IOSR Journal of Economics and Finance (IOSR-JEF)
e- ISSN: 2321-5933, p-ISSN: 2321-5925. Volume 9, Issue 3 Ver. II (May - June 2018), PP 28-36
www.iosrjournals.org

Revisiting the Causal relationship among Oil price, Exchange rate and Stock market performance in Nigeria: Vector Error Correction Model

Paul Ndubuisi
Department of Banking and Finance, Abia State University, Uturu. Nigeria
Corresponding Author: Paul Ndubuisi

Abstract: *The sought to examine the dynamic causal relationship between-crude oil prices, exchange rate and stock market performance in Nigeria from January 1995 to December 2016 using a Parsimonious Vector Error Correction Model (VECM) that uses the Granger causality test and Accounting Innovation-generalized variance decomposition analysis. The result are as follows; a short-run positive relationship is observed between the Nigerian stock market and crude oil prices and the direction is from crude oil prices to the Nigerian stock market but not the other way round. The short run relationship between exchange rate and Nigerian stock market is observed to be positive and the direction is from the exchange rate to the Nigerian stock market. Exchange rate is also observed to be positively related to the movements in the crude oil prices in the short run with the direction of causality running from crude oil prices to exchange rate. However, the results of a multi-variate Johansen cointegration test suggest the existence negative relationship among the three variables in long run.The Variance Decomposition analysis shows that the Nigerian stock market performance and Exchange rate behaviour are strongly influenced by the movements in Crude Oil prices.*

Keywords: *Exchange Rate, Crude Oil Price, Nigerian Stock Market, Vector Error Correction Model*

Date of Submission: 29-05-2018 Date of acceptance: 18-06-2018

I. Introduction

The study examines the dynamics of how oil price fluctuation affects the economy through a number of channels (Eryiğit 2012). Numerous studies (Chen et al., 1986; Fama,1991Le & Chang 2011) modeled the relation between asset prices and real economic activities in terms of production rates, productivity, growth rate of gross national product, unemployment, yield spread, interest rates, inflation, dividend yields, and so forth. Numerous debate around this issue is often to examine the effect of crude oil price fluctuation on the volatility of financial markets, the direct effect on stock market performance and how adjustments in exchange rate policy (e.g Basher *et al*, 2010; Imarhiagbe, 2010; Kumar, 2014), as recently observed in 2014 in Nigeria, calls for further investigation.Studying the relationship between crude oil prices and these two variables is considered necessary for several reasons:First crude oil has a great importance in the current Nigerian economy. It is almost impossible to identify a commodity that has a greater influence when observing the Nigerian economy. Crude oil has effectively dominated the nation's economic activities and the national budget is built annually around the crude oil production and revenue. It therefore implies that the general performance of the national budget and aggregate economy will strongly be sensitive to variations in crude oil prices. Increase in crude oil prices will provide additional income to Nigeria. If this additional income is transmitted back to the economy, then higher crude oil prices would be expected to improve the level of economic activities in the country by increasing aggregate demand, corporate profitability and stock market performance. On the other hand, falling crude oil prices will lead to decrease in the level of aggregate demand through decreasing national incomeor per capita income. From the macroeconomic point of view, changes in the aggregate demand resulting from decrease in the disposable income in the economy will alter expectations of economic trends and consequently exchange rate and stock market performance will be affected.

The theoretical linkage between the selected variables and stock market returns is through arbitrage pricing theory (APT) (Ross, 1976), where multiple risk factors can explain asset returns. While early empirical papers on APT focussed on individual security returns, it may also be used in an aggregate stock market framework, where a change in a given macroeconomic variable could be seen as reflecting a change in an underlying systematic risk factor influencing future returns. Most of the empirical studies based on APT theory, linking the state of the macro economy to stock market returns, are characterised by modelling a short run relationship between macroeconomic variables and the stock price in terms of first differences, assuming trend stationarity. Few studies in Nigeria are mainly based on two-variable framework with some considering the

relationship between crude oil prices and stock market behaviour, and others the relationship between exchange rates and stock market behaviour. The relationship between these threevariables has, therefore, not been that closely studied, especially within the context of African Oil-exporting countries and Nigeria in particular. Abdelaziz et al. (2008) noted that oil price can act as a channel through which exchange rate affects the stock market. Hence, omitting one of the three variables in the analysis may offer limited explanation to the relationship between crude oil price movements, exchange rate behaviour and stock market performance (Adebiyi et al., 2009).

