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Impact of Oil Price Shocks on Sectoral Returns in Nigeria Stock Market

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ABSTRACT

This paper investigates the impact of oil price shocks on stock returns in Nigeria using monthly data on four sectoral indices – Banking, Insurance, Food, Beverages, and Tobacco (FB&T) and Oil and Gas (O&G) – over the period January 2010 to December 2018. The oil price shocks are decomposed into precautionary demand, aggregate demand, and supply sources. The outcome of the estimation of a Structural Vector Autoregressive (SVAR) model suggests that precautionary demand oil shock had negative and significant impact on the sectoral returns except for FB&T whose response was insignificant; aggregate demand oil shock had a negative but insignificant impact on the sectoral returns but for the O&G sector whose response was positive although insignificant; whereas oil supply shock had a positive but insignificant impact on the sectoral returns in the Nigerian stock market. However, O&G sector was the only exception with negative response to oil supply shock, albeit, insignificantly.

Keywords: Oil Price, Stock Returns, Structural VAR
JEL Classification: G

1. INTRODUCTION

The role of oil resource and the implications of its changing prices on the global economy has been extensively examined in the literature (Hamilton, 1983; Mork, 1989; Baláž and Londarev, 2006; Kilian, 2008 a and b; Arouri and Rault 2009; Jones et al., 2004; 1996; and Chittedi, 2012), among others. As the world's leading fuel, oil resource is unarguably an essential factor input in the production process, accounting for 32.9% of global energy consumption, and over 61.0% of global trade in 2013 (BP, 2014). This significant role underscores the extensive literature on the implications of oil price changes on key macroeconomic indicators such as inflation rate, exchange rate, interest rate, stock prices, international debt and output growth. Though these studies differ markedly in their findings, they nevertheless affirm the degree of risk the global economy is exposed to in the face of oil price fluctuations. Some of the noted effects of positive changes in oil price include: exacerbated inflationary pressure; reduced real disposable income; dampened aggregate demand; decelerated investment; worsened unemployment rate; and eventual slowdown of economic growth. These claims were clearly attested to by the macroeconomic distortions that accompanied the global oil crisis of the 1970s, the international Persian Gulf crisis of 1991 and, to a large extent, the recent 2007/2008 global financial and economic crisis. Though the degree of transmission of oil price shocks to the economy depends on whether the economy is oil-exporting or oil-importing, such consequences, in many climes, extend beyond the economic to the social spheres where oil price shocks are felt much more by the poor than the developed economies (McSweeney and Worthtington, 2007 and Rifkin, 2002).

Nigeria is a crude oil-exporting country whose economy is overly dependent on crude oil exports, which contribute about 98% of export earnings, 83% of Federal government revenue and a key contributor to GDP (CBN, 2010a). The proceeds from crude oil exports in 2002 accounted for over 70% of government revenue, 90% of foreign exchange earnings, and 26% of GDP. By 2006, the proportions of oil exports to government revenue, GDP and foreign exchange earnings increased to 87.2, 37.6 and 90.2%, respectively, while in 2010 earnings from oil alone contributed approximately 94.0% of total foreign exchange earnings (CBN, 2010b). These statistics underscore the vulnerability of the economy to the vagaries of international crude oil price.

Theoretically, an increase in oil price should indicate revenue windfall for oil-exporting countries as it is expected to shore up foreign exchange earnings and build reserve in the short-run. However, for net-importers of refined petroleum products such as Nigeria with domestic regulation of prices (subsidies), oil price increase may not translate to the expected economic benefit, rather, it can cascade into severe fiscal hiccups, constraining government's ability to finance the huge import bills as well as meet other international obligations. The aftermaths may be detrimental to economic growth arising from increased domestic production cost and decline in aggregate demand. Consequently, the impact of oil price fluctuation on exchange rate, monetary policy, government expenditure, and stock market in Nigeria has severally been investigated. Evidence from a survey of these studies were mixed, ostensibly due to the different methodologies and data frequencies employed (Effiong, 2014; and Abeng, 2016).

