Federal University of Technology, Owerri , P.M.B 1526, Owerri, Imo state. Nigeria.

ABSTRACT
Oil price is one of the most important economic factors directing the world economy. This is even more pronounced for the Nigerian economy that relies heavily on crude oil export revenues. A change in oil price is expected to impact on all her economic frontiers. Thus, the aim of this study is to investigate the effect of global oil price changes on All share index of the Nigerian Stock exchange. Relevant data for the estimation were obtained from Central Bank of Nigeria's data base ranging from the period January, 2006 to December,2015, making for an equal 120 observations. The end of month values of the All-share index , which is value weighted constitutes all trading securities on the stock market, These were related with the prevailing price of oil at the global market for the corresponding periods. A combination of preliminary analysis, short run and long run models were generated in this investigation. The paper established that, while the trace and max Eigen value tests indicates a case of no co-integration, the causality test reveals that none of the variables granger cause each other. The impulse–response function indicates that , on the average, All Share Index was feeding on itself . Variance Decomposition analysis shows that at a 10 year horizon, 97.36% of the variance in All Share Index are explained by their own shocks. While the VAR estimates suggest that All share index responds to fluctuations in the global pricing of oil overtime; the ARCH model of order 1 indicates the presence of volatility clustering on the All share Index. On the other hand, coefficients of ARCH , GARCH and ASSYMETRIC GARCH terms did not satisfy the decision rules but probability of the GARCH in Mean Term did, suggesting that oil price volatility affects returns on All share index of the Nigeria stock exchange at 1% Alpha level. Based on the findings of study, we conclude that investors purposing to invest in the Nigerian stock market should do so with some bit of caution seeing that outcome of some of the tests were at variance with each other. They did not all provide, a satisfactory and predictive information on the trading position of the Nigerian All share index. This simply infers that, to some extent, the global price of oil should be taken cognizance of while predicting the price of stocks in the Nigerian stock market. It is expedient we state here that, the efficiency of capital markets are measured by the ability of securities to reflect and incorporate all relevant information almost instantaneously , in their prices. In other words, how responsive the Nigerian Stock market is to information, will determine the rate at which volatility in the global pricing of crude oil will affect the pricing of stock and by extension value of the All share index. Capital markets have been found to be fairly efficient in the advanced economies as well as in a number of emerging capital markets. We therefore recommend that the Nigerian Securities and Exchange Commission, should strive to make the Nigerian capital market as efficient as possible
Keywords: Nigerian Stock Market , All-share Index, Efficient market, Crude oil price, Oil price volatility.

1.0 Introduction:

Crude oil is one of the most actively traded commodities in the world. Petroleum still remains the primary energy source for transportation and manufacturing industries. For this reason, oil price movements may impose significant influence on economic situation in different countries.

According to Hamilton, 1983 and Wakeford, 2006 as quoted by Dada (2011), oil price volatility is predominantly defined with respect to price fluctuations resulting from changes in either the demand or supply side of the international oil market . These changes are unexpected and unpredictable and have been traditionally traced to supply side disruption such as OPEC supply quotas, and political upheavals in the oil-rich Middle East. At our local scene in Nigeria , it might be attributed to the activities of militant groups in the Niger Delta region . The shock could be positives (a rise) or negatives (a fall) in price. Two issues are involved here , first is the percentage increase and second is the timing of the shocks, that is, the speed and persistence of the price increase. It is important to note that oil price shocks are mainly unanticipated fluctuation in oil price above a certain percentage that is considered normal.

On the other hand, stock values ideally, reflect the market's best estimate of the future profitability of firms. Asset prices are the present discounted value of the future net earnings of firms. Thus, the effect of oil price shocks on the stock market is a meaningful and useful measure of their economic impact. Furthermore ,

both the current and the expected future impacts of an oil price are expected to reflect on stock prices and returns(Jones et al 2004).

Nigeria as a sovereign nation is vulnerable to fluctuations in international oil market despite its being one of the leading producers of oil in the world. This is given the fragile nature of her economy that is heavily dependent on crude oil proceeds. It is generally argued that for net oil-exporting countries, a price increase directly increase real income through higher export earnings. though part of this gain would be later offset by losses from lower demand for exports generally due to the economic recession suffered by trading partners and the Dutch disease problem which diversely affects the term of trade (Bartlett).

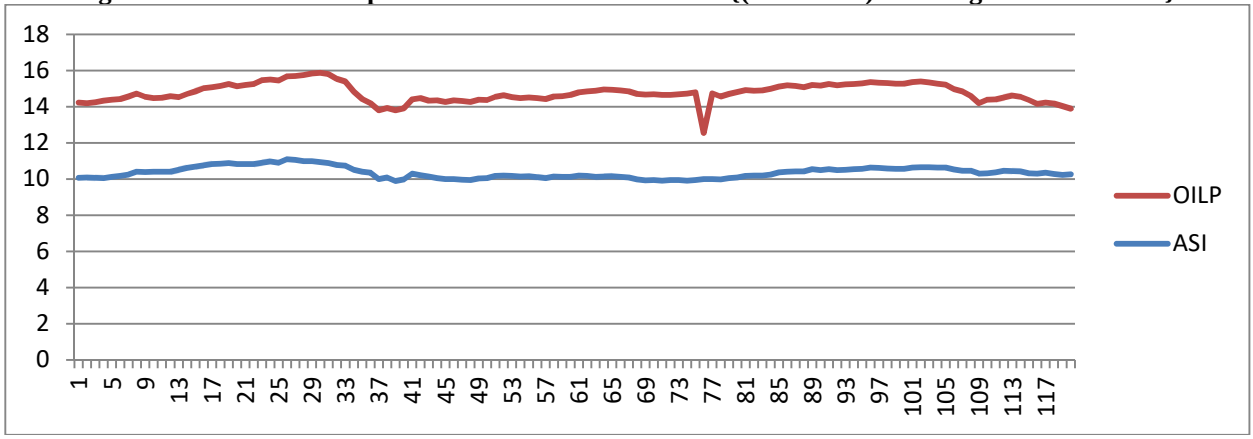
Despite the many debates on the effect of oil price volatility, extant studies show, however, that there is still no consensus as to the exact effects of oil price volatility on economy (Schmidbauer and Kalaycioglu, 2008). The identification of the forces that drive stock returns and the dynamics of their associated volatilities is a major concern in current empirical works (Giovannini et al, 2004). While there is strong presumption in the financial press that oil prices drive the stock market, the empirical evidence on the impact of oil price shocks on stock prices has been mixed (Kilian and Park, 2007). Recent empirical research has found evidence of a relationship between oil price movements and stock prices (Sadorsky, 2008). For instance, findings by Aloui and Jammazi (2009) show that rises in oil price play a significant role in determining both the volatility of stock returns and the probability of transition across regimes (Ogiri et al,2013).

