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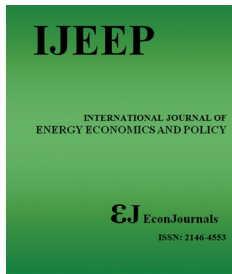**75** PUBLICATIONS **29** CITATIONS

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The Influence of Oil Price Fluctuations on Stock Market of Developing Economies: A Focus on Nigeria

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ABSTRACT

The inconclusiveness of findings from various studies on Nigeria on the effect of crude oil price fluctuation on the stock market has led to an argument in literature, thus necessitating further exploration of the subject. This study examines the effect of variations in the price of crude oil on selected stock market performance variables in Nigeria using monthly frequency data covering January 1997-December 2016. Variance decomposition, impulse response analysis, and VAR estimations were employed for the study. The results reveal that oil price variations are slowly transmitted in some stock market performance variables. The findings indicate that the effect of crude oil price fluctuations in the Nigerian stock market is greatly minimized and does not sufficiently account for market activities.

Keywords: Emerging Economy, Nigeria, Oil Price Shocks, Stock Market, Vector Autoregressive
JEL Classifications: C25, Q47, F4

1. INTRODUCTION

This study aims to examine whether fluctuations in crude oil price impact on stock market performance in developing economy from January 1997 to December 2016. Nigeria is used as a proxy for developing economies because she is the sixth largest member of OPEC and the largest net exporter of crude oil in Africa but also a highly promising economy for international portfolio diversification. In many industrialized economics, the production process uses crude oil as an essential raw material. Because of this, its demand is highly presumed to correlate with the growth of industrial production of many economies. From the economic perspective, higher demand for any commodity without marching increase in its supply paves the way for its price appreciation. Similarly, the cash flow of producing firms will be affected by an increase in raw material required in the production process. Nigeria exports crude oil and imports refined crude oil from international markets. It is assumed that any apparent movements

in the international oil market will affect some macroeconomic variables which can affect the performance of the stock market. Considering the producer (exporter) and consumer (importer) nature of Nigeria, an increase in oil prices will likely affect the cash flow of companies and individuals. Corporate earnings will be subdued, which may lead to falling investors' appetite towards investing in the capital market. Therefore, investigating the effect of oil price movements on the stock market performance is a study worth engaging.

In Nigeria, the increase in crude oil price at international markets usually attracts more money into the federation account. As a result, more money is released to government tiers, which will put pressure on the inflation rate and exchange rate. The question here is; does this reflect in the performance of the stock market? Various studies on the effect of crude oil price fluctuation on the stock market in Nigeria show mixed results. For instance, Omisakin et al. (2009), Mordi et al. (2010), Abbas and Terfa (2010), Adebiyi et al.

(2010), Akomolafe and Danladi (2014), Akinlo (2014), Iheanacho (2016), Lawal et al. (2018), Soyemi et al. (2017), Ojikutu et al. (2017), Obi et al. (2018) observe a positive effect of oil price shock on the stock price. On the contrary, studies like Adaramola (2012) and Effiong (2014) reported an inverse correlation between the price of oil movements and returns from stocks. For Okany (2014), the two constructs do not react to each other. However, Babatunde et al. (2013) and Effiong (2014) recorded a very weak relationship oil price shock and stock price in Nigeria. This inconclusiveness of findings has created much doubt in literature. This study is an effort aimed at providing further insight into the subject. The study's significance lies in its ability to generate results that will improve the forecasting accuracy of stock market behavior from crude oil price variations, which will aid investors and policymakers in decision making. This study's latest year with valid, accurate data was 2016 while the commencement year 1997 was the period the journey to stable leadership in Nigeria started. The stability of leadership of any nation says much about the functioning of various organs of the economy which includes the stock market.

The remainder of the study is presented; thus, section 2 presents the literature review, while section 3 indicates the material and methods adopted in the study. Section 4 reports the empirical results and discussion, while section 5 is the conclusion.

2. LITERATURE REVIEW

Conceptually, oil price shock or fluctuation refers to unanticipated changes in the prices of oil. In the wake of the oil price shocks of the 19,970, there emerged a body of literature that started growing and interrogating the effect oil prices changes have on the real economic activity. Among the early researchers that probed the oil price and aggregate economy nexus is Hamilton (1983) who emerged with the finding that fluctuations in the price of oil precipitated ten out of the eleven post-war recessions in the United States up to 1983. This motivated many scholars to carry out similar investigations. Oil price shocks usually cause some increases in the general price levels and a significant decrease in productivity. Thus, fluctuation in oil price is seen as a key ingredient for forecasting the capital market activities. Still, research has provided conflicting results, and several authors have disagreed with their findings on the nature of the nexus between oil price and the stock market. The conflicts in results have left doubt which this study intends to investigate in an emerging market economy. While crude oil is considered universally as the life-wire of every nation, stock markets are generally regarded as an engine of economic growth (Uwubanmwen and Omorokunwa, 2015). Results of some empirical inquiries on the oil price movements and stock market connection are highlighted below.