Recently, research interest has generally shifted to examining the impact of oil price shocks on stock market returns, possibly due to the growing importance of the stock market as a channel of monetary policy, in addition to the growing role of the market as the source of financing long-term development projects. However, extant literature indicate that most of these studies adopted the aggregate analytical approaches which mask the dynamics inherent in the market as the effect of oil price change is apportioned equally across sectors, without taking cognizance of the heterogeneous and industry specific features of the sectors. However, there is an emerging body of literature that is focused on addressing this limitation in the literature. These studies adopt industry level approach to the analyses of the impact of oil price shocks on stock market returns, thereby making study results veritable input to portfolio investors' decision making process and the conduct of monetary policy. They also facilitate the monetary authority's better understanding of the role of the stock market as a channel of monetary policy transmission, and identify the underlying factors that drive individual industries' sensitivity or risk exposure to oil prices changes. In economies where these studies had been conducted, economic agents had achieved better economic management and effective decision making processes.

These arguments are elaborated over the next four parts. Part two reviews the related literature while the methodology and data used in this study are presented in part three. Part four contains the empirical results of the econometric analysis and the paper is concluded in part five.

2. LITERATURE REVIEW

An oil price shock reflects a change in the price of oil due to an unanticipated change in oil market fundamentals (i.e. global supply or demand of oil). Hamilton (2009a; 2009b) maintains that oil prices change in response to either geopolitical or economic events, which suggests that oil prices change due to supply disruptions (supply-side shocks) or economic growth/downturns (demand-side shocks). In particular, supply-side shocks are driven by events such as the Yom Kippur War in 1973, the Iranian revolution in 1978, Iraq's invasion of Iran and Kuwait in 1980 and 1990, respectively, the Arab Spring in 2010 or Syrian unrest in 2011. Such shocks lead to major oil production disruptions, which are not accommodated by a similar reduction in the demand for oil and thus, drive oil prices to higher levels. Similarly, demand-side shocks are related to oil price changes which are influenced by movements in the global business cycle. For instance, the remarkable growth of the Chinese and other emerging economies from 2004 to 2007 significantly increased oil demand from these countries, while oil supply did not follow suit, driving up oil prices to unprecedented levels. Conversely, the global economic recession during the Global Financial Crisis of 2007-2009 led to the collapse of oil prices, as the dramatic reduction of oil demand was not accompanied by a reduction in the supply of oil.

Kilian (2009a) maintains that there are three types of oil price shocks (rather than two), namely, the supply-side, aggregate demand, and precautionary demand shocks. Kilian's aggregate demand shocks are the same as Hamilton's demand-side shocks. However, according to Kilian (2009a), geopolitical unrest, primarily observed in the Middle East region, does not lead to supply-side oil price shocks, as suggested by Hamilton (2009a; 2009b). On the contrary, Kilian argues that these events trigger precautionary demand shocks, which arise due to the uncertainty that the geopolitical turbulence imposes on economic agents about the future availability of oil. To put it simply, Kilian maintains that economic agents expect a shortage in oil supply soon after initiation of geopolitical unrest and, thus, they increase their demand for oil instantly, driving oil prices to higher levels. Finally, he suggests that supply-side shocks are related to restrictions in oil supply by OPEC, via cartel behavior, as a strategy to inflate oil prices. Empirical studies in this area are ubiquitous.

Lawal et al. (2016), using EGARCH econometric model, find that volatility in the stock market is positively and significantly influenced by oil price shock. Using Vector Error Correction Model, Olufisayo (2014), investigates how stock market growth in Nigeria is related to oil price shocks. His finding shows a positive impact of oil price shocks on the stock market, albeit, temporary.

Effiong (2014) using Structural Vector Auto-regression (SVAR) investigates the effects of oil price shocks on the Nigerian stock market. In line with the work of Kilian and Park (2009), he disentangled the sources of the shocks into supply, aggregate demand and oil-specific demand shocks, and found that whereas price changes caused by supply shocks are negative and insignificant, those caused by aggregate demand and oil-specific demand shocks are both positive and significant. On the whole, his study shows that oil price shocks account for about 47% variation in Nigerian stock prices in the long term.