This study contributes to the study of linkage between crude oil price movements, exchange rate behaviour and stock market performance of African oil-exporting countries. The increased integration of financial markets in the world today provides investors with new ways to diversify their investment portfolios, making the understanding of the type and direction of impact of changing oil prices on stock prices and exchange rates an importantguide to international investors and their fund managers in managing risk inherent in their portfolios by identifying if the Nigerian stock market offers diversification effect.

II. Literature Review

Evidence of stock market performance and selected macroeconomic variables at international economy.

Studies on the relationship between oil prices, exchange rate and stock market performance in four Middle East oil-exporting countries (Kuwait, Saudi Arabia, Egypt, and Oman) has been investigated by Abdelaziz et al. (2008). The initial results of the empirical analysis show absence of any long-run co-integration between oil prices, stock prices and real exchange rate. However, upon splitting the sample period to account for major oil price shocks, the study discovered a long-run equilibrium relationship among the stock prices, the real exchange rates and oil prices for Egypt, Saudi Arabia and Oman. In Kuwait, results suggest the existence of a long-run equilibrium relationship between stock and oil prices. The conclude that re-adjustment towards the long-run equilibrium in each country stock market occurs via changes in the oil price with shocks in Egypt and Saudi Arabia correcting itself in17 and 14 months, respectively, while it takes 22 and 24 months in Oman and Kuwait. A Similar study was carried out by Parvar et al.(2008), whoinvestigated the relationship between oil prices and real exchange rate in a sample of 14 oil-exporting economies using monthly data and autoregressive distributed lag approach. The results of the analysis suggest a long run stable relationship between the two variables in all countries studied. The analysis of the short-run dynamics, indicate the existence of unidirectional causality from oil prices to exchange rates in four countries (Angola, Colombia, Norway, and Venezuela) from exchange rates to oil prices in two countries (Bolivia and Russia), bidirectional causality in four other countries (Gabon, Indonesia, Nigeria and Saudi Arabia), and no causality in the remaining four countries (Algeria, Bahrain, Kuwait and Mexico). Furthemore, Nikbakht (2009) investigated the long run relationship between real oil price and real exchange rate using monthly data of seven OPEC member countries from January 2000 to December 2007. The results of the study show a long run and positive linkage between real oil prices and real exchange rates, suggesting that real exchange rate of OPEC members depends on oil price movements significantly.

In an analysis of oil price movement, Basher and Sadorsky (2006) argued that the impact of falling oil prices on stock market differs depending on whether the country is an oil-exporter or importer. In an oil-exporting country, a rise in world oil prices improves the trade balance, leading to a higher current account surplus and an improved net foreign asset position. In addition, it tends to increase private disposable income in the countries. This increases corporate profitability, raises domestic demand and stock prices thereby causing exchange rate to appreciate. In oil-importing countries, the reverse is the case, generally. Trade deficits may beoffset by weaker growth and, over time, real exchange rate depreciates, while stock prices decline (see Basher and Sadorsky, 2006). Other notable scholars have identify oil price as: the linear measure of oil price (Afshar *et al*, 2008); asymmetric oil price (Mork, 1989; Lee *et al*, 1995); and net oil price increase (Hamilton, 1996).

Evidence from Nigeria

Some empirical studies in Nigeria have considered the relationship between oil prices and stock market performance in Nigeria see Adaramola (2012); Asaolu and Ilo (2012); Asaolu and Ilo (2012); Ogiri et al. (2013); Babatunde et al. (2013); Englama et al. (2010); Egbe (2015); Zubair (2013); Umoru and Asekome (2013). Adaramola (2012) investigated the long-run and short-run dynamic effects of oil price volatility on the Nigerian stock market behaviour from the first quarter of 1985 to the fourth quarter of 2009 using Johansen cointegration tests. The results of a bi-variate model specified in the study show a significant positive stock return to oil price shock in the short-run and a significant negative stock return to oil price shock in the long run with the Granger causality test indicating strong evidence that the causation runs from oil price shock to stock returns; explaining that variations in the Nigerian stock market performance are explained by oil price movements. Asaolu and Ilo (2012) investigated the relationship between oil prices and stock market performance in Nigeria from 1984 to 2007 using Johansen cointegration and Vector Error Correction (VECM)

