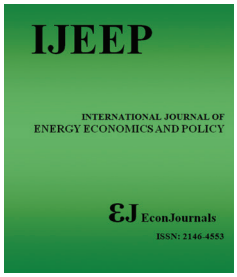

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Stock Prices Reaction to Oil Price Fluctuations: Empirical Evidence from Nigeria

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ABSTRACT

The study investigated stock market reactions to oil price fluctuations in Nigeria. A longitudinal design consisting of data on the Nigerian Stock market index, crude oil prices, exchange rate, interest rate, inflation rate and GDP for the period 1984-2019 was employed. The data were subjected to stationarity and cointegration tests using ADF and Johansen's techniques. Based on the results of the stationarity and cointegration tests, Vector error correction model was used to analyse the research data. The results indicate that crude oil prices have short-run and long-run effects on stock market returns. Exchange rate was found to have significant short-run effect on stock market returns.

Keywords: Stock market returns; crude oil prices; oil price fluctuations; exchange rate; interest rate
JEL Classification: H25

1. INTRODUCTION

From the onset, when Nigerians had no idea about crude oil deposits in the country, Agriculture was the mainstay of the economy. Then, comprehensive development plans to take Nigeria to lofty heights were put in place by the political actors and erstwhile nationalists who wrestled power from the colonial masters. The focus on agricultural sector was consistent with development economists' "position that agricultural sector has a very vital role in the economic development process of a nation, emphasizing that agricultural productivity is fundamental for a sustainable development strategy" (Oluwafemi et al., 2015 and Inusa et al., 2018). In the 1960s, the contribution of the agricultural sector to the export earnings and employment was over 80%; and about "65% of the gross domestic product (GDP) and about 50% of the government revenue; the above contributions were despite the dependence of most of Nigerian farmers on traditional tools and indigenous farming methods" (Oluwafemi et al., 2015). The situation changed immediately crude oil was discovered in Nigeria in commercial quantities coupled with the exploration and subsequent exploitation of the crude oil (Inegbedion et al., 2019).

The discovery of crude oil in commercial quantities precipitated the commencement of conscious disengagement in agricultural activities. Ironically, while the agricultural sector contributed as much as over 80% (80%) to Nigeria's foreign exchange earnings in the 60s, it was the petroleum sector that took over the domination of Nigeria's foreign exchange earnings, contributing to as much as over 90% of Nigeria's foreign exchange earnings within the period (Inegbedion et al., 2019). The domination of the other sectors of the Nigerian economy by the crude oil sector caused Nigerian economy to tilt towards a mono-product economy. The perceived ease with which oil wealth could be accumulated served as a major disincentive to prospective agriculturists. One of the early consequences was the threat to food security that led to endless importation of food stuffs by the federal government during the second republic in the 1980s; a development that triggered an unfavourable balance of trade and subsequently, persistent balance of payment deficits for a significant part of the 1980s and beyond.

It was the persistent balance of payment deficits that led to the introduction of Structural Adjustment Programme (SAP) when the military administration of General Ibrahim Badamosi Babangida overthrew the civilian government of Alhaji Shehu Shagari.

As a major source of energy for domestic and industrial appliances, crude oil is of fundamental importance to the world's economy. But several factors often interfere with world crude oil prices, thus making crude oil prices stochastic. However, fluctuating oil prices tend to exert a significant impact on any oil dependent economy. Rapid fluctuations in oil prices make oil a key macroeconomic factor, owing to its creation of unstable economic conditions and its impact on global financial stability (Anyalechi et al., 2019; and Naifar and Al Dohaiman, 2013). The capital market is an engine room for development in any economy, Nigeria inclusive. The ability of the capital market to live up to expectations in its all-important role of financial intermediation is largely dependent on investors' confidence in the market. But fluctuations in stock prices in the capital market often cause major market performance indicators to deepen and thus precipitate loss of confidence on the part of investors. It is for this reason that this study investigates stock prices' reaction to oil price fluctuations in Nigeria.