Kilian and Park (2009) observe that returns on stock in the USA react to movement in oil price whether as a result of supply or demand shocks. The authors further opine that shocks in oil prices impact stock returns. Papapetrou (2001) argues that true economic activity, jobs and stock prices are a substantial reaction to changes in oil prices. Others like Jones and Kaul (1996), Sadorsky (1999), Basher et al. (2012) and Cunado and Perez de Gracia (2003) find a negative relationship, although Faff and Brailsford (1999) observe

a positive link. A study on the effects of changes to oil prices on the Australian Paper and Packaging and Transportation industries was carried out by Faff and Brailsford (1989). The relationship between oil price and industries was significantly negative.

Jones and Kaul (1996), conducted a similar study with a cash flow assessment model in the developed countries of the United States, Canada, Great Britain and Japan. The result showed an inverse connection between oil and stock prices. Sadorsky (1999) studied the link between oil price volatility in the USA between 1947 and 1996 using VAR and GARCH modeling and established a strong correlation between oil price volatility and inventory return. The relationships between the fluctuation in oil prices and stock market between 13 European nations and the USA have been studied by Park and Rati (2008). The result showed a strong negative effect of oil price shock on the oil-importing countries and positive effect on the oil-exporting countries.

Magyereh et al. (2016) found no relationship between the stock market index returns of developing countries and oil price shocks and applying unrestricted vector autoregressive (VAR) approach on daily oil future returns and the daily US returns. It has also been observed that spot oil returns do lead some individual oil company stock returns (Huang et al., 1996). Still, general market indices are not much impacted by oil future returns. Zhang (2017), Nandha and Faff (2008) confirm that large oil shocks occasionally contribute a big way to stock markets.

3. MATERIALS AND METHODS

3.1. Materials

This study adopted an expo facto research design. The stock market data for the study were obtained from the Nigeria Stock Exchange (NSE) and Central Bank of Nigeria (CBN) Statistical Bulletins. The data frequency is monthly from January 1st 1997 to December 31st 2016 and contains Naira dominated value-weighted stock market indices. The stock market variables which form our dependent variables consist of market capitalization, All-Share Index, the market value of shares traded, the market volume of shares traded, average closing price and several deals. Market capitalization is the monthly sum of all the listed firms on the NSE as documented by the NSE. All-Share Index is the barometer that measures the strength of the stock market in terms of share price appreciations and depreciation in the market. The market value of shares traded is the product of the number of shares traded on each stock multiply by the market price per share. Market volume of shares traded presents the number of shares traded on the NSE for all the listed firms. The average closing price is the monthly mean market price per share of each stock for all the listed firms. Several deals are the monthly sum of individual transactions on all the listed stocks. In all the above-mentioned stock market variables were collected from the NSE and Central Bank of Nigeria statistical bulletins. The crude oil price data were sourced from US Energy Information Administration data stream (2018), and this encompasses spot historical prices of Brent crude oil from January 1997 to December 2016. This variable was employed as our independent variable to measure oil price shocks' effect on some selected stock market variables. We choose to use the Brent spot

crude oil price indices rather than other local oil price or other oil prices such as West Texas Intermediate and Dubai-serve for several reasons. First, Brent spot crude oil price was expressed in U.S. $/barrel. Second, Brent spot crude oil price measures the spot price of various oil barrels, which are quoted in the global oil market. Thirdly, Brent oil serves as a benchmark in the crude oil market. However, consistent with convention, all data used in this study were transformed by taking the raw data's natural logarithm. The control variables that captured and factored Nigerian economic moods in this study are the exchange rates and the inflation rates, which are quite high compared to developed economies.

3.2. Methods
The study employed Vector Autoregressive (VAR) model to estimate the effect of oil price shocks on selected stock market variables. This enables the endogeneity of all remaining variables tested when oil price shocks are introduced as exogenous variables. The appropriate diagnostic tests were used to ascertain the linear or non-linear effects of crude oil price shocks on some selected stock market variables. We conducted Unit Root based on Augmented Dickey-Fuller and Phillips and Perron to verify the order of integration of the variables. Extant literature is on the position that VAR modelling employs a series of unit root tests to ensure our variables are integrated on the order of one 1(1). We employed the Akaike Information Criterion (AIC), and Schwarz Bayesian Criterion (SBC) to determine the appropriate number of lag length of the VAR model. However, the study employed the variance decomposition and impulse response functions to analyze the variables' short-run dynamics.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Descriptive Statistics
Table 1 demonstrates that all the variables selected for the study have positive mean values. The standard deviation of the all-share index (9.171) is the highest among the variables, implying that it is the riskiest and most highly volatile period of study. The positive mean monthly oil price changes indicate an upward trend during the study period. The mean value of the all-share index is 99544.04 points for the 240 months and the highest. Market capitalization and several deals equally exhibited high variability during the period. Probably, the innovation in these selected stock market variables in Nigeria has been fueled by the unstable money supply regimes and the frequent movements in the international oil price.