Chaudary et al. (2014) find strong evidence of positive correlation between oil price shocks and stock returns in Nigeria. Gil-Alana and Yaya (2014) investigate how oil prices are related to the Nigerian stock market using fractional integration. They find that not only did oil prices have immediate significant and positive impact on the Nigerian stock market, the shock lasted for upwards of 3 months before adjusting back to equilibrium. They therefore, concluded there is a short run relationship between oil price and stock market in Nigeria, but not in the long run.

Using NARDL model, Dhaoui et al. (2018) investigate the asymmetric responses of stock markets in OECD countries. Their result confirms the previous findings in the literature which reveal a non-linear relationship between stock market prices and oil price shocks. They, however, find that positive and negative oil price shocks have different effects on stock market reactions. In fact, they show that the response speed and the time of adjustment to new equilibrium is a function of the changes in the directions of the macroeconomic fundamentals and it is quite sensitive to it, in this case, oil price.

Using evolutionary co-spectral analysis Creti et al. (2014) study the nature of the movements of oil price and stock markets for major oil-exporting OPEC member countries, namely, United Arab Emirate, Kuwait, Saudi Arabia and Venezuela. Their findings show that there could be positive or negative co-movements between oil price and the stock markets of these countries though this interdependency is strong only in the medium-term but not in the short run. However, they note that the source of the oil shock is one of the major determinants of the correlation between oil price and stock returns in these countries. For instance, oil shocks caused by major global events such as wars or change in global business cycle will result in increase in demand for oil which translate to increase in income for net oil exporters and consequently, rise in their stock prices.

Using Structural VAR, Bastianin et al. (2016) assess how the volatility in the stock markets of G7 countries are influenced by oil price shocks. Disentangling the origins of oil price shocks, they find that oil prices driven by supply shocks do not have any impact on the stock returns of G7 countries. However, oil prices whose sources are from shocks on aggregate demand or oil specific explain at least 10% volatility in stock returns in G7 countries.

Zhu et al. (2017), using a two-stage Markov regime-switching model, examine if stock returns react in the same magnitude during positive and negative oil price shocks. They find that during the periods of low volatility, oil price shocks have little or no impact on stock returns. However, during the high volatility regime, the impact oil price shocks have on stock returns is statistically significant. Disentangling the sources of oil price shocks, they also find that while the impact of the price changes caused by supply shocks is not significant on stock returns, those caused by aggregate demand and oil-specific demand shocks are significant. Furthermore, they find that whereas the shocks driven by aggregate demand shocks have a positive impact on stock returns, those which are caused by oil-specific demand shocks negatively impact the stock returns.

Disaggregating the sources of oil price shocks into aggregate demand, oil-specific demand, and supply shocks, Degiannakis et al. (2014) assess the impact of oil price shocks on the volatility of the stock market using Structural VAR. They segregated the volatility into conditional, realized, and implied measures, the first two measure current stock market volatility, whereas the latter measures the forward-looking volatility. They find that while oil-specific and supply oil price shocks do not impact on stock market volatility, aggregate demand shock significantly affects the stock market volatility. This finding holds true for both current and forward looking volatility measures at an aggregate and sectoral level. Furthermore, they find that the aggregate demand shock negatively and significantly impacts on all sectoral indices and volatility measures.

Abhyankar et al. (2013) using SVAR study the effect of oil price shocks on Japanese stock market. They find that the nature of response of the Japanese stock market to oil price shocks depends on the source of the shock. For instance, when positive oil price shocks are driven by shocks in aggregate global demand, Japanese stock returns react positively, but when driven by oil-specific demand, the impact on stock returns is negative. On the other hand, supply shocks caused by disruptions in global oil productions have no effect on Japanese stock returns. Furthermore, they find that the channel through which demand and supply shocks to oil price impacts Japanese stock returns is the expected real cash-flow and not changes on expected returns. They also did a comparative analysis between US and Japanese markets and found that when shocks in oil price are caused by aggregate global demand and are oil-specific, the Japanese stock market appears more sensitive and reacts stronger than the US. Again, they found that whereas shocks arising from demand and supply shocks affect Japanese stock returns through expected cash flow, for the US however, it is through both changes in expected cash flow and discount rates.