2. LITERATURE REVIEW

The financial market of any system is critical to economic development of that system. It consists of the money and capital markets. As the engine room of the capital market, the stock market in its role of financial intermediation functions as a mechanism or process or channel through which investors' "savings are mobilized and efficiently allocated to achieve economic growth" (Osamwonyi and Osakioyaigbinoba, 2015). It ensures that intermediate and long term capital resources are accessible to industries that are in dire need of finance for development purposes through issuing of shares and stocks. Consequently, the overall development of any economy depends on the pattern of the stock market and how well the stock market performs. In the past two decades, there have been insinuations that stock market performance is influenced by fluctuation in crude oil prices. The insinuations have attracted research interest globally on the relationships between oil price fluctuations and stock market performance. The series of studies, which have spanned oil exporting and oil importing countries have produced mixed results (Osamwonyi and Osakioyaigbinoba, 2015; and Adebiyi et al., 2010).

The volatility of crude oil prices cause distortions in major economies whether oil exporting or oil importing countries. For oil exporting countries, which often depend on oil revenues to finance their budgets, crude oil price fluctuations disrupt the projected revenue when there are downward fluctuations and could stimulate inflation when upward fluctuations result. For crude oil importing countries, the same disruptions could occur, with downward fluctuations leading to excess cash that may trigger inflation while upward fluctuations will have a negative impact on projected revenue. To this end, understanding the volatility of crude oil prices and the pattern of fluctuations, if any, is critical to effective policy formulation because of the potential for uncertainty that may result in all sectors of the economy and the attendant instability for both oil exporting and importing economies (Gokmenoglu, 2015). It is for this reason that "oil is widely considered as the lifeblood of modern economies and the indexation of oil has long been regarded as the leading pricing mechanism in the energy market" (Hulshof et al., 2016). As a major source of energy critical for technological development, a significant positive relationship has been found between countries' advancement and their demand for crude oil.

2.1. Empirical Review

Anyalechi et al. (2019) investigated "the responsiveness of the stock market returns to fluctuation in oil prices in Nigeria" the study employed the longitudinal design and used data for the period 1994-2016. Unit roots test was done to test for stationarity and Bound testing technique was employed to test for cointegration while ARDL estimation technique was used to test for significance of data with due cognisance to the outcome of the unit roots and the cointegration tests. The findings revealed that changes in oil prices and inflation rate were positively related to stock market returns; but while oil price fluctuations had insignificant impact both in the long-run and the short-run, inflation rate had had significant influence on the short run but insignificant influence on the long run. Exchange rate and interest rate were found to have negative influence on stock market returns but only the short-run effect of interest rate on stock market returns was found to be significant.

Igbinovia and Igbinovia (2019) investigated the "reaction of the Nigerian stock market to fluctuations in oil prices using time series data for the period 1981-2017." The study employed a longitudinal design and performed cointegration test to ascertain the relationship between the variables on the long-run. Based on the results of the cointegration test, Error Correction Model was used to test for significance of data. Results show that that the fluctuations in oil prices were positively related to stock market returns but the relationship was insignificant. Nevertheless, exchange rate and interest rate exerted significant influence on stock market return.

Li et al. (2015) examined the "impacts of oil price shocks on the returns of China's listed oil companies." The study employed the longitudinal design and segregated global oil price shocks into global supply shock and demand shock, as well as domestic demand shock and precautionary demand shock. Impacts of the various oil price shocks on the stock returns of China's stocks were examined using samples from 2008 to 2013. The findings revealed that industries' returns significantly responded to the fluctuations in oil prices and the response was found to be positive.

Ogiri et al. (2013) investigated oil price and stock market performance in Nigeria. They employed the longitudinal design. Augmented Dickey Fuller test was used to test for stationarity while Johansen's test was done to test for cointegration. Vector error correction and Vector auto regression were used to test for significance of data. Results indicated that stock price movement is significantly influenced by fluctuations in crude oil prices. Specifically, it was revealed that stock market performance is significantly linked to crude oil price fluctuations

Osamwonyi and Osakioyaigbinoba (2015) investigated oil price volatility and stock market returns in Nigeria. They employed a

longitudinal design and data were collected for the period 1980-2012. They performed stationarity and cointegration tests to examine the variables' parameters consistency even with change in time origin as well as long run relationships. Data were analysed using the Vector Error Correction Mechanism to estimate the dynamic patterns of adjustment in oil price volatility with respect to stock market instability within the VECM context. They found the perceived deleterious effects of oil price fluctuations in the stock market to be substantive, and oil price instability was found to have extensive negative effects on stock returns in the short run, and intensifies volatility in the market in the long run. However, externally determined factors were shown to play more active roles in stock price volatility in Nigeria than fluctuations in crude oil prices.