According to this summary statistics, the average monthly closing price fluctuated rather slowly during the period. The negative value of skewness for our data set revealed that the data points are clustered to the left side of the mean, except lnAPPA with a positive cluster which implies that data points are skewed to the right of the data average. The variables indicated that the data are not normally distributed as a result of sets of data not balanced normal distribution (skewness of zero), except for lnNOD that the data are normally distributed. Confirming the above analytics, Kurtosis results in Table 1 showed that the variables are not normally distributed which revealed symmetric distribution with no well-behaved tails excluding lnAPPB, lnNOD and VOPPB with more than the expected value of 3 indicating that symmetric distribution is well-behaved. Although kurtosis confirmed that all the variables are heavily-tailed distribution with positive expected values, though, Jarque-Bera test statistic of our dataset exceeds the critical value of 5% significance level, resulting in the conclusion that the adopted variables follow a normal distribution.

4.2. Tests for Stationarity
To determine the stationarity of the employed variables, the result of unit root tests in Table 2 shows the order of integration (does not have unit root). Traditionally, the null hypothesis assumes that variables have a unit root. The outcomes for the unit root test are based on the assumption of Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) are attained at 5% level of significance. However, the decision rule for the position to accept the null hypothesis that the variable has a unit root or does not support the outcome of the two statistical tests. The outcomes from Table 2 above revealed that the employed variables attained stationarity (does not have unit root), but these were obtained at the first difference.

Based on the above outcomes, the study rejects the null hypothesis assumption of Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP). It concludes that our employed variables do not have a unit root. Nevertheless, stationarity was attained at 1(1), but none of the variables attained stationarity at 1(2). On this note, the overall outcomes satisfy the condition for Johansen Cointegration test since all the variables attained stationarity after first differencing. The outcomes of the Johansen cointegration test was subject to satisfying the precondition for running cointegration model, which states that variables must be non-stationary at the level. Still, when the variables are converted into the first difference, then they become stationary. This position was

Table 1: Descriptive statistics

Variable	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
LNOPPB	3.828	4.897	2.282	0.683	−0.318	2.052	11.352
%ΔOPPB	0.802	25.080	−26.910	9.171	−0.340	3.115	4.146
LNAPPB	3.257	4.993	2.283	0.3754	0.629	5.957	89.914
LNMC	7.819	9.549	5.375	1.422	−0.433	1.614	23.279
LNMVALUE	23.316	26.369	19.755	1.601	−0.538	2.066	17.677
LNMVOL	21.049	23.723	17.332	1.528	−0.388	2.013	13.718
LNNOD	10.838	12.885	2.493	1.478	−2.323	11.396	801.933
LNNSEASI	9.854	11.051	8.495	0.694	−0.522	2.105	16.490

Source: Researcher's Estimation using E-View. lnAPPB: Natural log of Average closing oil price per barrel in US$, lnOPPB: Natural log of Oil Price per barrel in US$ at month-end, %ΔOPPB: Percentage change in Oil Price per barrel in US$, lnMC: Natural log of Market capitalization in Billion Naira, lnNSEASI: Natural log of Nigerian Stock Exchange All-Share Index, lnMVOL: Natural log of the Market volume of trade, lnMVAL: Natural log of Market value of trade in Naira, lnNOD: Natural log of Number of deals or trades.

highlighted in the previous section, where employed variables attained stationarity after first difference. The outcomes for the

Table 2: Stationarity results

Variable	[a]Augmented Dickey-Fuller (ADF)	[a]Phillips and Perron (PP)	Order of Integration
lnOPPB	−19.32647***	−18.99767***	1 (1)
%ΔOPPB	−11.36989***	−94.20518***	1 (1)
lnAPPB	−14.42972***	−30.30106***	1 (1)
lnMC	−12.70675***	−28.63905***	1 (1)
lnMVALUE	−12.44347***	−38.51012***	1 (1)
lnMVOL	−13.98515***	−84.53476***	1 (1)
lnNOD	−11.13418***	−100.0612***	1 (1)
lnNSEASI	−15.98697***	−15.89726***	1 (1)

Source: Researcher's Estimation using E-View. lnAPPB: Natural log of Average closing oil price per barrel in US$, lnOPPB: Natural log of Oil Price per barrel in US$ at month-end, %ΔOPPB: Percentage change in Oil Price per barrel in US$, lnMC: Natural log of Market capitalization in Billion Naira, lnNSEASI: Natural log of Nigerian Stock Exchange All-Share Index, lnMVOL: Natural log of the Market volume of trade, lnMVAL: Natural log of Market value of trade in Naira, lnNOD: Natural log of Number of deals or trades

trace test and the max-eigen value test both indicate the existence of no cointegration at 5% level. This implies that the variables of the study have no long-run equilibrium relationships among themselves. However, the Johansen cointegration test's outcome led to the employment of the unrestricted VAR model in favour of vector error correction model (VECM).