analysis. The results of the study suggest a long run relationship between the two variables. Ogiri et al. (2013) considered the relationship between oil prices and stock market performance in Nigeria from 1980 to 2009 using a Vector Auto-Regressive (VAR) model. The results suggest that oil price volatility significantly explains stock price movements in the Nigerian stock market. In a follow-up study, Babatunde et al. (2013) applied multivariate Vector Auto-Regressive (VAR) model, using the generalised impulse response function and the forecast variance decomposition error to investigate the interactive relationship between oil price shocks and the behaviour of the Nigerian stock market. The results suggest that the Nigerian stock market returns exhibit positive but insignificant response to oil price shocks but reverts to negative effects after a period of time depending on the nature of the oil price shocks.

Oil and stock market performance- evidence from Nigerian

Apart from these studies that have examined the relationship between oil prices and stock market performance in Nigeria, other studies have also investigated the relationship between oil prices and exchange rate in Nigeria.Englama et al. (2010) examined the effects of oil price volatility on exchange rate in Nigeria using monthly data from January 1999 to December 2009. The study employed cointegration technique and vector error correction model (VECM) for the long-run and the short-run analysis, respectively. The results suggest that a 1.0 per cent increase in oil price at the international market increases Nigerian exchange rate with the US Dollar volatility by 0.54 per cent in the long-run, while in the short-run by 0.02 per cent.In another major study, Egbe (2015) examined the impact of oil price volatility on the real exchange rate in Nigeria using quarterly data from the first quarter of 1981 to the fourth quarter of 2009 by employing cointegration and Error Correction method. The results of the study shows that dynamic short run impact of oil price volatility on exchange rate does not hold, even though most of the movements in real exchange rate is due to changes in the long-run.

Exchange rate and stock market performance-evidence from Nigeria

They are also few studies that have considered the relationship between exchange rate and stock market performance and in Nigeria. Zubair (2013) employed cointegration to test for the possibility of long-run relationship and Granger causality to investigate the causal relationship between the Nigeria stock market index and exchange rate before and during the global financial crisis using monthly data over the period 2001 to 2011. The results of the investigation show absence of long-run relationship before and during the global financial crisis. The Granger causality test indicates absence of causality between the NSM All Share Index and Exchange rate to the US Dollar in both periods.Umoru and Asekome (2013) examined the dynamic interaction between stock prices and exchange rate of Naira to US Dollar using co-integration and the Granger causality techniques. The results show that whenever there is a change in the Naira-US Dollar exchange rate, stock prices react in the same direction. The results provide evidence of a positive co-integration between the Naira-US Dollar exchange rate movement and the Nigerian stock market performance with bi-directional Granger causality found to exist between stock prices and exchange rate in Nigeria.

It would therefore be insightful to examine the relationship among oil price, exchange rate and stock market performance in Nigeria.

III. Data And Methodology

3.1 Data Sample

This study investigates the dynamic relationship between oil prices exchange rate and stock market performance in Nigeria using monthly data over the period of January 1995 to December 2016 representing a total of 264 observations. As a proxy for the world price of crude oil (OIL) , this study uses the Brent spot price (measured in US dollars per barrel), which is the most commonly used benchmark for pricing in the crude oil market (Dagher and Hariri,2013) sourced from the U.S. Energy Information Administration (EIA). The All Share Index sourced from the Nigerian Stock Exchange (NSE All-Share Index) is used as a proxy for the Nigerian stock market performance. The official foreign exchange of Naira (₦) to US dollar ($)obtained from the Central Bank Statistical Bulletin (CBN)is used as the exchange rate.