The above empirical findings notwithstanding, some scholars have maintained that fluctuations in oil prices do not have any relationship with stock market performance. In a study of 22 emerging economies (Nigeria not included), Maghyereh (2004) findings imply that oil shocks have no significant impact on stock index returns in emerging economies.

Agren (2006) as cited by Ogiri et al(2013) argued that the stock market's own shocks, which are related to other factors of uncertainty than the oil price, are more prominent in explaining stock price movements. While some authors have maintained that it is not in all stock volatility cases that are oil price change- induced, Fisher (2005) in his (Stop fretting about oil) study of investment analysis quipped: “Don't believe these stories. There is no connection between the two..... So why do we hear so often something like the market fell today because oil rose”. Fisher (ibid) further reiterated that there is no credible cause - and-effect relationship between oil and stocks, and so investors should buy good stocks and hold them irrespective of what he calls investor sentiment as measured by the “Investors intelligence” data. From the forgoing introduction , it has become expedient that we ascertain if fluctuations in the global pricing of crude oil affects the pricing and sale of stocks at the Nigerian stock market.

A review of crude oil prices within the last decade indicates that, oil prices increased on the average from US$ 25 per barrel in 2006 reaching a record nominal high of US$ 147 in mid -2008 and a sharp drop to US $46 a barrel in 2009. Again, between February, 2011 and August 2014, the price of oil increased tremendously. It maintained an all time high of US$128 in March 2012. As at December , 2015, the Bonny light oil price came down to so low as USD37.80 per barrel. On the other hand , the All share index witnessed a boost from 26,010.8 points in February 2011 to 41,532.3 points in August 2014. It maintained an all time high of 42,482.5 points in June 2014. As at December, 2015, the all share index stood at 28,642.3 points.(www.cenbank.org). Apparently from figure 1.1 below , it appears there might be a relationship between the duo .

Figure 1.1 : Trend of oil prices and The All- share index{(2006-2015) - In a logarithmic format}



Source: www.cenbank.org /

It is against the above backdrop that this study is set to analyze crude oil price volatilities and the impact it has on the pricing of stocks at the Nigerian Stock market. A study on this discuss has attracted a plethora of studies in recent times. See Ukweni(2011) and Asaolu and Ilo (2012) . Others are Ogiri et al (2013), Okany(2014), Akinlo (2014),, Uwubanmwen and Omorokunwa(2015) and Ekong and Ekong (2016). While some of the studies concentrated on the relationship between oil price volatility and macro economic variables; others dwelt specifically on the impact of oil price fluctuations on the trading positions and performances of the Nigerian stock market.

Centrally, this study is intended to ascertain the impact of oil price volatility on the pricing of stocks on the Nigerian stock market . It will investigate the relationship between fluctuations in the global pricing of Bonny light crude oil and the All-share index at the Nigerian stock exchange

This study is significant as it will examine in detail, the impact of oil price volatility on the All share index for the period 2006 to 2015. It will inform policy decisions and assist investors purposing to invest on stocks to ascertain if an enabling environment exists on the floor of the stock market in times of oil price fluctuations and to appraise the associated risks or otherwise in the ensuing scenario.

The study is bound to generate interests and debates on the impact of oil price volatility for net oil exporting countries. Hence it will also serve as reference materials for future and further works in this area. It will also provide basis for further comparative studies, on both the stock markets of oil exporting and importing nations.

The study will also add to the existing stock of knowledge on the subject matter. It will also help to educate the general public, investors , stock brokers and students alike. The study is limited only to the Nigerian context and the period of investigation is delineated, from January2006 – December 2015; a period of 120 months or (Ten) years.

2.0 CONCEPTUAL FRAMEWORK

The conceptual framework of this study was based on the variables under study.

2.1 The meaning of NSE All-share Index

Market index is a quick measure to judge the overall direction of the market and the scope of its movements. Even in the most bullish or bearish markets, you are likely to see stocks that their prices do not move in the same direction with the overall market trend. On a typical trading day, prices of various stocks will move in different directions, some gaining and others losing. Given that scenario, it would be difficult ordinarily to readily make a judgment as to overall market direction without complex on-the-spot calculations. That's where a ready market price index comes handy.

A market index is a statistical parameter to reflect the composite value of a market characteristic. When it is the price, we have a price index, which is an attempt to represent the overall price performance of the market with one statistic - the index value. In effect, the index is calculated in a way that makes it generally representative of the market. In all cases, effort is made to use a basis that best achieves the intended purpose. Usually, that entails some weighting of the individual components. If, for instance, we sum up the prices of all stocks, that will produce a statistic. However, that will not reflect the strength of each company. A weighting with market capitalization would produce a capitalization-weighted index that reflects company capitalization. On the basis, there are price-weighted, capitalization-weighted and even share-weighted indices.(NSE Fact book-2015)

An index can be representative of the entire market - like the NSE all-share index - or just for a section - like tech stocks or top 100 most capitalized stocks or whatever. Only that the basis should be known.

The NSE All-share Index is a total market (broad-base) index, reflecting a total picture of the behaviors of the common shares quoted on the Nigerian Stock Exchange. It is calculated on a daily basis, showing how the prices have moved. It started in January 1984, the base year, with a value of 100 and has now risen beyond the 6,000 mark. (Smartproinvesting.com, 2007).

2.2 The Nigerian Stock Exchange (NSE)

The Nigerian Stock Exchange (NSE) was established in 1960 as the Lagos Stock Exchange. In 1977, its name was changed from the Lagos Stock Exchange to the Nigerian Stock Exchange. As at March 7, 2017, it has 176 listed companies with a total market capitalization of about N8.5 trillion. All listings are included in the Nigerian Stock Exchange All Shares index. In terms of market capitalization, the Nigerian Stock Exchange is the third largest stock exchange in Africa.

History

Operations on the floor of the Nigerian Stock Exchange began officially on August 25, 1961 with 19 securities listed for trading but informal operations had commenced earlier in June, 1961. Operations were initially conducted inside the Central Bank building with the exchange having four firms as market dealers: Inlaks, John Holt, C.T. Bowring and ICON (Investment Company of Nigeria]]. The volume for August, 1961, was about 80,500 pounds and it rose to about 250,000 pounds in September of the same year with the bulk of the

investments in government securities. In December 1977 it became known as The Nigerian Stock Exchange, with branches established in some of the major commercial cities of the country.

Operation

The NSE is regulated by the Securities and Exchange Commission, which has the mandate of Surveillance over the exchange to forestall breaches of market rules and to deter and detect unfair manipulations and trading practices. The Exchange has an automated trading System. Data on listed companies' performances are published daily, weekly, monthly, quarterly and annually.

The Nigerian Stock Exchange has been operating an Automated Trading System (ATS) since April 27, 1999, with dealers trading through a network of computers connected to a server. The ATS has facility for remote trading and surveillance. Consequently, many of the dealing members trade online from their offices in Lagos and from all the thirteen branches across the country. The Exchange is in the process of establishing more branches for online real time trading. Trading on The Exchange starts at 9.30 a.m. every business day and closes at 2.30 p.m.