4.3. VAR Model Estimation

4.3.1. VAR model estimates using oil price per barrel

The outcome from Table 3 indicates a significant influence of crude oil price on itself which implies that the variable is strongly endogenous but has a strongly exogenous influence on other employed variables, that is, the crude oil price has a weak influence on dependent variables. Although, exceptional among the variables is NSE all-share index that appeared to be least exogenous, which implies that crude oil price has a strong influence on NSE all-share index. The result of VAR estimation showed that average closing oil price per barrel has strong endogeneity since the variable has a significant influence on itself. The influence of average closing

Table 3: VAR model estimates using Oil Price per barrel

	lnOPPB	lnAPPB	lnMC	lnMVALUE	lnMVOL	lnNOD	lnNSEASI
lnOPPB$_{t-1}$	1.136	0.006	0.380	−0.241	0.153	−0.082	0.151
	(14.625)	(0.030)	(1.803)	(−0.371)	(0.201)	(−0.089)	(1.989)
lnOPPB$_{t-2}$	−0.216	0.019	−0.262	0.399	−0.078	0.167	−0.121
	(−2.781)	(0.090)	(−1.243)	(0.614)	(−0.103)	(0.180)	(−1.602)
lnAPPB$_{t-1}$	−0.012	0.466	0.038	−0.022	0.199	−0.045	0.056
	(−0.439)	(6.113)	(0.501)	(−0.094)	(0.717)	(−0.133)	(2.017)
lnAPPB$_{t-2}$	−0.040	0.381	0.007	0.116	0.153	−0.803	−0.025
	(−1.371)	(4.791)	(0.089)	(0.467)	(0.527)	(−2.281)	(−0.885)
lnMC$_{t-1}$	0.037	0.053	0.276	−0.076	−0.215	−0.142	0.046
	(1.186)	(0.626)	(3.250)	(−0.291)	(−0.701)	(−0.380)	(1.499)
lnMC$_{t-2}$	−0.018	−0.073	0.654	−0.052	0.174	0.079	−0.057
	(−0.579)	(−0.852)	(7.571)	(−0.194)	(0.555)	(0.206)	(−1.823)
lnMVALUE$_{t-1}$	0.005	0.003	0.012	0.375	0.202	0.074	0.012
	(0.477)	(0.108)	(0.418)	(4.148)	(1.907)	(0.578)	(1.123)
lnMVALUE$_{t-2}$	0.005	0.020	0.006	0.292	0.279	−0.144	0.006
	(0.418)	(0.662)	(0.211)	(3.183)	(2.599)	(−1.097)	(0.543)
lnMVOL$_{t-1}$	0.005	−0.002	−0.007	0.146	0.322	−0.003	−0.004
	(0.569)	(−0.080)	(−0.301)	(1.972)	(3.708)	(−0.032)	(−0.431)
lnMVOL$_{t-2}$	−0.005	−0.005	0.020	−0.023	−0.009	0.028	0.006
	(−0.602)	(−0.202)	(0.819)	(−0.314)	(−0.109)	(0.266)	(0.647)
lnNOD$_{t-1}$	−0.005	−0.002	0.050	0.027	−0.035	0.036	0.010
	(−0.775)	(−0.144)	(2.858)	(0.498)	(−0.557)	(0.465)	(1.538)
lnNOD$_{t-2}$	−0.002	−0.020	−0.004	0.054	0.109*	0.257*	−0.002
	(−0.320)	(−1.127)	(−0.238)	(0.986)	(1.699)	(3.299)	(−0.254)
lnNSEASI$_{t-1}$	0.127	−0.095229	0.457221	−0.327279	−1.826236	2.690449	0.759094
	(1.455)	(−0.40547)	(1.93784)	(−0.44842)	(−2.1384)	(2.58740)	(8.92865)
lnNSEASI$_{t-2}$	−0.107	0.136	−0.579	0.774	1.966	−1.501	0.174
	(−1.271)	(0.600)	(−2.543)	(1.100)	(2.386)	(−1.496)	(2.123)
C	−0.056	0.487	−1.913	7.509	9.049	−2.196	−0.283
	(−0.191)	(0.619)	(−2.465)	(3.169)	(3.270)	(−0.630)	(−0.996)
R-squared	0.984	0.624	0.973	0.783	0.675	0.540	0.985
Adj. R-squared	0.982	0.591	0.970	0.764	0.647	0.500	0.984
Sum sq. resids	1.232	8.992	9.075	86.837	118.897	176.262	1.178
S.E. equation	0.091	0.245	0.246	0.761	0.890	1.084	0.089
F-statistic	691.532	19.126	412.563	41.674	24.003	13.534	772.771
Log likelihood	168.358	5.385	4.629	−180.567	−206.334	−238.619	172.029
Akaike AIC	−1.882	0.105	0.114	2.373	2.687	3.081	−1.927
Schwarz SC	−1.618	0.370	0.379	2.637	2.952	3.345	−1.663
Mean dependent	3.827	3.265	7.861	23.346	21.078	10.862	9.875
S.D. dependent	0.679	0.383	1.431	1.567	1.499	1.533	0.701

Table 3 is Oil Price per barrel. The underlying cointegrated VAR model is of order 2, contains unrestricted intercepts, and lag order was selected using Akaike information criterion (AIC). Standard errors generated from none replications and factorization is based on Cholesky Decomposition. We do capture the out of sample dynamics in the subsequent impulse responses.

oil price per barrel on other variables recorded weak influence, which implies that the variable is strongly exogenous.

Our observation for market capitalization revealed that this variable is weakly endogenous and least exogenous, that is, natural log of market capitalization has a weak influence on itself and strong influence from NSE all-share index and crude oil price. The outcome for the natural log of the market value of trade was the same as that of market capitalization. Similarly, we also observed that natural log of market volume of trade and the natural log of deals traded are weakly endogenous, least exogenous and strongly endogenous to other variables. NSE all-share index has a significant influence on itself which implies that this variable is strongly endogenous but has a strongly exogenous on other employed variables, that is, NSE all-share index has a weak influence on dependent variables. The results align with existing literature. In the diagnostic tests conducted, it was observed that most of the variables used are not normally distributed and heteroscedastic.