Olufisayo (2014) examined "the relationship between changes in oil prices and stock market growth in Nigeria." The study was longitudinal and data were collected for the period 1981-2011. Data were analysed using vector error correction modelling approach. The results showed that crude oil prices and exchange rate have significant impact on stock market growth. Oil price change was also found to have a causal relationship with stock market performance. The VECM shows that stock market performance is significantly dependent on shocks occasioned by oil price fluctuations.

Siddiqui (2014) investigated "oil price fluctuation and stock market performance in Pakistan" with a view to ascertaining the extent to which international oil price fluctuation influence the performance of stock markets in Pakistan. The longitudinal survey was employed and KSE-100 Index provided the required data for stock market performance. The predictive power of political stability in explaining stock market performance was also reckoned with. The findings indicate a positive correlation between oil prices, exchange rate and foreign private portfolio investment and stock market performance. Also democratic governance was found to negatively impact stock market performance. In view of the foregoing, the following hypotheses were tested:

$H0_1$: Fluctuations in the prices of crude oil do not have any significant influence on macroeconomic variables like interest, exchange and inflation rates

$H0_2$: Macroeconomic variables (interest, exchange and inflation rates) do not significantly impact on stock price movements

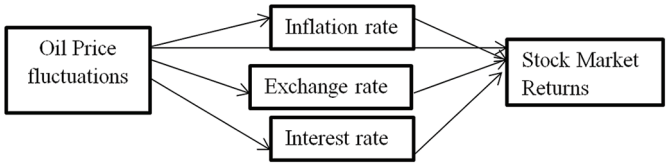
$H0_3$: Fluctuations in the prices of crude oil do not have any significant influence on stock price movements

The results of the empirical review indicate that oil price fluctuations influence inflation rate, exchange rate and interest rate; which, in turn, influence stock prices (Figure 1).

2.1.1. Gap in literature

The problem of oil price fluctuations and stock market returns has attracted the attention of many authors in the past two decades. Foremost among them are Anyalechi et al. (2019), Igbinovia and Igbinovia (2019) Gourène and Mendy (2018), Li et al. (2015), Ogiri et al. (2013), Osamwonyi and Osakioyaigbinoba (2015), Olufisayo (2014) and Siddiqui (2014), among others. The studies have produced mixed results. While some of the studies did not find any statistically significant relationship between oil price changes and stock market performance (Anyalechi et al., 2019; and Igbinovia and Igbinovia, 2019), others found positive and statistically significant relationship between oil price fluctuations and stock market returns (Li et al., 2015; Ogiri et al., 2013; Osamwonyi and Osakioyaigbinoba, 2015; and Olufisayo, 2014). The mixed results indicate the need for further studies on the problem. Besides, none of the previous studies made any attempt to explain the reasons for the divergent results. Neither did any of the previous studies make any attempt to mitigate or isolate the impact of the global financial crisis on stock market returns with the period 2007-2009 at a time the crude oil prices had an upsurge. This study sought to fill these gaps

Figure 1: Conceptual framework



2.2. Theoretical Framework

This study is anchored on the symmetric or linear theory. "The theory provides a strong correlation between oil prices and critical macroeconomic measures and explains why upward oil price fluctuations were responsible for every post-World War II recession except the 1960's depression" (Ikechukwu and Omotayo, 2019). The earlier studies of Burbidg and Harrison (1984) as well as Gisser and Goodwin (1986) provided support that serve to validate the symmetric theory. Arising from the symmetric theory and given the significant contribution of crude oil sales to Nigeria's foreign exchange earnings, Nigeria's projected revenues in any fiscal year are largely dependent on crude oil earnings. Thus, government expenditure, which is a major stimulant of national income, is significantly influenced by fluctuations in crude oil prices. This explains the choice of the symmetric theory.