In order to encourage foreign investment into Nigeria, the government has abolished legislation preventing the flow of foreign capital into the country. This has allowed foreign brokers to enlist as dealers on the Nigerian Stock Exchange, and investors of any nationality are free to invest. Nigerian companies are also allowed multiple and cross border listings on foreign markets.

Pricing

The Nigerian Capital Market was deregulated in 1993. Consequently, prices of new issues are determined by issuing houses and stockbrokers, while on the secondary market prices are made by stockbrokers only. The market/quote prices, along with the All-Share Index plus NSE 30 and Sector Indices, are published daily in The Stock Exchange Daily Official List, The Nigerian Stock Exchange CAPNET (an intranet facility), newspapers, and on the stock market page of the Reuters Electronic Contributor System.

Regulation

The NSE is regulated by the Securities and Exchange Commission, which has the mandate of Surveillance over the exchange to forestall breaches of market rules and to deter and detect unfair manipulations and trading practices. The exchange has an automated trading System. Data on listed companies' performances are published daily, weekly, monthly, quarterly and annually.

Transactions on The Exchange are regulated by The Nigerian Stock Exchange, as a self-regulatory organization (SRO), and the Securities & Exchange Commission (SEC) – apex regulator, which administers the Investments & Securities Act of 2007.

The All-Share Index

The Exchange maintains an All-Share Index formulated in January 1984 (January 3, 1984 = 100). Only common stocks (ordinary shares) are included in the computation of the index. The index is value-weighted and is computed daily. The highest value of 66,371.20 was recorded on March 3, 2008. Also, The Exchange has introduced the NSE-30 Index, which is a sample-based capitalization-weighted index plus four sectoral indices. Similarly, five sectoral indices have been introduced to complement existing indices. These are NSE-Food/Beverages Index, (Later renamed NSE – Consumer Goods Index) NSE Banking Index, NSE Insurance Index, NSE Industrial Index and NSE Oil/Gas Index.

On the flip side of this study is the concept of oil pricing. We intend to briefly review this below:

2.3 The Price of crude oil

The price of crude oil, or the oil price, generally refers to the spot price of a barrel of benchmark crude oil a reference price for buyers and sellers of crude oil . There is a differential in the price of a barrel of oil based on its grade determined by factors such as its specific gravity or API and its sulphur content and its location for example, its proximity to tidewater and/or refineries. Heavier, sour crude oils lacking in tidewater access are less expensive than lighter, sweeter oil.(www.wikipaedia)

Trend of oil pricing

From 1999 till mid 2008, the price of oil rose significantly. It was explained by the rising oil demand in countries like China and India. In the middle of the financial crisis of 2007–2008, the price of oil underwent a significant decrease after the record peak of US$147.27 it reached on July 11, 2008. On December 23, 2008, WTI crude oil spot price fell to US$30.28 a barrel, the lowest since the financial crisis of 2007–2010 began. The price sharply rebounded after the crisis and rose to US$82 a barrel in 2009. In July 2008 oil reached a record peak of US$147.27 but by February 2009 it sank beneath $40 a barrel. On 31 January 2011, the Brent price hit $100 a barrel for the first time since October 2008, on concerns about the political unrest in Egypt. For about three and half years the price largely remained in the $90–$120 range. In the middle of 2014, price started declining due to a significant increase in oil production in USA, and declining demand in the emerging countries. The oil glut—caused by multiple factors—spurred a sharp downward spiral in the price of oil that continued through February

2016. By February 3, 2016 oil was below $30—a drop of "almost 75 percent since mid-2014 as competing producers pumped 1-2 million barrels of crude daily exceeding demand.

2.4 The causes of oil price fluctuations

There are two views dominating the oil market discourse. There are those who strongly believe that the market has undergone structural changes and that low oil prices are here to stay for a prolonged period. At the other end of the spectrum, there are those who think that this is yet another cycle and oil prices will recover sooner rather than later. These two scenarios – structural versus cyclical – reflect the high degree of uncertainty engulfing the oil market. This presupposes that we can separate neatly the cyclical from the structural, but this would be an oversimplification. All the factors discussed above have become intertwined and the response of one part of the system will affect the other parts. (www.Wikipaedia)

A 2016 survey of the academic literature finds that "most major oil price fluctuations dating back to 1973 are largely explained by shifts in the demand for crude oil". As the global economy expands, so does demand for crude oil. The authors note that the price of oil has also increased at times due to greater "demand for stocks (or inventories) of crude oil... to guard against future shortages in the oil market. Historically, inventory demand has been high in times of geopolitical tension in the Middle East, low spare capacity in oil production, and strong expected global economic growth." In particular, political events can have a strong influence on the oil price. Historical examples include OPEC's 1973 embargo in reaction to the Yom Kippur War and the 1979 Iranian Revolution...
The supply of oil is dependent on geological discovery, the legal and tax framework for oil extraction, the cost of extraction, the availability and cost of technology for extraction, and the political situation in oil-producing countries. Both domestic political instability in oil producing countries and conflicts with other countries can dis-stabilize the oil price. In 2008 the New York Times reported, for example, in the 1940s the price of oil was about $17 rising to just over $20 during the Korean War (1951–1953). During the Vietnam War (1950s – 1970s) the price of oil slowly declined to under $20. During the Arab oil embargo of 1973—the first oil shock—the price of oil rapidly rose to double in price. During the 1979 Iranian Revolution the price of oil rose. During the second oil shock the price of oil peaked in April 1980 at $103.76. During the 1980s there was a period of "conservation and insulation efforts" .Following the Persian Gulf crises and war there was a period of global recessions Although the oil price is largely determined by the balance between supply and demand—as with all commodities—some commentators have argued that the rise in oil prices prior to the financial crisis of 2007–2008 was due to speculation in futures markets (www.Wikipaedia)

2.5 Impact of declining price

A major rise or decline in oil price can have both economic and political impacts. The decline on oil price during 1985–1986 is considered to have contributed to the fall of the Soviet Union. Low oil prices could alleviate some of the negative effects associated with the resource curse, such as authoritarian rule, gender inequality etc. Lower oil prices could however also lead to domestic turmoil and diversionary war. The reduction in food prices that follows lower oil prices could have positive impacts on violence globally.
Research efforts have shown that declining oil prices make oil-rich states less bellicose. Low oil prices could also make oil-rich states engage more in international cooperation, as they become more dependent on foreign investments. (www.Wikipaedia)

2.6 Theoretical foundation

This includes the Market based, Exhaustible Resource and Capital Market Efficiency theories

Market Based Theory:

The theory is predicated on the basic economic principle of demand and supply. Here, prices at which goods are traded are determined by the interaction of the forces of demand and supply. In other words, supply and demand is mutually determined by the price at which sellers are willing to supply just the amount of a good that buyers want to buy. The price established by the interaction of the forces of demand and supply which satisfies simultaneously both sellers and buyers is known as the equilibrium price while the quantity traded at this price is called the equilibrium quantity(Owuamanam,2016)

Exhaustible Resource Theory,

This theory recognizes that oil and other exhaustible resources are only temporarily available, and as such its price should be treated as user cost or depletion charge, which compensates future generations for a denial of access to the product. Capital Replacement Approach (CRA) is based on the principle of cost recovery, covering

production and refining. At the minimum, the price is expected to be consistent with the cost of replacing capital in the production process. (Kanu and Nwaimo,2016)

Capital Market Efficiency Theory

This may be defined as the ability of securities to reflect and incorporate all relevant information, almost instantaneously, in their prices. In finance theory, there are three forms of capital market efficiency. They are : The Weak –form , Semi strong form and Strong form of efficiency. They are briefly discussed below:

Weak form of market efficiency.