4.3.2. VAR model estimates using percentage change in oil price per barrel

The VAR estimation, as revealed in Table 4, depicted significant outcomes. We observed that percentage variation in the price per barrel of oil recorded a weak influence on itself on lag 1 and 2. This is an indication that percentage variation in the price per barrel of oil is weakly endogenous when lagged by 2 periods. The percentage variation in the price per barrel of oil appeared to have strong endogeneity on the average closing oil price per barrel, natural log of market capitalization, and the natural log of NSE all-share index. This implies that it has a strong influence on these highlighted variables but a weak influence on the other variables. For the estimation on the average closing oil price per barrel, we ascertained that this variable is weakly endogenous, which implies that average closing oil price per barrel has a weak influence on itself on the lagged period. The influence of average closing oil price per barrel on the other variables shows that the variable is strongly exogenous, indicating a weak influence on the dependent variables and other variables.

Table 4: VAR model estimates using percentage change in oil price per barrel

	%ΔOPPB	lnAPPB	lnMC	lnMVALUE	lnMVOL	lnNOD	lnNSEASI
%ΔOPPB$_{t-1}$	0.044*	−0.002***	0.003***	−0.001***	0.004***	−0.003***	0.001***
	(0.554)	(−0.903)	(1.370)	(−0.183)	(0.549)	(−0.355)	(1.066)
%ΔOPPB$_{t-2}$	−0.064*	0.001***	0.002***	0.005***	0.006***	0.012***	0.002***
	(−0.836)	(0.534)	(1.021)	(0.762)	(0.796)	(1.224)	(2.915)
lnAPPB$_{t-1}$	−2.518	0.458*	0.058*	−0.065	0.192	0.0181	0.066**
	(−0.909)	(5.909)	(0.746)	(−0.276)	(0.708)	(0.053)	(2.435)
lnAPPB$_{t-2}$	−3.585	0.357*	0.003*	0.036	0.073	−0.778	−0.027
	(−1.288)	(4.575)	(0.038)	(0.150)	(0.266)	(−2.256)	(−1.007)
lnMC$_{t-1}$	1.453	0.052*	0.230*	0.087	−0.029	−0.217	0.030**
	(0.475)	(0.610)	(2.702)	(0.336)	(−0.095)	(−0.574)	(1.021)
lnMC$_{t-2}$	−2.484	−0.043*	0.620*	0.280	0.565	0.037 (0.095)	−0.051
	(−0.781)	(−0.480)	(7.001)	(1.037)	(1.809)		(−1.659)
lnMVALUE$_{t-1}$	0.051	0.002**	0.030**	0.324*	0.149	0.098	0.015***
	(0.048)	(0.072)	(1.014)	(3.590)	(1.430)	(0.744)	(1.463)
lnMVALUE$_{t-2}$	−0.002	0.012**	0.021**	0.211*	0.199	−0.125	0.008***
	(−0.002)	(0.401)	(0.685)	(2.295)	(1.872)	(−0.932)	(0.751)
lnMVOL$_{t-1}$	0.571	−0.007**	0.003**	0.107*	0.269*	−0.003	−0.004***
	(0.660)	(−0.271)	(0.112)	(1.454)	(3.163)	(−0.024)	(−0.509)
lnMVOL$_{t-2}$	−0.286	−0.005**	0.033**	−0.050*	−0.053*	0.062	0.010***
	(−0.33)	(−0.219)	(1.369)	(−0.679)	(−0.632)	(0.586)	(1.234)
lnNOD$_{t-1}$	−0.296	−0.002**	0.046**	0.048*	−0.010*	0.033*	0.009***
	(0.479)	(−0.130)	(2.684)	(0.909)	(−0.169)	(0.427)	(1.486)
lnNOD$_{t-2}$	−0.622	−0.020**	−0.007**	0.064*	0.121*	0.259*	−0.001
	(−0.992)	(−1.116)	(−0.390)	(1.200)	(1.965)	(3.334)	(−0.205)
lnNSEASI$_{t-1}$	8.122	−0.120	0.505	−0.308	−1.794	2.662	0.757*
	(0.974)	(−0.512)	(2.174)	(−0.436)	(−2.191)	(2.578)	(9.337)
lnNSEASI$_{t-2}$	−5.594	0.150	−0.429	0.158	1.112	−1.276	0.212*
	(−0.657)	(0.631)	(−1.808)	(0.219)	(1.329)	(−1.209)	(2.559)
C	7.705	0.372	−2.094	7.147	8.864	−2.712	−0.397
	(0.277)	(0.476)	(−2.699)	(3.021)	(3.238)	(−0.785)	(−1.464)
R-squared	0.076	0.625	0.974	0.796	0.700	0.543	0.987
Adj. R-squared	−0.011	0.590	0.971	0.777	0.671	0.500	0.985
Sum sq. resids	11318.08	8.879	8.776	81.584	109.214	173.739	1.070
S.E. equation	8.7155	0.244	0.243	0.740	0.856	1.080	0.085
F-statistic	0.870	17.757	393.541	41.573	24.781	12.652	777.826
Log likelihood	−579.918	6.425	7.379	−175.451	−199.368	−237.436	179.945
Akaike AIC	7.255	0.105	0.093	2.323	2.614	3.078	−2.012
Schwarz SC	7.539	0.388	0.376	2.606	2.898	3.362	−1.728
Mean dependent	1.884	3.269	7.860	23.346	21.072	10.851	9.869
S.D. dependent	8.667	0.381	1.430	1.567	1.493	1.527	0.697