3.2 Model Specification

This study employs a multivariate Vector Error Correction Model (VECM)that uses the Granger causality test and generalized variance decomposition analysisto study the relationship between crude oil prices, exchange rate and stock market performance in Nigeria. All the data series are transformed into the natural log form. Specifically, Oil Price in the natural log form is represented as $lnOil$, NSE All Share Index in the natural log form is given by $lnALS$ and Exchange rate in the natural log form represented as$lnExch$. The first difference of their natural log values are represented as $\Delta lnOil$, $\Delta lnALS$ and $\Delta lnExch$ respectively.The first step is to investigate the order of integration of the variables used in the empirical study.The ADF (Augmented Dickey

Fuller) test will be used, complemented with the PP (Phillips Perron) in which the null hypothesis is $H_o: \beta = 0$ i.e. βhas a unit root, and the alternative hypothesis is $H_1: \beta < 0$ .If the unit root tests confirm that at least some of the variables are I(1), then the next step would be to test if they are cointegrated, i.e. if they are bound by a long-run relationship. Cointegration exists between a set of non-stationary variables when a certain linear relationship of the series is stationary.

3.2.1. Johansen co integration test

The test of the presence of long run equilibrium relationship among the variables using Johansen Co integration test involves the identification of the rank of the n by n matrix Π in the specification given by.

$$\Delta Y_t = \beta + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \prod Y_{t-k} + \varepsilon_t \quad (1)$$

Where $Y_t$is a column vector of the n variables Δ is the difference operator, Γ and Π are the coefficient matrices, k denotes the lag length and β is a constant. In the absence of cointegrating vector, Π is a singular matrix, indicating that the cointegrating vector rank is equal to zero. Johansen co integration test will involve two different likelihood ratio tests: the trace test (λtrace) and maximum eigen value test (λmax) shown in equations below:

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \quad (2)$$

$$J_{max} = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (3)$$

Where r the number of individual series, $T$is the number of sample observations and and λ is the estimated eigen values. The trace test tests thenull hypothesis of *r* cointegrating vectors against the alternative hypothesis of *n* cointegrating vectors. The maximum eigen value test (λmax), on the other hand, tests the null hypothesis of *r* cointegrating vectors against the alternative hypothesis of *r* +1 cointegrating vectors. If the two series are found to be co-integrated, then vector error correction model (VECM) is appropriate to investigate causality relationship.

3.4.Vector Error-Correction Modelling (VECM)

The Short run equilibrium relationship is tested usingVector Error-Correction Model (VECM). VECM is a restricted VAR that has cointegration restriction built into the specification.The VECM analysis in this study is based on the function:y_t = f(oil returns, Exchange rate returns, and stock returns). The VECM involving three co-integrated time series is set as:

$$\Delta lnALS_t = \alpha_1 + \sum_{k=1}^{p} \mu_{1k} \Delta lnALS_{t-k} + \sum_{k=1}^{p} \delta_{1k} \Delta lnExch_{t-k} + \sum_{k=1}^{p} \partial_{1k} \Delta lnOilp_{t-k} + \lambda_1 Z_{t-1} + \varepsilon_t (4)$$

$$\Delta lnExch_t = \alpha_2 + \sum_{k=1}^{p} \mu_{2k} \Delta lnALS_{t-k} + \sum_{k=1}^{p} \delta_{2k} \Delta lnExch_{t-k} + \sum_{k=1}^{p} \partial_{2k} \Delta lnOilp_{t-k} + \lambda_2 Z_{t-1} + \varepsilon_t (5)$$

$$\Delta lnOilp_t = \alpha_3 + \sum_{k=1}^{p} \mu_{3k} \Delta lnALS_{t-k} + \sum_{k=1}^{p} \delta_{3k} \Delta lnExch_{t-k} + \sum_{k=1}^{p} \partial_{3k} \Delta lnOilp_{t-k} + \lambda_3 Z_{t-1} + \varepsilon_t (6)$$

Where Z_{t-1} is the error correction term obtained from the cointegration model. The error correction coefficientsλ_1, $\lambda_2$and $\lambda_3$indicate the rate at which it corrects its previous period disequilibrium or speed of adjustment to restore the long-run equilibrium relationship. Hence, they are expected to capture the adjustment in $\Delta lnALS_t, \Delta lnExch_t$ *and*$\Delta lnOilp_t$towards the long-run equilibrium whereas coefficients of $\Delta lnALS_{t-k}$, $\Delta lnExch_{t-k}$ and $\Delta lnOilp_{t-k}$ are expected to capture the short-run dynamics of the model.This method of analysis permits us to test for the direction of causality, if it exists, as discussed next. Moreover, it captures the dynamics of the interrelationships between the variables through variance decomposition.It is essential to appropriately specify the lag length k for the VECM model; if k is too small the model is misspecified and the missing variables create an omitted variables bias, while overparameterizing involves a loss of degrees of freedom and introduces the possibility of multicollinearity (Gujarati and Porter, 2009). The study uses Akaike information criterion (AIC) to determine the optimum lag length.