3. METHODOLOGY

The study employed the longitudinal design and data were collected over a 35-year period (1985-2019) on the key variables, oil prices, interest rate, inflation rate, exchange rate and the Nigerian Stock Exchange (NSE) Index (All-share index), As the aggregation of share price gains and losses within the period under investigation, the All-Share Index (ASI) was deemed suitable to capture the stock market returns in the Nigerian capital market. The data were sourced from Statista-the statistics portal and the CBN statistical Bulletin. Augmented Dickey Fuller test was performed to test for stationarity of all the variables since stationarity is sacrosanct to the usability of the results of any time series study. Cointegration test, using Johansen's technique, was further performed to check for the relationship between the variables on the long-run. The significance of the cointegration prompted the decision to use vector error correction model as the test for significance of the studies' variables.

3.1. Model Specification

The study's model was specified as:

$$SP=\beta_0+\beta_1 COP+\beta_2 IntR+\beta_3 InfR+\beta_4 ExchR+\beta_5 GDP+e_t \quad (1)$$

Where:
Δ SP=Changes in stock prices
ΔCOP=Changes in crude oil prices
IntR=Rate of interest
InfR=Rate of inflation
ExchR=Exchange rate
GDP=Gross Domestic Product
e. =Stochastic error term
β_0=Proportion of the variation in stock prices that is not explained by changes in explanatory and control variables;
β_1=Slope of changes in crude oil prices
β_i (i = 2 − 5) represent the slopes of the other macroeconomic variables.

In line with Anyalechi et al. (2019) and Engle and Granger (1987), equation (i), which presents a long-run relation between stock market return and the explanatory variables, can be modified to accommodate a short-run dynamic adjustment process as follows:

$$\Delta SP_{t,j} = \beta_0 + \sum_{i=1}^{m1} \beta_{1i,j} \Delta SP_{t-1,j} + \sum_{i=0}^{m2} \beta_{2i,j} \Delta COP_{t-1,j} + \sum_{i=0}^{m3} \beta_{3i,j} \Delta IntR_{t-1,j} + \sum_{i=0}^{m4} \beta_{4i,j} \Delta InfR_{t-1,j} + \sum_{i=0}^{5} \beta_{5i,j} \Delta ExchR_{t-1,j} + \sum_{i=0}^{6} \beta_{6i,j} \Delta GDP_{t-1,j} + \delta \varepsilon_{t-1,i} + e_t \quad \text{(ii)}$$

Where
ΔRepresents "change in" operationalized by the differencing operator,
m_i (i = 1 − 5) = the number of lags, representing the speed of adjustment parameter; and

ε_{t-1} is the error correction term derived from the residuals of Equation (i) which is lagged by one period.

This method of estimation assumes that the variables are cointegrated, that is.all the variables are integrated of order one I(1) while the error term should be stationary, I(0). But if the variables in (i), instead of exhibiting I(I), they have a combination of I(1) and I(0) then another method of co-integration (ARDL) is employed. This technique is that of Pesaran et al. (2001). This approach is replaces ε_{t-1} in Equation (ii) with its equivalent in Equation (v). By linear combination of the lagged variables, ε_{t-1} is substituted as shown in Equation (iii) (Anyalechi et al., 2019).

Solving equation (i) for and lagging the result by one period and substituting the result in equation (ii) gives equation (iii).

$$\Delta SP_{t,j} = \Phi_0 + \sum_{i=1}^{n1} \Phi_{1i,j} \Delta SP_{t-1,j} + \sum_{i=0}^{n2} \Phi_{2i,j} \Delta COP_{t-1,j} + \sum_{i=0}^{n3} \Phi_{3i,j} \Delta IntR_{t-1,j} + \sum_{i=0}^{n4} \Phi_{4i,j} \Delta InfR_{t-1,j} + \sum_{i=0}^{n5} \Phi_{5i,j} \Delta ExchR_{t-1,j} + \sum_{i=0}^{n6} \Phi_{6i,j} \Delta GDP_{t-1,j} + \Phi_7 SP_{t-1} + \Phi_8 COP_{t-1} + \Phi_9 IntR_{t-1} + \Phi_{10} InfR_{t-1} + \Phi_{11} ExchR_{t-1} \Phi_{12} \text{GDP} + w_t \quad \text{(iii)}$$