Table 4 is the Percentage change in Oil Price per barrel. The underlying cointegrated VAR model is of order 2, contains unrestricted intercepts, and lag order was selected using Akaike information criterion (AIC). Standard errors generated from none replications and factorization is based on Cholesky Decomposition. We do capture the out of sample dynamics in the subsequent impulse responses

Market capitalization results, the market value of share traded, the market volume of share traded, number of deals, and the NSE all-shares index are weakly endogenous on themselves for the lagged period, which implies that the variables have weak influence on themselves. However, these variables recorded weak influence on other employed variables which is an indication that the variables are strongly exogenous. Though except for the market volume of share traded and several deals that recorded strong influence on NSE all-shares index, which implies that these variables are strongly endogenous with NSE all-shares index. For the validity of VAR results, the researchers carried out diagnostic tests. Most of the employed variables are not normally distributed, and the result showed the presence of heteroscedasticity.

The outcomes for variance decompositions for our first model in both the short and the long horizons showed that price per barrel of oil is a strong predictor of itself but does not predict other variables as the total forecasted values for all the variables in the whole period is less than the predicted value of itself in the first period. This outcome for oil price per barrel is in line with our outcome for VAR estimation where we found oil price per barrel to be strongly

endogenous on itself and strongly exogenous on other variables. In the same pattern, average closing oil price per barrel is a strong predictor of itself and does not predict other variables. This outcome did not deviate with our observation on VAR estimation. Market capitalization followed the same pattern; as a result, showed that this variable is a strong predictor of itself and does not predict other variables. This outcome did not deviate with our observation on VAR estimation. However, the outcomes for the remaining employed variables followed the same pattern as we observed that these variables are a strong predictor of themselves, and they do not forecast the outcomes of the other variables.

In Table 6 as shown above, in both short and long-run horizon, we ascertained that percentage change in oil price per barrel predict itself and does not forecast the short-run and long-run variation of other employed variables. Also, average closing oil price per barrel predict itself and does not predict variation in other employed variables. In the same pattern, market capitalization, the market value of share traded, the market volume of share traded, number of deals and NSE all-share index predicted the variation of themselves. Still, these variables do not forecast the outcomes

Table 5: Variance decompositions using oil price per barrel

Horizon	S.E.	lnOPPB	lnAPPB	lnMC	lnMVALUE	lnMVOL	lnNOD	lnNSEASI
Shock to lnOPPB, explained by innovations in								
1	0.091	100.00	0.000	0.000	0.000	0.000	0.000	0.000
4	0.201	94.390	1.720	1.324	1.490	0.037	0.160	0.880
8	0.2684	84.249	7.179	2.570	4.515	0.107	0.134	1.246
16	0.340	68.770	14.885	4.757	8.142	0.304	0.851	2.291
Shock to lnAPPB, explained by innovations in								
1	0.245	0.0003	100.00	0.000	0.000	0.000	0.000	0.000
4	0.325	0.031	98.697	0.216	0.316	0.027	0.611	0.102
8	0.376	0.148	96.990	0.303	1.283	0.028	1.162	0.087
16	0.412	0.550	93.902	0.659	3.152	0.024	1.372	0.341
Shock to lnMC, explained by innovations in								
1	0.246	0.202	0.032	99.766	0.000	0.000	0.000	0.000
4	0.355	2.823	0.281	89.149	1.121	0.248	4.825	1.554
8	0.456	4.937	0.326	83.216	4.348	0.577	5.441	1.155
16	0.587	9.343	1.858	71.236	9.521	0.929	5.972	1.141
Shock to lnMVALUE, explained by innovations in								
1	0.761	0.004	5.599	0.142	94.254	0.000	0.000	0.000
4	0.972	0.175	4.431	0.227	91.769	2.390	0.782	0.226
8	1.085	0.922	3.581	0.278	88.908	2.407	1.453	2.452
16	1.230	3.811	2.805	0.396	79.701	2.025	1.538	9.723
Shock to lnMVOL, explained by innovations in								
1	0.890	1.355	0.0002	0.434	16.443	81.768	0.000	0.000
4	1.084	1.204	0.077	1.288	31.896	62.600	0.878	2.056
8	1.170	1.307	0.270	1.119	38.872	54.090	1.420	2.922
16	1.280	3.139	0.539	1.007	40.847	45.362	1.462	7.643
Shock to lnNOD, explained by innovations in								
1	1.084	0.080	0.081	0.122	0.013	0.019	99.685	0.000
4	1.183	0.436	2.047	0.387	0.837	0.075	90.685	5.534
8	1.235	0.989	5.424	0.704	0.970	0.086	84.310	7.517
16	1.287	1.651	7.487	0.782	1.853	0.098	78.114	10.015
Shock to lnNSEASI, explained by innovations in								
1	0.089	2.172	0.526	5.984	1.551	0.309	0.381	89.077
4	0.163	7.740	2.349	7.802	7.226	0.265	2.063	72.555
8	0.227	9.795	1.938	5.483	16.666	0.234	2.354	63.530
16	0.322	11.922	1.304	2.939	27.047	0.316	2.284	54.188