3.5. Granger causality test and Variance Decomposition

The VECM employed in this study uses the Granger causality test and generalized variance decomposition to examine the short run dynamic relationship between the three variables.Granger causality test is used to ascertain the direction of causality between the three variables.Impulse response and variance decomposition can help in explaining the effect of a shock over time on the variables in a system. Assuming one-period shock is introduced to Oil price (*Oilp*) by increasing $\varepsilon_1$by one standard deviation at time $t = 0$ we can observe how this impulse will affect All Share Index (*ALS*) and Exchange rate (Exchr) immediately and several periods later. The relative strength of the Granger-causality among the variables beyond the sample period is explained by identifying the relative importance of a variable in generating its own variations. Variance decompositions provide a literal breakdown of the change in value of the variable in a given period arising from changes in the same variable in addition to other variables in previous periods. A variable that is optimally forecast from its own lagged values will have all its forecast error variance accounted for by its own disturbances (Sims, 1982). This analysis will therefore help to explain how much a random shock to one innovation is responsible for predicting subsequent variation of the other innovation that is not already accounted for by its own variation.

IV. Empirical Results

4.1. Unit Root Tests Results

To test the stationary properties of the data, ADF (Augmented Dickey Fuller) and PP (Phillips Perron) unit root tests are employed. The results for both the level and differenced variables are presented in Table 1 below:

Table 1. Unit root test

Augmented Dickey–Fuller (ADF) test					
Variables	Levels	Prob. **	First Difference	Prob. **	Order of Integration
lnOilp	-1.449388	0.5576	-11.77795	0.0000	I(1)
lnALS	-1.634546	0.4633	-13.22976	0.0000	I(1)
lnExch	-1.529003	0.5167	-10.76816	0.0000	I(1)
Phillips-Perron (PP) test					
lnOilp	-1.400495	0.5819	-11.77795	0.0000	I(1)
lnALS	-1.630665	0.4653	-13.22097	0.0000	I(1)
lnExch	-1.531970	0.5152	-10.76816	0.0000	I(1)
Notes: All variables in logarithms ** MacKinnon (1996) one-sided p-values					

Source: Calculated using Eviews 7

The stationarity test was performed first in levels and then in first difference to establish the presence of unit roots and the order of integration in all variables. The study implemented ADF and PP test with intercept plus trend. The results of the ADF and PP stationarity tests for each variable show that both tests fail to reject the presence of unit root for the data series in levels, indicating that the variables are non-stationary in levels. The first difference results reveal that the variables are stationary at 1% significance level, indicating that the examined time series variables are integrated of order one, I(1).For this study the optimum lag length using Akaike information criterion (AIC) is 4.

4.2Cointegration Test Results

This study next examined the null hypothesis of no cointegration among Oil prices, exchange rate and NSM All Share Index performance using Johansen Cointegration test. The results are presented in Table 2 below:

Table 2. Johansen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	5 Percent Critical Value	Prob.**
None *	0.135314	42.48256	29.79707	0.0011
At most 1	0.023082	8.316169	15.49471	0.4322
At most 2	0.011964	2.828387	3.841466	0.0926
Maximum Eigenvalue				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	5 Percent Critical Value	Prob.**
None *	0.135314	34.16639	21.13162	0.0004

At most 1	0.023082	5.487783	14.26460	0.6794
At most 2	0.011964	2.828387	3.841466	0.0926

Trace test and Max-eigenvalue test indicates 1 cointegrating equation(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Normalized Cointegrating Coefficients: Cointegrating Equation