The ARDL equivalent of the Error correction model is obtained by replacing the lagged level variables by ECT_{t-1} as follows:

$$\Delta SP_{t-1} = \lambda_0 + \sum_{i=1}^{k1} \lambda_{1i,j} \Delta SP_{t-1,j} + \sum_{i=0}^{k2} \lambda_{2i,j} \Delta COP_{t-1,j} + \sum_{i=0}^{k3} \lambda_{3i,j} \Delta IntR_{t-1,j} + \sum_{i=0}^{k4} \lambda_{4i,j} \Delta InfR_{t-1,j} + \sum_{i=0}^{k5} \lambda_{5i,j} \Delta ExchR_{t-1,j} + \sum_{i=0}^{k6} \lambda_{6i,j} \Delta GDP_{t-1,j} + \delta ECT_{t-1j} + \theta_t \quad \text{(iv)}$$

In (iv) the speed of adjustment is represented by a negative and statistically significant estimation (Anyalechi et al., 2019). This negative condition must hold for the model to be seen as appropriate in the context.

3.2. Measurement of Variables

The measurement procedures adopted for stock price movements (dependent variable), crude oil prices (independent variable) as well as interest rate, inflation rate and exchange rate (control variables) are explained here.

3.2.1. Stock market price changes

The stock market price changes were measured by the ASI of the NSE since the ASI represents the aggregation of price gains and losses on any trading day. Although the monthly values of the required data for the period 1985-2014 were available, the monthly values were not used. The non-employment of monthly values was a calculated attempt to reduce the influence of the global financial crises on the fluctuations in the prices of shares and by implication, stock market returns within the period mid 2007- early 2009 as the behaviour of stock prices within the period was mainly under the influence of the global financial crises rather than oil prices. To this end, half-yearly data, which captured the fluctuations in stock prices, were employed. The half-yearly data consisted of the maximum and minimum data in each of the halves. Specifically, if the maximum value in the year occurred in on half, say July-December, the minimum in January-June was included to complete the two data points. If the maximum value occurred in January-June, the minimum value in July-December was included to complete the required two data points.

3.2.2. Exchange rate

The exchange rate of Nigerian Naira (₦) to the Dollar ($) for the period 1984-2019 was used.

3.2.3. Interest rates

The interest rate employed was the bank lending rate for the period under consideration. The choice of this rate was informed by the need to examine the influence of interest rate on investors' choice of investment alternatives.

3.2.4. Inflation rate

The inflation rates employed were the official inflation rates used in deflating the nominal values of GDP for the period to obtain the real GDP.

3.2.5. Crude oil prices

The average prices per annum for the period 1984-2019 were used. Half-yearly data consisting of the maximum and minimum data in each of the halves per annum as was done in the measurement procedure employed for stock market returns was also used to measure crude oil

price fluctuations. This was to ensure that the measurement procedure of crude oil prices was consistent with that is stock market returns.

4. FINDINGS

4.1. Stationarity Test

Results of the unit roots stationarity tests show that one of the variables, GDP, was stationary at level while the remaining five variables, stock changes, crude oil prices, exchange rate, interest rate and inflation rate were all significant at first difference (Table 1)

4.2. Cointegration Test

Results of the cointegration test indicate that the asymptotic significant probabilities associated with the null hypotheses that: there is no cointegration equation, at most one, at most two, at most 3, at most 4 and at most 5 cointegration equations were 0.0016, 0.0078, 0.0351, 0.1257, 0.2258 and 0.6181 respectively. Thus, while we may reject the hypotheses that there is no cointegrating equation and there is one cointegrating equation, we cannot reject the hypotheses that there are at most two, three, four and five cointegrating equations. The implication is that all the variables are cointegrated and thus, there is a long-run relationship between the variables (Table 2).

Two of the control variable (inflation rate and GDP) were found to be collinear. The two variables were thus dropped from the model. The final estimation was done with four variables, stock price movements (dependent variable), crude oil prices (independent variable) as well as exchange rate and interest rate (control variables).