The security prices reflect all past information about the price movements in the weak form of efficiency. It is therefore not possible for an investor to predict future security price by analyzing historical prices and achieve performance(returns) better than the stock market index such as the All share index of the Nigerian stock exchange. This is so because the capital market has no memory and the all share index has already incorporated past information about security prices in the current market price.

Most empirical tests have shown that that there exists serial independence between the security prices overtime. In other words, share prices behave randomly. Hence the weak form of efficiency is referred to as the random walk hypothesis

Semi strong form of efficiency

Here, the security prices reflect all publicly available information. This implies that an investor will not be able to outperform the market by analyzing the existing company related or other relevant information available in say annual accounts, or financial dailies/ magazines. The semi strong efficient market hypothesis implies that the share price reflects an event or information very quickly and therefore, it is not possible for an investor to beat the market using such information.

Strong form of efficiency

In the strong form of efficiency, the security prices reflect all published and unpublished, public, and private information. This is a significantly strong assertion and empirical studies have not borne out the validity of the efficient market hypothesis in the strong form of efficiency, as people with private or insider information have been able to outperform the market.

Evidently, we have seen that market efficiency refers to information efficiency. Capital markets have been found to be fairly efficient in the advanced economies as well as in a number of emerging capital markets. At this stage it behooves of us to ask if these markets are perfect markets as well. A perfect market envisions more stringent conditions and the following are the attributes of a perfect market: There are no entry barriers, a large number of buyers and sellers and divisibility of financial assets. Others are the absence of transaction costs , no tax differences and a free trade in securities..In practice , capital markets have imperfections, thus an efficient market may not be perfect.(Pandy,2007)

It is expedient we state here that ; how efficient or responsive the Nigerian Stock market is to information will determine the rate at which volatility in the global pricing of crude oil will affect the pricing of stock and by extension value of the All share index at the floor of the Nigerian stock market (Pandy,,2007)..

2.7 Empirical Review

Asaolu and Ilo (2012) posit that oil prices and the Nigerian stock market return are tied together in the long run ; given the dominance of the oil sector on the Nigerian economy. However, contrary to expectation Nigeria, an oil exporting country still experiences the golden rule of “oil up, stock down” which should be applicable to oil importing countries. This may be an indication of the country’s failure to translate its huge foreign exchange earnings from oil into an improved industrial sector productivity

Adaramola (2012), asserted that variations in the Nigerian stock prices are explained by oil price volatility; while. Musibau, Adenikinju and Adenikinju(2013), are of the opinion that stock market returns exhibit insignificant positive response to oil price shocks but reverts to negative effects after a period of time depending on the nature of the oil price shocks..

Ogiri et al (2013), suggests that oil price changes are important factors in explaining stock price movement. Specifically, their findings shows that there are significant links between oil prices and stock market performance. This has implications for policy makers and stock market regulators on ways to achieve sustainable economic development in the long run

Okany (2014) recorded that oil price is a significant exogenous variable which could improve the accuracy of stock price prediction in the Nigerian stock market by an extent.

Akinlo O.O.(2014) suggests the existence of a long run relationship between oil price, exchange rate and stock market growth. A unidirectional causality runs from oil price change to stock market development. The impulse response function shows that oil price has a temporary positive impact on stock market. The Variance Decomposition analysis shows that stock market development to be very much dependent on shock on oil price change.

Akomolafe and Danladi (2014), asserted that the Nigerian economy is blighted by a series of instabilities, when there is a significant fluctuation in the international price of crude oil, thanks to the economy's over-reliance on the oil sector. Outcome of their study indicates that industries belonging to the aforementioned sectors, apparently were not directly affected by oil prices, and were also not sensitive to oil price changes. The banking sector responds mostly to change in oil price. The paper concludes with recommendation that policy makers have to take into cognizance the trend in oil prices in the formulation of policies that affect the stock market

Chaudary et al (2014) posit that share prices increase with oil price increase. They asserted that share prices of Nigerian companies respond positively to the world market and oil prices.

Uwubanmwen and Omorokunwa (2015) sought to estimate a model that will help explain the behavior of stock price volatility, movements in oil prices and real exchange rates in Nigeria using quarterly data from 1990 to 2012. Statistical and econometric techniques such as the Error Correction Mechanism (ECM) and the Bi-variate GARCH model were used to test for the relationships and to check if volatility in oil prices are transmitted to stock prices in Nigeria. The study showed that oil price volatility generates and stimulates stock prices volatility in Nigeria. The authors recommended that the excess crude oil revenues should be transform into physical capital and infrastructure rather than distribute the windfalls to the state and local government, a situation that ensures easy transmission of oil prices into the Nigerian economy.

Ekong and Ebong (2016) were of the opinion that there exists a causal relationship between oil price, stock market indicators and economic growth in a core oil dependent economy like Nigeria

Away from the Nigeria scene ; Imaghiagbe(2010) analyzed the impact of oil prices on stock prices of selected major oil producing and consuming countries namely Mexico, Russia, Saudi Arabia, India, China, and the US.. In all the countries reviewed , variance decomposition and impulse response tests confirm the existence of oil prices and exchange rates influences over stock prices.

Narayan and Narayan(2010) investigated the effects of oil prices on Vietnam stock exchange prices during the period 2000-2008. Outcome of the study revealed that stock exchange prices, oil prices and nominal interest rates are co integrated and boil prices have a significant effect on stock exchange prices in a positive direction.

Toraman, Basarir and Bayramoglu (2011), investigated the effects of crude oil price changes on sector indices of Istanbul Stock exchange. They were of the opinion that oil price is one of the most important economic factors directing the world economy as a small change in oil price has positive or negative effects on all the economic factors

Lastly, Fatima and Bahir (2014) , investigated the volatility of international oil prices and stock market of two emerging Asian markets namely China and Pakistan .Outcome of study indicates that oil prices impact negatively on the stock markets of these economies since they are oil importing and oil dependent nations.

So much has been said on the relationship between oil price changes and stock market volatility. This study is set to add to the existing body of literature on this subject.