LNASI	LNEXCHR	LNOILP	C
1.000000	-52.84321	-14.56172	-201.4945
S.E	(9.02426)	(4.23719)	
t-values	[-5.85568]	[-3.43664]	
Log likelihood	847.5208		

Source: Calculated using Eviews 7

The results of the multivariate test considering the long-run relationship between the three variables, as shown in Table 2 show that there exists one co integrating equation at 5 percent level of significance as per Trace test and Maximum Eigen value test. The cointegration equation points out that the long-run relationship between NSM All Share Index performance and Oil prices as well as Exchange rate is negative, indicating that Oil prices movements and Exchange rate behaviour exert a significant negative shock on Nigerian stock market performance in the long run.

4.3Vector Error correction Results

Next is the estimation of the short-run relationship between the variables using Vector auto regression (VAR) that that imposes co integration in an error correction model (VECM), with the optimal lag length chosen using Akaike Information Criterion (AIC). The ECM coefficient is known as the speed adjustment factor, it tells how fast the system adjusts to restore equilibrium. It captures the reconciliation of the variables over time from the position of disequilibrium to the period of equilibrium.

Table 3. Results of Parsimonious Vector Error Correction Model

	Dependent Variables		
Independent Variables	**D(LNASI)**	**D(LNEXCHR)**	**D(LNOILP)**
ECT	-0.176815 (0.05291) [-3.34187]	-0.002059 (0.00040) [-5.15001]	- 0.000969 (0.00042) [-2.29283]
D(LNASI(-1))	0.179566 (0.10825) [1.65877]	0.050720 (0.08181) [0.61994]	0.134137 (0.08644) [1.55184]
D(LNEXCHR(-1))	0.030606 (0.00809) [3.78505]	0.108363 (0.08216) [1.31897]	0.108363 (0.08216) [1.31897]
D(LNOILP(-1))	0.228249 (0.06710) [3.40163]	-0.313271 (0.18868) [-3.53259]	0.659540 (0.08650) [7.62474]
C	0.003787 (0.00728) [0.51999]	0.080926 (0.08203) [0.98651]	0.037058 (0.08667) [0.42759]

Source: Calculated using Eviews 7

The results of the vector correction model (VECM) in table 3show that t-values associated with the coefficient of the lag value of the Crude Oil price and Exchange rate are statistically significant when NSM All Share Index (ASI) is used as the dependent variable, which indicate that Crude Oil price and Exchange rate exert positive impact on the Nigerian stock market performance in the short run.The VECM results also indicate that All Share Index (ASI) adjust the disturbances to restore long-run equilibrium significantly and in right direction. The coefficient of error correction term (ECT) -0.176815which suggests the speed of adjustment to

equilibrium after a shock is negative and statistically significant at 1% level. Hence, speed of adjustment towards the long-run equilibrium is approximately 17.7% per month for the Nigerian stock market.

4.4VECM Granger Causality Test Results

Summary results of the Granger Causality test in Table 4offer some interesting insights. For each of the variables, at least one channel of Granger causality is active.

Table 4. VECM Granger Causality Test Results

Dependent Variables	Independent Variables	Chi-sq	Prob.	Result
NSM ASI	LNEXCHR	24.10871	0.0197	Existence of Causality
	LNOILP	28.76194	0.0043	Existence of Causality
Exchange Rate	LNASI	14.70127	0.2582	No Causality
	LNOILP	26.98067	0.0078	Existence of Causality
Oil Price	LNASI	13.07738	0.3634	No Causality
	LNEXCHR	18.47400	0.1020	No Causality

Source: Calculated using Eviews 7

According to the results in table 4, it can be summarised that there exist a unidirectional short-run causal relationship between the stock market performance and the two variables (Exchange rate and Oil price). At 5% level of significance the results showthat ASI does not Granger cause OIL (prob. = 0.3634) but that OIL Granger causes ASI (prob.=0.0043). The causality between Exchange rate and Oil prices shows that EXCH does not Granger cause OIL (prob. = 0.1020), but OIL Granger causes Exch (prob. = 0.0.0078). The causality between Nigerian stock market performance and Exchange rate indicates that ASI does not Granger cause EXCH (prob. = 0.2582), but EXCH Granger causes ASI (prob. = 0.0.0197).