Table 1: Unit root test

SN.	Variable	P value at level	P value at 1st difference	Significant at
1.	SPC	0.6474	0.0002	1er difference
2.	Crude oil prices	0.5277	<0.001	1st differences
3.	ExchR	0.9797	<0.001	1st difference
4.	IntR	0.1357	<0.001	11st difference
5.	InflR	0.1958	<0.001	1st difference
6.	GDP	0.0025	<0.001	Level

Table 2: Cointegration test

Hypothesized	Eigenvalue	Trace	0.05 critical	
No of CEs			Value	Prob. ***
None	0.4253	113.8462	95.7537	0.0016
At most 1	0.3738	78.9463	61.8189	0.0078
At most 2	0.3097	49.4564	47.8561	0.0351
At most 3	0.2160	26.1027	29.7971	0.1257
At most 4	0.1539	10.7743	15.4947	0.2258
At most 5	0.0039	0.24859	3.84147	0.6181

Estimated Equation

$$D(SPC) = C(1)*(SPC(-1) -0.403319569004*COP(-1) -0.0311432969965*EXCHR(-1) +0.331872850644*INTR(-1) +0.219743090731) + C(2)*D(SPC(-1)) + C(3)*D(SPC(-2)) + C(4)*D(COP(-1)) + C(5)*D(COP(-2)) + C(6)*D(EXCHR(-1)) + C(7)*D(EXCHR(-2)) + C(8)*D(INTR(-1)) + C(9)*D(INTR(-2)) + C(10)$$

Results of the error correction model present the long run equilibrium relations. The cointegration equation is estimated as:

SPC +0.2197 – 0.4033 COP (−1) +0.03114 Exchr (−1) +0.3319 Intr (−1) =0;

Thus,

SPC= – 0.2197 + 0.4033 COP (−1) −0.03114 Exchr (−1) – 0.3319 Intr (−1)

The results indicate that a unit change in crude oil prices will lead to a 40.33% change in stock prices, a unit change in exchange rate will cause a 3.114% change in stock prices while a unit increase in interest rate will cause a 33.19% reduction in stock prices. The results further show that the explanatory variable (COP) has positive long-run relationships with SPC. Two or the Control variables (exchr and Intr) had negative long-run relationship with SPC (Table 3). However, only crude oil prices were found to significantly influence SPC on the long run.

Following the long-run coefficients of the cointegration equations, the short-run coefficients were estimated through the Error correction model (ECM) component/The ECM Estimations in the cointegration equation show that the coefficients of all the regressors have the hypothesized (A priori) signs. Two of the variables, crude oil prices and exchange rate, had statistically significant short run influence on stock price changes at the 95% confidence level, but while crude oil prices had significant positive influence on stock market returns, exchange rate had significant negative effect, Also, interest rate had insignificant short-run negative influence on stock price movements (Table 4). Furthermore, the coefficient of the error correction term (ECT) is −0.2745 and this coefficient had a calculated t of −2.7412 and an asymptotic significant probability value of 0.0077. Thus, the speed of adjustment after short-run fluctuations is 27.45.9%. The values indicate the speed of restoration of the system to equilibrium after a previous deviation. The implication is that previous period disequilibrium is corrected at a speed of 27.45% (Table 4).

Lastly, results of the error correction model show that the explanatory variable (crude oil prices) and the control variables

Table 3: Estimated vector error correction model

Dependent variable	SPC	Standard error	t-statistic	Significant P	Remark
Variable	Coefficient				
COP (−1)	0.4033	0.0536	7.2167	0.0010	Significant
exchr (−1)	0.0311	0.0875	1.5089	0.062	NS
Intr (−1)	−0.3319	0.2570	−1.2912	0.0752	NS
Constant	0.2197				

Table 4: Estimated ECM Equation Coefficients and Sig P

Dependent variable				
Coefficient	**Standard error**	**t statistic**	**Significant**	**p**
C (1)	−0.277	0.0988	−2.8046	0.0077
C (2)	0.2841	0.1494	1.9008	0.0627
C(3)	0.2069	0.1582	1.3080	0.1964
C (4)	0.1430	0.0536	2.6700	0.0100
C (5)	0.0067	0.0561	0.1186	0.9061
C (6)	−0.0322	0.0875	−2.3675	0.0417
C (7)	−0.0854	0.0796	−1.0733	0.2979
C (8)	0.0587	0.0853	0.6889	0.4938
C (9)	0.0819	0.0837	0.9784	0.3322
C (10)	−0.0234	0.8470	−0.0276	0.9780