3. DATA AND METHODOLOGY

3.1. Nature and Sources of Data

This study uses monthly data obtained from various relevant sources for the different variables from January 2010 to December 2018, a total of 108 observations for all the selected variables. Monthly data was chosen because the study requires high frequency data especially as regards investment decisions. Daily data would have served better but because some key variables in this study such as Oil Inventory (Kilian and Murphy, 2014, Kilian and Lee, 2013) (proxy for precautionary oil demand shocks) and global Real Economic Activities (proxy for oil demand shocks) (Kilian, 2009, Kilian and Park, 2009, Wang et al., 2013) were not available at a higher frequency. Data for Nigerian sectoral returns: Banking (BNK), Insurance (INS), Food, Beverages and Tobacco (FB&T), and Oil and Gas (O&G) were sourced from the Nigerian Stock Exchange. All the sectoral returns were deflated using the Consumer Price Index (CPI) gotten from the Nigerian Bureau of Statistics (NBS) to determine their real returns. Brent Crude Oil Price (proxy for world crude oil price), Global Oil Production (proxy for global Oil Supply shocks), and Global Oil Inventory (Proxy for Precautionary Demand Shocks) were obtained from the U.S. Energy Information Administration (EIA).

Given the lack of data on crude oil inventories for other countries, we follow Hamilton (2009a) in using the data for total US crude oil inventories provided by the EIA. These data are scaled by the ratio of OECD petroleum stocks over US petroleum stocks, also obtained from the EIA. That scale factor ranges from about 2.23 to 2.59 in our sample. The resulting proxy for global crude oil inventories was expressed in changes rather than percent changes. One reason is that the percent change in inventories does not appear to be covariance stationary, whereas the change in inventories does (Kilian and Murphy, 2014). The other reason is that the proper computation of the oil demand elasticity requires an explicit expression for the change in global crude oil inventories in barrels. This computation is only possible if oil inventories are specified in changes rather than percent changes (Kilian and Murphy, 2014). Global Real Economic Activities (proxy for Aggregate Demand Oil Price shocks) also called Kilian Index was sourced from Kilian's website Kilian (2019).

3.2. The SVAR Model

In order to investigate the transmission of shocks from oil prices to Sectoral (banking, insurance, oil and gas, food-beverages-textile) stock market price returns, this study employed a structural VAR model. The SVAR framework is generally focused on how the innovations to one endogenous variable affect other endogenous variables included in the model (Effiong, 2013). Specifically, the justification for using SVAR is to examine the transmission of shocks from oil prices to sectoral stock returns. This model imposed a set of restrictions on the contemporaneous relationship between the variables in line with economic theory in order to separate innovations to the variables orthogonally so as to have structural interpretation. As long as the shocks are identified, the effects on all the variables in the model can be dynamically measured. By following this method, and following the study of Kilian and Park (2009), and Effiong (2014), we disentangle the different sources of oil price shocks on sectoral (banking, insurance, oil and gas, food-beverages-textile) stock market price returns into demand and supply components. The general algebraic structural VAR representation is described thus:

$$AY_t = C + \sum_{i=1}^{i=4} D_i Y_{t-i} + Bv_t \tag{1}$$

$$v_t \sim N(0,1) \tag{2}$$

The uppercase alphabet $Y_t = \{rstp_t, roilp_t, oild_t, grea_t, oils_t\}$ is a vector of variables. Real stock market price index returns for banking sector, insurance sector, food-beverages-textile sector, and oil and gas sector are denoted as vector matrix $rstp = \{bnk, ins, fbt, og\}$; *roilp* is the real oil price, *oild* is the precautionary oil demand; *grea* represents the index for global real economic activity; and *oils* is percent changes in global oil supply, respectively. Matrix A is the contemporaneous matrix that shows the linear relationship between the endogenous variables; matrix C contains the constant parameters; matrix D is the lag matrix that control the underlying dynamics embedded in the model; matrix B is the diagonal weight matrix for the serially and mutually uncorrelated structural shocks v_t.