4.5Variance Decomposition Test

This study estimated the variance decompositions under the VECM framework to investigate the dynamic relationship among Nigerian stock market performance, exchange rate behaviour and Crude Oil prices. The VDCs provide a literal breakdown of the change in value of the variable in a given period arising from changes in the same variable in addition to other variables in previous periods.

Table5.Accounting Innovation: Generalized variance decompositions

Shock to NSM All Share Index explained by innovations in			
Period	NSM ASI	Exchange Rate	Crude Oil Prices
1	85.04914	5.502432	9.448433
5	71.25213	9.049711	19.69816
10	67.45250	9.971683	22.57582
12	62.67550	11.15309	26.17140
15	56.22939	12.71064	31.05997
20	47.15204	14.89632	37.95164
Shock to EXCHANGE RATE explained by innovations in			
Period	NSM ASI	Exchange Rate	Crude Oil Prices
1	0.329647	92.52711	7.143241
5	1.235759	69.83963	28.92461
10	1.420060	65.16303	33.41691
12	1.563649	60.70877	37.72758
15	1.679979	56.47272	41.84730
20	1.746906	54.00558	44.24752
Shock to Crude Oil Prices explained by innovations in			

Period	NSM ASI	Exchange Rate	Crude Oil Prices
1	0.167120	0.195643	99.63724
5	1.587011	0.972865	97.44012
10	1.462817	1.574925	96.96226
12	1.386800	1.663544	96.94966
15	1.330722	1.796762	96.87252
20	1.253528	1.939834	96.80664

The variance decompositions presented in Table 5indicate that 85.05% of shocks to Nigerian stock market performance are self-explained in the first month. Exchange rate accounted for 5.5% while Crude Oil prices accounted for 9.45%. In the tenth month Oil prices accounted for about22.6% while Exchange rate explained 9.97%. After twelve months of the shock, the influence of Exchange rate and Oil prices increased to about 11.15% and 26.17% respectively.

The variance decompositions presented in Table 5indicate that about 92.53% of shocks to Nigerian Exchange rate to the US Dollar are self-explained in the first month with Stock market performance accounting for about 0.33% while Crude Oil prices accounted for 7.13%. In the tenth month Crude Oil prices accounted for about 33.42% while stock market performance explained only 1.42% of the total variations in Exchange rate. After twelve months of the shock the influence of Crude Oil prices increased to about 37.73%.

The variance decompositions presented in Table 5clearly show that most of the variations in Crude Oil prices are due to its own innovation. Immediately after the shock,Crude Oil prices explain about 99.6% of the total variations in its own innovation. The results indicate that after twelve months of the shock, Crude Oil prices still explain over 96% of the total variations in its own innovation with little influence from the stock market performance (about 1.39%) and exchange rate (about 1.66%).

V. Conclusion

This study examined the short and long-term relationship between oil price movements, exchange rate behaviour and stock market performance in Nigeria from January 1995 to December 2014. As expected from an oil exporting country, a short-run positive relationship is observed between the Nigerian stock market and crude oil prices and the direction is from crude oil prices to the Nigerian stock market but not the other way round. The short run relationship between exchange rate and Nigerian stock market is observed to be positive and the direction is from the exchange rate to the Nigerian stock market. Exchange rate is also observed to be positively related to the movements in the crude oil prices in the short run with the direction of causality running from crude oil prices to exchange rate. However, the results of a multi-variate Johansen cointegration test suggest the existence negative relationship among three variables in long run. The significant negative long run relationship between the Nigerian stock market performance, exchange rate and Crude Oil prices is a deviation from the expectation.To better understand how shocks in the Crude Oil prices explain variations in the Nigerian stock market performance and exchange rate behaviour, the study estimated the Variance Decompositions (VDC) under the framework of VECM. The VDCs show that crude oil prices explain significant proportion of the total variations in both stock market performance and exchange rate behaviour.