3.0 Methodology

In order to realize the objective of this study, an econometric diagnostic procedure is adopted to understand the behavior of time series data before suitable model can be developed .The operationalization and analytical procedure is based on the following relationship model;

$ASI = f(OILP) + Et$ ..... Equation 1

Where ASI = All share index , $OILP$ = Global price of oil. and Et = Error term

3.1 Model Specification.

A functional model is specified for the time series data to determine the relationship between the global price of crude oil and the ALL share index at the Nigerian stock market i.e.

$\Delta ASI_t = \beta_1 + \beta_2 \sum_{t=1}^{n} OILP + \sigma 1 VAR(-1) + Et$ ..... Equation 2.

Where VAR(-1) is a VAR term and E is error term. The presumptive sign or apriori expectation for the models in equations 1 and 2 is that $\beta 1$ and $\beta 2 > 0$.The notations imply that an increase in oil prices may result in an increase in the position of the All share index at the Nigerian stock market .

The long run effects are captured through the coefficients of the independent variable. That is β_1 captures the impact while the coefficient of the VAR variable contains information whether the past values of variables affect the current values of the variables under the study. The size and statistical significance of the coefficients of the residual correction terms measures the tendency of the variable to return to the equilibrium(Lutlepohl,2005).

3.2 Justification of the chosen variables :

Crude oil price.

Crude oil price shocks could be defined as price fluctuations resulting from changes in either the demand or supply side of the international oil market. These changes are unexpected and unpredictable and have been traditionally traced to supply side disruption. The coefficient of oil price shocks β_1, is expected to be positive i.e. $\beta_1 > 0$

The All-Share Index

The Nigerian Stock Exchange maintains an All-Share Index formulated in January 1984 (January 3, 1984 = 100). Only common stocks (ordinary shares) are included in the computation of the index. The index is value-weighted and is computed daily. The highest value of 66,371.20 was recorded on March 3, 2008. Also, The Exchange has introduced the NSE-30 Index, which is a sample-based capitalization-weighted index plus four sectoral indices. Similarly, five sectoral indices have been introduced to complement existing indices. These are NSE-Food/Beverages Index, (Later renamed NSE – Consumer Goods Index) NSE Banking Index, NSE Insurance Index, NSE Industrial Index and NSE Oil/Gas Index.(Wikipedia, the free Encyclopedia) .
Coefficient of the All share Index β_2, is expected to be positive i.e. $\beta_2 > 0$

3.3 Apriori expectations

For the sake of clarity and in line with above justification of chosen variables, we hereby state precisely, the a priori expectations of this research: The coefficient of global oil price shocks are expected to be positive i.e. $\beta_1 (1=0) > 0$ implying that the All share index is expected to correlate positively with an global oil price shocks.

3.4 Estimation Procedure

This paper adopts technique to test for presence of stationarity at level order using time series properties of the variables subjected to Augmented Dickey fuller test statistic. That is followed up by preliminary tests consisting of descriptive statistics, correlation matrix, normality test and Breusch Pagan Godfrey Heteroskesdasticity tests; after which a performance co integration test to examine long run convergence of the variable equations were carried out. Next is the VAR model for multivariate analysis of the identity variable (OILP) on (ASI) to determine the level of relationship between the duo and to ascertain the significant level of OILP on ASI. The causal effect and significant relationship between OILP and ASI is determined by the granger causality test. A ten period Variance Decomposition and Impulse Response Analyses are investigated over the years of study. **Lastly i**n our analysis of oil price volatility on All Share index of the Nigerian Stock market, all variations in the ARCH /GARCH modeling approach will be pursued for an informed policy recommendation. All these models will be run on E views 7.0

4.0 Data Analysis , Results and Discussion

Data on the Nigerian stock market (All-share index) was obtained from the website of the Central Bank of Nigeria, taking end of month values of the index (ASI) which is value weighted and constitutes all traded securities. Scope of study was delineated from January, 2006 to December,2015 making for 120 Observations. Again the price of Bonny light crude oil was also obtained from the Central Bank of Nigeria data base ranging from the period January, 2006 to December,2015 .making for an equal 120 observations.
A combination of preliminary analysis, short run and long run models were generated in this investigation.

Unit root test

Variable	T-stat	Critical value at 1%	Critical value at 5%	Critical value at 10%	Order of co-integration	Sig.
OILP	-16.35	-3.49	-2.89	-2.58	I^{st} Difference	0.000
ASI	-3.89	-3.49	-2.89	-2.89	I^{st} Difference	0.0030

Source: E-views statistical version 7.0

This is carried out using Augmented Dickey fuller unit root tests to ascertain whether the data set are stationary or not and the order of integration. From the above table; the two variables namely oil price (OILP) and the All share Index(ASI), became stationary at first difference.

Descriptive Statistics

	OILP	ASI
Mean	86.98085	32851.47
Median	83.68000	29902.00
Maximum	138.7400	65652.40
Minimum	12.62200	19851.90
Std. Dev.	25.81770	10973.70
Skewness	-0.189323	1.009099
Kurtosis	2.145157	3.249923
Jarque-Bera	4.370649	20.67791
Probability	0.112441	0.000032
Sum	10437.70	3942177.
Sum Sq. Dev.	79319.87	1.43E+10
Observations	120	120

Source : E-views statistical package

While Oil price (OILP), averages 86.98 dollars. It ranges from 12.62 to 138.74 dollars with a standard deviation of 25.82. The All share index (ASI), averages 32,851.47points .It ranges from 19,851.90 to 65,652.40 with a standard deviation of 10,973. for the period under review

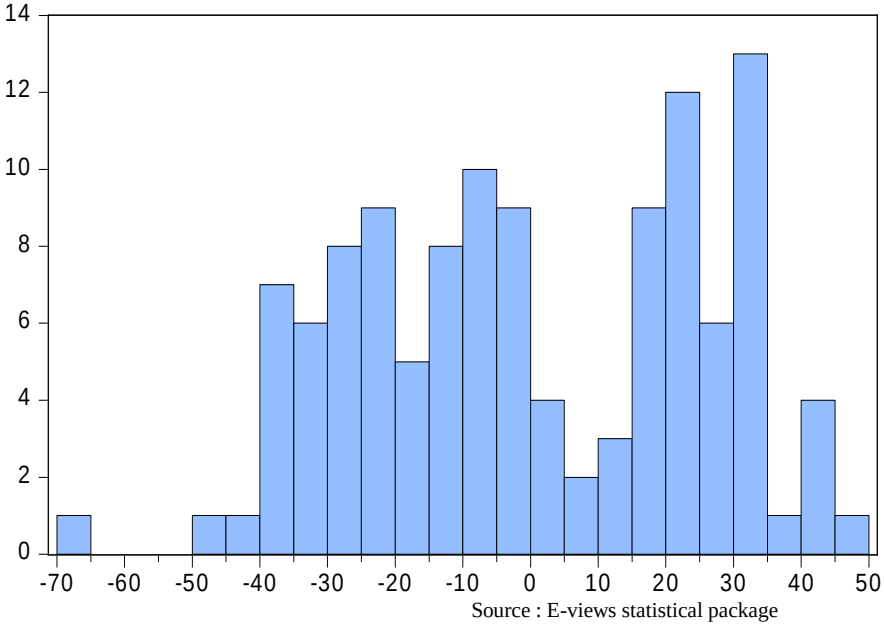
Correlation Matrix

	OILP	ASI
OILP	1	0.2071
ASI	0.2071	1

Source : E-views statistical package

The correlation coefficient between oil price (OIP) and the All share index (ASI) over the period of study was observed to be relatively low at 0.21