Table 5 is oil Price per barrel. The underlying cointegrated VAR model is of order 2, contains unrestricted intercepts, and lag order was selected using Akaike information criterion (AIC). Standard errors generated from none replications and factorization is based on Cholesky Decomposition. We do capture the out of sample dynamics in the subsequent impulse responses

Table 6: Variance Decompositions for the percentage change in oil price per barrel

Horizon	S.E.	%ΔOPPB	lnAPPB	lnMC	lnMVALUE	lnMVOL	lnNOD	lnNSEASI
				Shock to %ΔOPPB, explained by innovations in				
1	8.716	100.00	0.000	0.000	0.000	0.000	0.000	0.000
4	8.938	95.444	2.556	0.579	0.172	0.225	0.485	0.539
8	8.995	94.241	3.674	0.660	0.174	0.222	0.487	0.541
16	9.024	93.643	4.202	0.715	0.190	0.221	0.491	0.538
				Shock to lnAPPB, explained by innovations in				
1	0.244	0.395	99.605	0.000	0.000	0.000	0.000	0.000
4	0.321	1.073	97.857	0.254	0.043	0.120	0.534	0.119
8	0.362	1.036	97.266	0.348	0.122	0.175	0.952	0.100
16	0.383	0.988	96.853	0.569	0.290	0.178	1.025	0.097
				Shock to LNMC, explained by innovations in				
1	0.243	0.303	0.044	99.652	0.000	0.000	0.000	0.000
4	0.345	1.857	0.301	84.635	5.268	1.119	4.307	2.513
8	0.452	2.600	0.207	73.754	12.805	1.775	5.364	3.496
16	0.596	3.837	0.367	60.772	19.718	1.999	6.601	6.705
				Shock to lnMVALUE, explained by innovations in				
1	0.740	0.014	6.692	0.940	92.354	0.000	0.000	0.000
4	0.870	0.258	6.498	3.220	86.519	1.106	2.267	0.131
8	0.930	0.591	6.524	7.408	80.134	1.230	3.786	0.327
16	1.003	1.278	6.519	12.110	72.536	1.427	4.716	1.415
				Shock to lnMVOL, explained by innovations in				
1	0.856	0.722	5.68E-06	0.008	12.987	86.284	0.000	0.000
4	0.968	0.677	0.112	2.995	18.553	73.039	1.906	2.717
8	1.015	0.700	0.218	7.849	19.070	66.589	3.007	2.567
16	1.072	0.905	0.561	13.149	19.274	59.983	3.722	2.405
				Shock to lnNOD, explained by innovations in				
1	1.080	0.059	0.042	0.035	0.002	0.049	99.813	0.000
4	1.184	1.613	1.610	0.138	1.233	0.257	89.772	5.378
8	1.240	2.410	4.263	0.261	1.959	0.310	82.786	8.011
16	1.299	3.197	5.272	0.265	3.390	0.311	75.822	11.744
				Shock to lnNSEASI, explained by innovations in				
1	0.085	0.964	0.472	5.214	2.246	0.345	0.124	90.634
4	0.160	6.825	2.725	5.656	10.613	0.395	1.398	72.387
8	0.226	8.520	2.109	4.599	18.508	0.326	1.859	64.078
16	0.312	9.219	1.399	4.472	23.792	0.321	2.534	58.262

Table 6 is the percentage change in Oil Price per barrel. The underlying cointegrated VAR model is of order 2, contains unrestricted intercepts, and lag order was selected using Akaike information criterion (AIC). Standard errors generated from none replications and factorization is based on Cholesky Decomposition. We do capture the out of sample dynamics in the subsequent impulse responses

of the other variables. Though the forecasted values themselves, and that of other variables vary significantly. These highlighted results for variance decompositions are in line with our observation on VAR estimation on the employed variables. The results are consistent with existing literature. The results of variance decomposition analysis and impulse response function provide the same conclusions regardless of the order of decomposition since their estimation is independent of the ordering.

4.4. Implication of the Results

Figures 1 and 2 plot the responses of each of the employed variables to a one standard error shock in the other variable. This is presented in the appendix section. The figures show that variations in the price of crude oil in the market are slowly transmitted to some selected stock market variables. The Nigerian stock market responds to the global crude oil price shock some months after the shock. The response to the shock may be attributed to inflation and foreign exchange policy of the nation. These results show the inefficiency of the Nigeria stock market in transmitting

shocks in the international crude oil market. The situation is also reflected in the international crude oil market as the outcomes of our VAR estimations and variance decompositions indicate. The insignificant responses of the selected stock market performance variables to price shock in international crude oil market show the weak influence of the selected stock market variables in Nigeria in the international crude oil market. The result is consistent with that of Mordi et al. (2010), Al Hayky and Naim (2016) and Ojikutu et al. (2017).