However, since we are only interested in explaining the mutually orthogonal shocks, we express the relationship between the structural VAR shocks v_t and the reduced form VAR shocks z_t as below so as to derived the structural innovation from the reduced form shocks with imposed exclusion restrictions on matrix A;

$$A^{-1}Bv_t = z_t \tag{3}$$

$$A^{-1}B = S \tag{4}$$

$$Sv_t = z_t \tag{5}$$

$$v_t = S^{-1}z_t \tag{6}$$

The SVAR model in this study imposes a block-recursive structure on the contemporaneous relationship between the reduced-form shocks and the underlying structural shocks. The first block constitutes a model of Nigerian real stock returns. The second block constitutes a model of the global crude oil market. This is further explained in the next paragraph.

3.3. Identifying Assumption

The structural identification in this study is in line with that of Kilian (2009) in which oil price fluctuations is decomposed into oil-supply shocks, aggregate demand shocks, and oil-specific demand shocks respectively. Kilian used the oil-supply shocks to capture the global supply of crude oil, and the aggregate demand shock to capture the global economic activities, while the precautionary demand for crude oil which reflects oil-supply uncertainty is captured by the oil-specific demand shocks. In essence, a recursive identified structural model as used in Kilian (2009) is adopted so that the underlying sources of oil price shocks effects on sectoral stock prices can be examined, and it is as depicted below in equation 7:

$$\begin{pmatrix} z_t^{bnk} \\ z_t^{ins} \\ z_t^{fb\&t} \\ z_t^{o\&g} \\ z_t^{P\_oil} \\ z_t^{d\_oil} \\ z_t^{s\_oil} \end{pmatrix} = \begin{bmatrix} a11 & 0 & 0 & 0 & a15 & a16 & a17 \\ 0 & a22 & 0 & 0 & a25 & a26 & a27 \\ 0 & 0 & a33 & 0 & a35 & a36 & a37 \\ 0 & 0 & 0 & a44 & a45 & a46 & a47 \\ 0 & 0 & 0 & 0 & a55 & a56 & a57 \\ 0 & 0 & 0 & 0 & 0 & a66 & a67 \\ 0 & 0 & 0 & 0 & 0 & 0 & a77 \end{bmatrix} \begin{pmatrix} v_t^{shock\ to\ bnk\ returns} \\ v_t^{shock\ to\ ins\ returns} \\ v_t^{shock\ to\ fb\&t\ returns} \\ v_t^{shock\ to\ o\&g\ returns} \\ v_t^{precuationary\ demand\ shock} \\ v_t^{ggregate\ demand\ shock} \\ v_t^{oil\ supply\ shock} \end{pmatrix} \tag{7}$$

The above structural identification matrix can be divided into four segments of stock market segment, oil price segment, oil demand related segment, and the oil supply segment respectively. The justification for the recursive identification matrix in equation 7 is discussed as follows.

Firstly, the structural implication of the first four lines in the structural identification matrix is that the stock market responds to shocks of its own that are likely to be caused by interest rate and exchange rates volatilities as opined by Bjørnland (2009) and Basher et al. (2006; 2012), as well as to other shocks arising from other segments in the model. Secondly, oil price is affected by some shocks which are neither oil-supply shocks nor aggregate demand shock, and this uncertainty can be explained by the precautionary oil-demand shock. This justifies the inclusion of the future supply of crude oil in the model. Also, in the aggregate demand block, the global real economic activities respond instantaneously to oil-supply shocks, but may be affected by other shocks with lags. For instance, Hamilton (1983) and Kilian (2009) posited that global economic activities could be markedly affected by crude oil price disruption. In addition to this, Kilian and Park (2009) opined that global economic activity cannot be affected by changes in stock prices in any country in the short run. Lastly, oil supply shock is not contemporaneously affected by other shocks in the model, but exogenously determined. This kind of shocks is mainly caused by oil production disruptions which may be as a result of military and political conflicts leading to OPEC's production quota adjustment in the crude oil markets.

However, as discussed in the work of Kilian (2009), the effects of crude oils demand and supply shocks on the economy differ to some reasonable extent depending on whether the rise in oil price is driven by shortfall in oil production or oil spillage, or maybe a shift in precautionary demand for crude oil due to market uncertainty. Consequently, these shocks will surely have different effects on the stock returns, because specific oil price shock is being accompanied by other related shock such as the oil demand and supply shocks, and this would cause varying effects on the stocks returns over the horizons. In addition, the direct effects of oil demand on the economy and other industrial prices cannot be isolated from its indirect effect via the real oil price, and it would be totally biased to treat shock to oil price in a model while isolating the other oil related variables.