Normality test



Source : E-views statistical package

Series: Residuals
Sample 1 120
Observations 120

Mean	1.16e-14
Median	-3.351491
Maximum	46.96404
Minimum	-69.09291
Std. Dev.	25.25777
Skewness	-0.102582
Kurtosis	2.020650
Jarque-Bera	5.006097
Probability	0.081835

Breusch-Pagan-Godfrey -Heteroskedasticity Test

F-statistic	5.156595	Prob. F(1,118)	0.0250
Obs*R-squared	5.024427	Prob. Chi-Square(1)	0.0250
Scaled explained SS	2.479333	Prob. Chi-Square(1)	0.1154

Source: Output from E-views statistical package version 7

The shape and pattern of the normality test suggests that, the series are tilted more to the right ; while the probability values are less than the critical at 5%. The null hypothesis is rejected in favor of the alternative, that the variables are homoscedasticity in pattern, not serially correlated, suggesting that the model is robust for policy analysis.

Johansen co integration test

Trace test					Max Eigen value test				
Hypothesized No. of CEs	**Eigen value**	**Trace Stats**	**0.05 Critical value**	**Prob****	**Hypothesized No. of CEs**	**Eigen value**	**Max-Eigen Stats**	**0.05 Critical value**	**Prob****
None	0.075834	10.62635	15.49471	0.2355	None	0.075834	9.069257	14.26460	0.2804
At most 1	0.013449	1.557097	3.841466	0.2121	At most 1	0.013449	1.557097	3.841466	0.2121
Trace test indicates no cointegration at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level					Max –Eigen value * denotes rejection	Indicates no co-integration at the 0.05 level of the hypothesis at the 0.05 level			

Source: Output from E-views statistical package version 7

Both the trace and max Eigen value tests indicates a case of no co-integrating equations amongst the variables .This result suggests that the null hypothesis of no co integration between oil price(OILP) and All share index(ASI) of the Nigerian stock market cannot be rejected at 5% .Given the evidence that the series do not co-integrate, this may be a pointer to the fact that, the relationship between global oil price and All share index of the Nigerian stock market may be unstable.

Granger Causality test

Next, is the Granger causality test. The essence is to ascertain causal relationships between global oil pricing and value of the All share Index

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
ASI does not Granger Cause OILP	118	2.21317	0.1141
OILP does not Granger Cause ASI		0.70691	0.4953

Source: Output from E-views statistical package version 7

Outcome of the above test reveals that none of the variables granger cause each other.

Vector Auto Regression (VAR) Estimates

Vector Autoregression Estimates
Standard errors in ( ) & t-statistics in [ ]

	OILP	ASI
OILP(-1)	0.527283	10.12601
	(0.08818)	(16.6574)
	[5.97929]	[0.60790]
OILP(-2)	0.359840	-18.46097
	(0.08901)	(16.8135)
	[4.04261]	[-1.09798]
ASI(-1)	0.001042	1.079414
	(0.00050)	(0.09361)
	[2.10324]	[11.5308]
ASI(-2)	-0.001015	-0.111854
	(0.00050)	(0.09351)
	[-2.05120]	[-1.19622]
C	8.708467	1839.402
	(5.82296)	(1099.91)
	[1.49554]	[1.67233]
R-squared	0.705685	0.942084
Adj. R-squared	0.695267	0.940034
Sum sq. resids	22987.97	8.20E+08
S.E. equation	14.26301	2694.156
F-statistic	67.73563	459.5295
Log likelihood	-478.4852	-1096.943
Akaike AIC	8.194664	18.67701
Schwarz SC	8.312066	18.79441
Mean dependent	87.39425	33005.54
S.D. dependent	25.83754	11002.00
Determinant resid covariance (dof adj.)		1.44E+09
Determinant resid covariance		1.32E+09
Log likelihood		-1573.933
Akaike information criterion		26.84633
Schwarz criterion		27.08113

Source: Output from E-views statistical package version 7

Further analysis is conducted using a two variable VAR model of OILP and ASI to analyze the response of the all share index to changes in the global prices of oil . The estimates show that ASI (proxy for All share index of the Nigerian Stock market) has a higher R-squared compared to that of oil price(OILP)
From the above test, the coefficients of oil price (OILP) lagged (one and two periods) and ASI at lag one are statstically significant at 5%, ASI at lag two was negatively and statistically significant .too.
From the outcome of this study ,one can infer that , All share index (ASI) of the Nigerian stock market responds to fluctuations in the global pricing of oil overtime.

Variance Decomposition

Period	S.E.	OILP	ASI
1	2614.319	1.570058	98.42994
2	3784.759	2.749225	97.25078
3	4990.597	3.376814	96.62319
4	5938.889	2.829542	97.17046
5	6739.201	2.370118	97.62988
6	7381.831	1.977239	98.02276
7	7916.853	1.769491	98.23051
8	8361.704	1.806233	98.19377
9	8742.349	2.094909	97.90509
10	9074.456	2.636027	97.36397

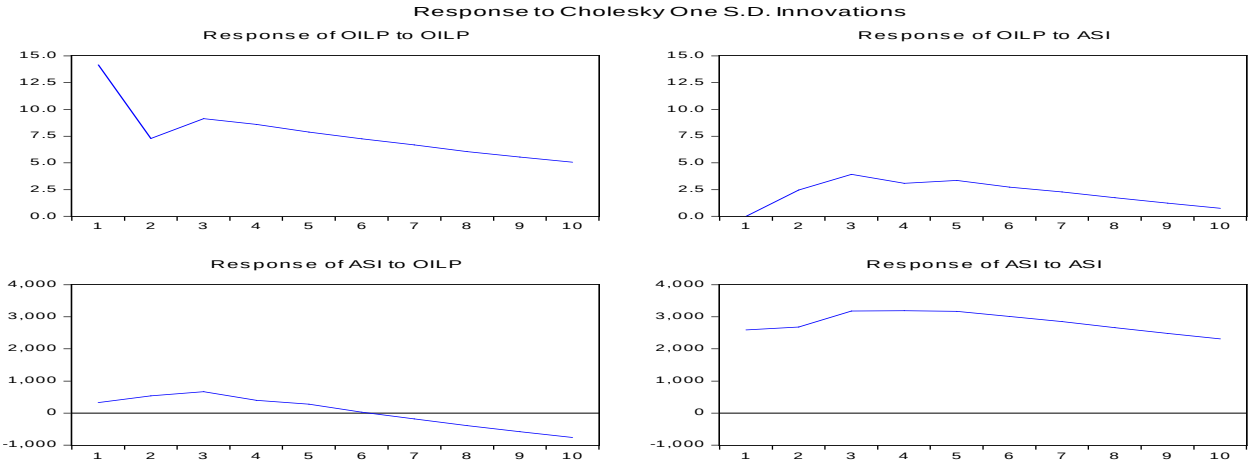
Source: Output from E-views statistical package version 7