Table 5: Estimated vector error correction model

Error correction	**D (SPC)**	**D(COP)**	**D (EXCHR)**	**D(INTR)**
Coin eq1	−0.2745	0.5035	0.3085	−0.1393
	(0.10014)	(0.1607)	(0.1607)	(0.1383)
	[−2.7412]	[1.8056]	[1.8092]	[−1.007]
DSPCI (−1)	0.2884	0.6593	−0.1816	−0.2497
(0.1518)	(0.4227)	(0.2435)	(0.2096)	
[1.9008]	[1.5599]	[−0.7459]	[−1.1913]	
R-squared	0.2184	0.3259	0.2526	0.3418
Adj R-squared	0.0857	0.2115	0.2426	02301
Sum sq Resids	1652.81	1281.97	425.49	315.26
S.E. equation	5.483	15.5526	8.9600	7.7126
F-statistic	1.6456	2.8473	3.3070	3.0584
Log likelihood	−192.307	−256.835	−222.093	212.6483
Akaike AIC	6.4224	8.4709	7.3690	7.0680
Schwarz SC	6.7626	8.8111	7.7082	7.4084

Table 6: Breusch godfrey serial correlation LM test

F statistic	**1.2486**	**Prob. (F2 23)**	**0.0547**
Obs. R squared	3.6238	Prob. Chi-square (2)	0.0732
Durbin Watson	2.1193		

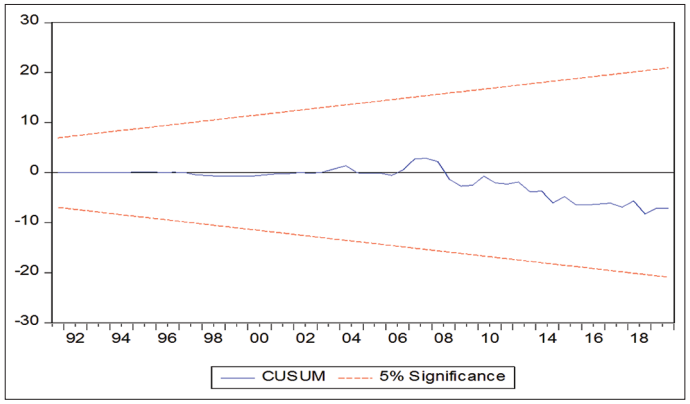
(interest rate and exchange rate) explain about 21.84% of the variation in stock price movements as shown by the coefficients of variation (Table 5).

Diagnostic tests were also performed. Firstly, a test for serial correlation was performed on the residuals using Breusch-Godfrey test. The results indicate an asymptotic probability value of 0.0732 for the Chi-square statistic. Thus, we cannot reject the null hypothesis that the series are not serially correlated 2.1193 (Table 6). Which lies between du and 4-du where du is the upper value of the Durbin Watson statistic. The non-correlation of the stochastic error terms is an indication that the results are not spurious. A stability test was also performed on the model and the results indicate that the model is stable since the trend is perfectly situated between two standard errors (Figure 2).

5. DISCUSSION OF FINDINGS

The results indicate that there is significant direct (positive) relationship between stock market returns, measured by stock price changes, (dependent variable) and oil price fluctuations (the explanatory variable). The implication is that increases or

Figure 2: Stability test



decreases in crude oil prices lead to increases or decreases in stock prices. In other words, fluctuations in crude oil prices stimulate fluctuations in stock prices in the same direction. Thus, instability in crude oil prices stimulates disequilibrium in stock market returns in the Nigerian Stock market. The results are consistent with those the studies of Li et al. (2015) Ogiri et al. (2013), Osamwonyi and Osakioyaigbinoba (2015) as well as Olufisayo (2014) but inconsistent with the findings of Anyalechi et al. (2019) as well as Igbinovia and Igbinovia (2019). The results further indicate that crude oil price changes have both short-run and long-run significant impacts on stock market returns.