The findings of this study provide insight into the dynamic relationship between oil price movements, exchange rate behaviour and stock market performance in Nigeria. Many of the few existing studies in Nigeria are mainly based on two-variable framework with some considering the relationship between crude oil prices and stock market behaviour, and others the relationship between exchange rates and stock market behaviour. The results of this study explainthe influence of Crude Oil price on the Nigerian stock market performance and the foreign exchange market.With the results of this study indicating that Crude Oil price significantly explains the exchange rate behaviour and stock market performance in Nigeria, policy makers in Nigeria and other oil exporting countries should keep an eye on thetrend andeffects of changes in oil price levels on their foreign exchange and stock markets.

References

[1]. Abdelaziz, M. G., Chortareas, G., and Cipollini, A. (2008). Stock Prices, Exchange Rates, and Oil: Evidence from Middle East Oil-Exporting Countries. *Unpublished manuscript.*

[2]. Adaramola, A. O. (2012). Oil Price Shocks and Stock Market Behaviour: The Nigerian Experience. *Journal of Economics*, 3(1):19-24.

[3]. Adebiyi, M. A., Adenuga, A. O., Abeng, M. O., and Omanukwue, P. N. (2009). Oil Price Shocks, Exchange Rate and Stock Market Behaviour: Empirical Evidence from Nigeria. *Unpublished Manuscript*. Available: http://www.Africa metrics.org/documents/conference09/papers.

[4]. Asaolu, T. O., and Ilo, B. M. (2012). The Nigerian Stock Market and Oil Price: A Cointegration Analysis. *Arabian Journal of Business and Management Review, Kuwait Chapter*, 1(5):28–36.

[5]. Babatunde, M. A., Adenikinju, O., and Adenikinju, A. F. (2013). Oil price shocks and stock market behaviour in Nigeria. *Journal of Economic Studies*, 40(2):180–202.
[6]. Boyd J.H., Jagannathan R., & Hu, J. (2001). The stock market's reaction to unemployment news: Why bad news is usually good for stocks? NBER Working Paper 8092.
[7]. Dagher, L., and Hariri, S. E. (2013). The impact of global oil price shocks on the Lebanese stock market. *Energy* 63:366-374.
[8]. Egbe, O. J. (2015). The Impact of Oil Price Volatility on the Real Exchange Rate in Nigeria: An Error Correction Model. *African Research Review*, 9(1):15 – 22.
[9]. Englama, A., Duke, O., Ogunleye, S., andIsma'il, F. U. (2010). Oil Price and Exchange rate Volatility in Nigeria: An Empirical observation. *Central Bank of Nigeria Economic and Financial Review*, 48(3):31-48.
[10]. Fama, E. F. (1991). Efficient capital markets: II. J Fin 46, 1575–1617.
[11]. Gujarati, D., and Porter, D. (2009). Basic econometrics. 5th ed. New York: McGraw-Hill.
[12]. Hamilton, J. D. (1983). Oil and the Macroeconomy since World War II. *The Journal of Political Economy*, 91(2):228-248.
[13]. Nikbakht, L. (2009). Oil prices and exchange rates: The case of OPEC. *Business Intelligence Journal*: January.
[14]. Ogiri, I. H., Amadi, S. N., Uddin, M. M., and Dubon, P. (2013). Oil price and stock market performance in Nigeria: An empirical analysis. *American Journal of Social and Management Sciences*, 4(1):20-41.
[15]. Parvar, J. R., Mohammad, and Mohammadi, H. (2008). Oil Prices and Real Exchange Rates in Oil-Exporting Countries: A Bounds Testing Approach. *MPRA PaperNo*. 13435.
[16]. Sims, C. A. (1982). Policy analysis with econometric models. *Brookings Papers on Economic Activity 1*:107–152.
[17]. Umoru, D., and Asekome, M. O. (2013).Stock Prices and Exchange rate Variability in Nigeria Econometric Analysis of the Evidence. *European Scientific Journal*, 9(25):261-285.
[18]. Zubair, A. (2013).Causal Relationship between Stock Market Index and Exchange Rate: Evidence from Nigeria. *CBN Journal of Applied Statistics*, 4(2):87–110.

Paul Ndubuisi, "Revisiting the Causal relationship among Oil price, Exchange rate and Stock market performance in Nigeria: Vector Error Correction Model." IOSR Journal of Economics and Finance (IOSR-JEF), vol. 9, no. 3, 2018, pp. 28-36.