Attempts at variance decomposition in the above table , reveals that at a one year horizon, 98.42 % of variance in All share index of the Nigerian Stock Market are explained by their own shocks. This did not change much at a 10 year horizon, as 97.36% of the variance in ASI are explained by their own shocks while the global price of oil (OILP) explains the outstanding value of 2.64%. These results suggest that at the end of ten years, the global price of oil did not provide satisfactory and predictive information on the trading position of Nigerian All share index.

IMPULSE –RESPONSE FUNCTIONS

The response of ASI to ASI as contained in the chart below indicates that it attained about 2,500 points in period 1.This increased to about 3,100 points in period 3 and remained relatively stable at that point till period 6 before it gradually nosedived to 2000 points in period 10. On the average, ASI could be seen to be feeding on itself.

The response of ASI to global changes in the prices OIL (OILP) was not so impressive as it peaked at about 500 points in period 3 before it degenerated unto negative values for periods 7 to 10



Source: Output from E-views statistical package version 7

Table 4.2.12 : VOLATILITY AND ARCH MODELLING APPROACH

TESTING FOR ARCH EFFECTS

F-statistic	92.23876	Prob. F(1,117)	0.0000
Obs*R-squared	52.45879	Prob. Chi-Square(1)	0.0000

source: E-views statistical package version 7.0

Since the LM statistics (52.46) is significant, we reject the null hypotheses that there is no first order ARCH effects. Furthermore, the F- statistics (92.24) corroborates the presence of first order ARCH effects.

Having established that an ARCH effect is present, we go further to test for an ARCH model of order 1, generalized ARCH-(GARCH(1,1)), threshold GARCH and a GARCH in mean outputs.

ESTIMATING AN ARCH MODEL

Method: ML - ARCH (Marquardt) - Normal distribution
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2

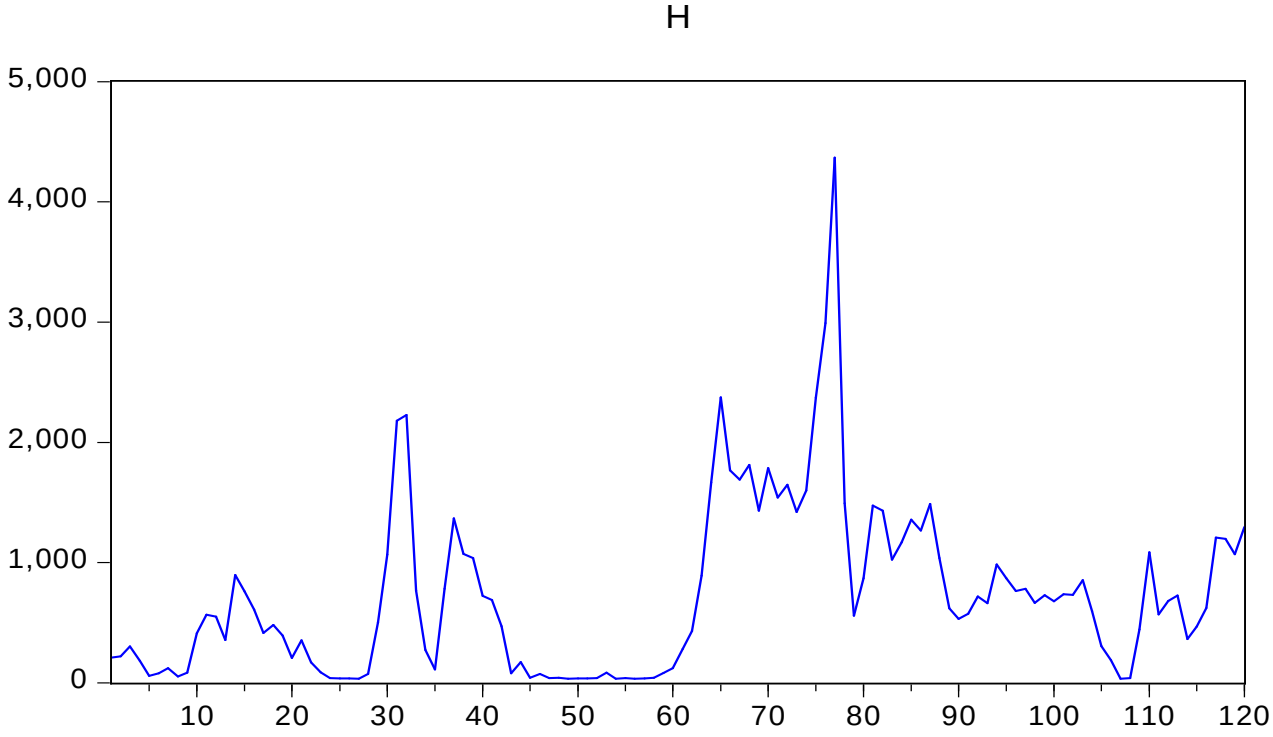
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	64.61917	3.992024	16.18707	0.0000
ASI	0.000525	0.000105	5.011838	0.0000
Variance Equation				
C	33.37657	8.749928	3.814497	0.0001
RESID(-1)^2	1.071896	0.370000	2.897016	0.0038

Source: E-views statistical package version 7.0

The average return is 64.62.The variance equation gives result of the ARCH model namely that the time varying volatility includes a constant component (33.38) plus a component which depends on past errors (1.07).The shaded line highlights the significant ARCH effects.
In line with the decision rule; if Y_1 is positive and significant, then there is volatility clustering. On the basis of this, the conclusion is that global pricing of oil exhibits volatility clustering on All share index of the Nigerian stock market .

GARCH MODELLING GRAPH

A graphic representation of the series under review reveals that , there was a mild volatility occasioned by global oil pricing on the All share index of the Nigerian stock market between 2006 and 2011 but this heightened in 2011 till 2014 after which it dove tailed unto a mild volatility rating till 2016.