The results also indicate that interest rate has negative influence on stock market returns but the influence is not statistically significant. Furthermore, exchange rate has only short-run significant influence on stock market returns but no significant long run effect. This is partially consistent with Igbinovia and Igbinovia (2019) as well as Siddiqui (2014) but inconsistent with Anyalechi et al. (2019). The results of the diagnostic tests for serial correlation and stability provide reasonable support for the reliability of the model estimates since the outcomes were found to be favourable.

6. CONCLUSION

There appears to be an increase in empirical literature on the relationship between oil prices and stock markets returns. Recent empirical studies in oil producing and non- oil producing countries have sought to explain the impact of oil price volatility on stock market performance with a view to explaining the linkage between oil price volatility and stock market performance. We examined stock market reaction to oil price fluctuations by investigating the extent to which oil price fluctuations impact on stock price changes. Interest rate and exchange rate were used as control variables. Based on the findings, we conclude that oil price fluctuations have significant long-run and short-run positive influences on stock market price changes and thus stock market returns. To this end, persistent increases in oil prices, leading to positive changes in crude oil prices stimulate increases in stock prices; leading to Bullish runs in the capital market. In the same vein, persistent decreases in oil prices, leading to negative changes in crude oil prices precipitate decreases in stock prices; leading to Bearish runs in the capital market. Thus the stock market reacts positively to fluctuations in crude oil prices.

This study has made significant contribution to knowledge in management science, financial management and social science literature. There is no doubt that numerous studies have attempted to explain the relationship between crude oil prices and stock market performance. In this study, we observed that the period of the global financial crisis (mid 2007 to early 2009) distorted the values of stock market prices and by implication, stock market returns. The downward trend in stock prices within the period had nothing to do with the explanatory variable of the study (oil prices) but mainly the financial crises that engulfed the globe at the time. Consequently the maximum and minimum values of stock price index in each year were used to capture the fluctuation of stock market prices. Thus, half-yearly data, which captured the fluctuations in stock prices, were employed. This was done to reduce the distortions of the stock market returns within the period of the global financial crises. The same measurement procedure was applied to crude oil prices, interest rate and exchange rate. By so doing, the influence of the global financial crises on stock market returns within the period was minimised. This forms the point of departure of this study from previous studies because none of these studies seem to have reckoned with the possible impact of the global financial crises on stock market returns for a period of almost 2 years when, ironically, crude oil prices were very high for a significant part on the time.

The study is not without some limitations that suggest the need for further studies. The control variables (exchange rate and inflation rate) included in the study was randomly selected from a host of other likely predictors. The extent to which these control variables are or are not the best to control for the relationship between crude oil prices and stock market returns is a limitation. In an attempt to reduce the impact of the global financial crisis on stock market returns, the study employed half-yearly data of the highest and lowest values and thus had 70 data points for the period 1984-2019 because the first trading on the floor of the Nigerian Stick Market with All-Share index was in 1985. Two data points were then inputted for annual data instead of 12 monthly data per annum which would have resulted in 432 data points within the period. This, probably, would have been more robust considering the number of variables in the model. This is a methodological imperfection and thus a limitation to the results of the study.

The above limitations indicate the need for further studies to fashion out other techniques to mitigate the influence of the global financial crises on global stock market returns and thus resolve the current stalemate in empirical literature on the impact of crude oil price fluctuation on stock market returns.

6.1. Recommendations

In view of the problem definition and research findings, the following recommendations are suggested: Policy makers in the oil producing countries should make adequate efforts to stabilise crude oil prices so that stock market returns will not be subjected to unnecessary fluctuations. This can be achieved by collaborating with member countries in the Organisation of Petroleum Exporting Countries (OPEC) to regulate oil output to ensure that output fluctuation is minimised. Secondly, investors in the stock market should study the trend in oil price movement to know when to engage in persistent purchases or when to engage in persistent sales, depending on whether they are Bearish or Bullish investors. Arising from the results of this study, investors should use crude oil prices as a barometer for ascertaining the trend in the stock market. Thus, when stock market performance appears to be unimpressive and oil price are on a downward trend, it should largely explain the behaviour in the stock market and allay their fears; but when stock market returns are unimpressive and crude oil prices are rising, it should give some source of concern to the investors. Lastly, investors should not panic when oil prices appear to be persistently down because after every downward trend an upward trend will begin at some point in time to signal the reversal of the previous trend.

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