5. CONCLUSIONS

This study examined the effect of oil price shock on selected performance variables in the Nigerian stock market. Vector autoregression (VAR) analysis was carried on monthly data for the period, January 1, 1997, to December 31, 2016. This study utilized variance decomposition and impulse response analysis to compliment VAR estimations for the models. In line with the existing empirical literature, the results from VAR estimation

revealed that international crude oil price is strongly exogenous to Nigerian stock market performance variables, which indicated that the oil price fluctuations in the international crude oil market have weak influence on stock market performance variables in Nigeria.

The results from the variance decomposition analysis also indicate a very weak relationship between the crude oil price shocks and stock market variables in Nigeria. In the international crude oil market, the impulse analysis reveal that variation in oil price is slowly transmitted to the Nigeria stock market. It is also established that crude oil price in the Nigerian capital market is greatly minimized, and the effect does not sufficiently account for changes in the stock market activities.

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APPENDIX

Figure 1: Impulse response for model 1 (oil price per barrel)
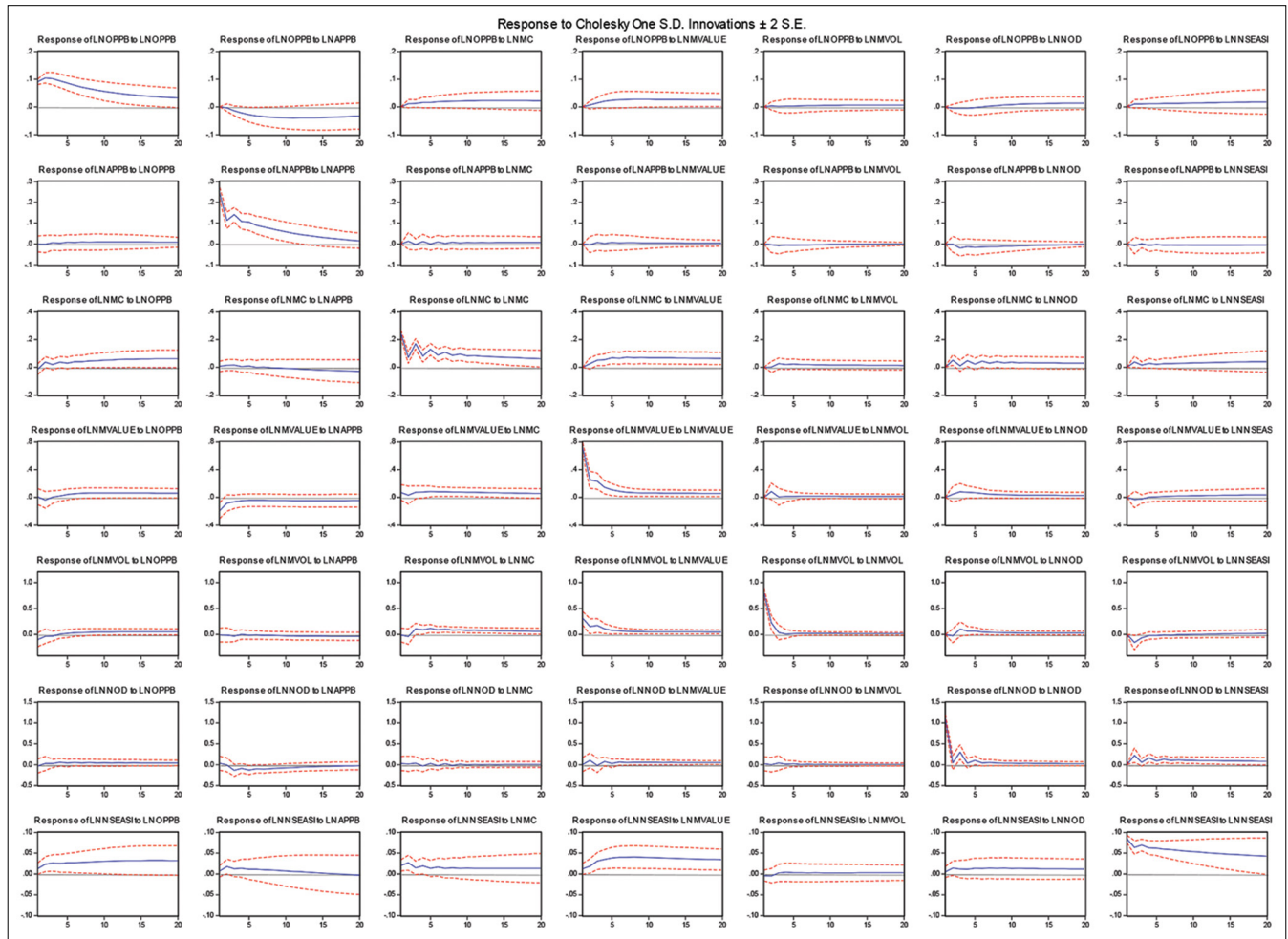
Figure 2: Impulse response for model 2 (percentage change in oil price per barrel)