Source: E-views statistical package version 7.0

GENERALIZED ARCH

Dependent Variable: OILP
Method: ML - ARCH (Marquardt) - Normal distribution
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	65.08712	3.811484	17.07658	0.0000
ASI	0.000521	9.88E-05	5.274156	0.0000
Variance Equation				
C	35.95198	11.13363	3.229132	0.0012
RESID(-1)^2	1.201947	0.459116	2.617957	0.0088
GARCH(-1)	**-0.097042**	**0.108270**	**-0.896296**	**0.3701**

Source: E-views statistical package version 7.0

The shaded line in the E-views output shows the significance of the GARCH term. These results show that the volatility coefficients, the one in front of the ARCH effect(1.201947), though positive and significant turned out to be greater one . This is contrary to the decision rule. The volatility coefficient of the GARCH Effect (-0.097042), though less than one is negative. Again this is contrary the decision rule.
Since the coefficients on the ARCH/ GARCH terms did not satisfy the decision rules we infer that there is no evidence that oil price changes have any effects on the all share index of the Nigerian stock exchange.

ASYMMETRIC GARCH

Dependent Variable: OILP
Method: ML - ARCH (Marquardt) - Normal distribution
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*RESID(-1)^2*(RESID(-1)<0) + C(6)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	52.28980	2.174308	24.04894	0.0000
ASI	0.000827	5.01E-05	16.49693	0.0000
Variance Equation				
C	388.9305	72.85743	5.338241	0.0000
RESID(-1)^2	1.441349	0.517332	2.786122	0.0053
RESID(-1)^2*(RESID(-1)<0)	**-0.050799**	**0.237584**	**-0.213815**	**0.8307**
GARCH(-1)	-0.944931	0.039035	-24.20748	0.0000

Source: E-views statistical package version 7.0

Since the coefficient on the asymmetric term (0.8307) is not significant, we infer that there is no evidence that positive and negative price shocks of oil have different effects on the all share index of the Nigerian stock exchange.

GARCH –IN –MEAN

Dependent Variable: OILP
Method: ML - ARCH (Marquardt) - Normal distribution
Presample variance: backcast (parameter = 0.7)

GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	0.008235	0.004583	1.796817	0.0724
C	66.48145	3.900065	17.04624	0.0000
ASI	0.000172	0.000117	1.462927	0.1435
Variance Equation				
C	18.33875	14.63262	1.253278	0.2101
RESID(-1)^2	1.001525	0.387913	2.581826	0.0098
GARCH(-1)	0.095641	0.113948	0.839337	0.4013

Source: E-views statistical package version 7.0

The above result show that volatility coefficients, though positive and significant turned out to be greater than one . This is contrary to the decision rule. The Coefficient of the GARCH in mean term is (0.0098) .Thus, we infer that to some extent, there exists some evidence that oil price volatility affects returns on All share index of the Nigeria stock exchange at 1 % Alpha level.

4.7 Discussion of study

The outcome of study has made us to understand that ;

- Though the global pricing of oil exhibits volatility clustering on the All share index ; the coefficients of the ARCH / GARCH and asymmetric terms did not satisfy the decision rules, thus we infer that there is no evidence that oil price changes have any effects on All share index of the Nigerian stock exchange,
- Lastly, the coefficient of the GARCH in mean term suggests that oil price volatility affects returns on All share index of the Nigeria stock exchange at 1% Alpha level.
- Based on the findings of study, we conclude that investors purposing to invest in Nigerian stock market should do so with some bit of caution; as all the tests ran did not provide satisfactory and predictive information of oil price volatility on the All share index except for the GARCH in Mean term. This simply infers that, to some extent, the global price of oil should be taken cognizance off while predicting the price of stocks in the Nigerian stock market.
- The results of our present study did not corroborate the findings of some earlier works such as that of Asaolu and Ilo (2012, Ogiri et al (2013) and Okany (2014).This may not be unconnected to the methodology and duration of study adopted by the previous researchers.

5.0 Summary of findings

The above array of tests were able to produce the following results:

- A trend review of oil price and the All share Index reveals a seeming relationship between the duo .
- The two variables turned stationary at first difference.
- The correlation coefficient between oil price (OIP) and the All share index (ASI) over the period of study was observed to be relatively low at 0.21.
- The shape and pattern of the normality test suggests that, the series are tilted more to the right ; while the probability values are less than the critical at 5%. The null hypothesis is rejected in favor of the alternative, that the variables are homoscedasticity in pattern, not serially correlated, suggesting that the model is robust for policy analysis.
- Both the trace and max Eigen value tests indicates a case of no co-integrating equations amongst the variables
- Outcome of the causality test reveals that none of the variables granger cause each other
- The VAR estimates show that All share index of the Nigerian Stock market has a higher R-squared compared to that of oil price.

- From the above test, the coefficients of oil price (OILP) lagged (one and two periods) and ASI at lag one are positively and statistically significant at 5%, ASI at lag two was negatively and statistically significant .too.
- From the outcome of this study ,one can infer that , All share index (ASI) of the Nigerian stock market responds to fluctuations in the global pricing of oil overtime.
- Variance Decomposition analysis indicates that at a one year horizon, 98.42 % of variance in All share index of the Nigerian Stock Market are explained by their own shocks. This did not change much at a 10 year horizon, as 97.36% of the variance in ASI are explained by their own shocks while the global price of oil (OILP) explains the outstanding value of 2.64%.
- The above results suggest that at the end of ten years, the global price of oil did not provide satisfactory and predictive information on the trading position of Nigerian All share index.
- The VAR analysis suggests that the All share index responds to fluctuations in the global pricing of oil overtime.
- The impulse –response function indicates that, the response of the All share Index to global changes in the prices of oil was not so impressive.
- The F statistics corroborates the presence of first order ARCH effects
- Global pricing of oil exhibits volatility clustering on All share index of the Nigerian stock market .
- The GARCH modeling graph indicates that , there was a mild volatility occasioned by global oil pricing on the All share index of the Nigerian stock market between 2006 and 2011 but this heightened in 2011 till 2014 after which it dove tailed unto a mild volatility rating till 2016.
- Coefficients on the ARCH/ GARCH terms did not satisfy the decision rules, thus we infer that there is no evidence that oil price changes have any effects on All share index of the Nigerian stock exchange
- Coefficient of the asymmetric term is not significant, thus we infer that there is no evidence that positive and negative price shocks of oil have different effects on All share index of the Nigerian stock exchange.
- Coefficient of the GARCH in mean term suggests that oil price volatility affects returns on All share index of the Nigeria stock exchange at 1% Alpha level.

5.2 conclusion and Recommendations

Based on the findings of study, we conclude that investors purposing to invest in the Nigerian stock market should do so with some bit of caution; as all the tests ran did not provide satisfactory and predictive information of oil price volatility on the All share index except for the Vector Auto Regression (VAR) analysis and GARCH in Mean term. This simply infers that, to some extent, the global price of oil should be taken cognizance off while predicting the price of stocks in the Nigerian stock market

Since the efficiency of capital markets are measured by the ability of securities to reflect and incorporate all relevant information , almost instantaneously , in their prices, most capital markets have been found to be fairly efficient in the advanced economies as well as in a number of emerging capital markets. The Nigerian securities and exchange commission should strive to make the Nigerian capital market as efficient as possible .

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