4. EMPIRICAL RESULTS

4.1. Unit Root Test

The result of the ADF and P-P unit-root tests are presented in the Table 1. From the table, ADF test statistics shows that all the variables were stationary at 1% level of significance, while the P-P test statistics shows that all the variables were stationary at 1% level of significance, except global real economic index which is stationary at 10% level of significance. Since the variables are all level stationary, I(0), there is no tendency for co-integration to exist among the variables; hence, there is no need to carry out such test and we may proceed to the estimation of the structural VAR model with valid inferences.

4.2. Lag Selection Criteria

Table 2 shows the lag selection result by six different parsimonious model selectors. The asterisk indicates lag order selected by the criterion, LR is the Likelihood Ratio based test statistics, FPD is the test based on the final prediction error generated from the initial VAR model, AIC is the Akaike information criterion, SC represents the Schwarz information criterion, and HQ is the Hannan-Quinn information criterion. We can see clearly from the table that lag one is selected by the criteria, however, we do not strictly base our estimation on this as the model produced by lag one suffered autocorrelation and heteroscedasticity. Consequently, we adopted a VAR model of order two in this study to circumvent the two problems of autocorrelation and heteroscedasticity, and to arrive at a more reasonable result.

4.3. Model Stability Test

Generally, the ability to predict the direction of the key variables is the principal objective of the VAR/VEC model. The model must be stable in order to achieve this goal. The test for checking the stability of the structural VAR model was conducted using the autoregressive roots graph. As shown in Figure 1, the test result indicates that the model is stable as all the eigenvalues lie inside the unit root circle.

4.4. Structural VAR, Impulse Response Functions (IRF) and Analysis

4.4.1. Response of sectoral stock returns to precautionary demand oil price shocks

Figure 2 shows that sectoral returns in the Nigerian stock market respond negatively on impact by oil price increases caused by

Figure 1: Inverse roots of AR characteristic polynomial

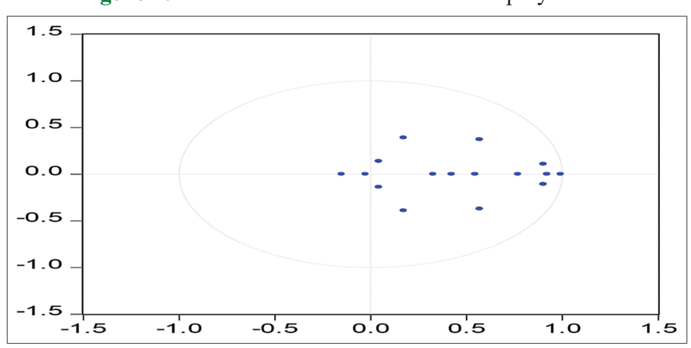


Table 1: Unit root test result

Variables	ADF test-stat	Prob.	P-P test-stat	Prob.
Banking	−9.5343***	0.0000	−9.5071***	0.0000
Insurance	−9.1958***	0.0000	−9.1765***	0.0000
Food beverages and tobacco	−10.6084***	0.0000	−10.7857***	0.0000
Oil and gas	−9.1215***	0.0000	−9.1184***	0.0000
Aggregate demand oil shock	−1.8957***	0.0000	−1.6858*	0.0868
Oil supply shock	−9.0348***	0.0000	−9.0411***	0.0000
Precautionary oil demand shock	−9.4014***	0.0000	−9.3622***	0.0000
Real oil price	−6.6111***	0.0000	−6.6347***	0.0000

Source: Authors computation, 2019. *,**,***Denotes significance at 10%, 5% and 1% respectively precautionary demand oil shocks. The responses are significant on impact for all the sectors except food, beverages, and tobacco. The first graph shows that the banking sector's stock returns responded negatively in the 1st month to 1 time precautionary oil-demand shock. The negative return diminished sharply and turned positive in the 3rd month and thereafter the shock vanished in the 7th month. The impact of precautionary demand oil shock caused a negative delayed response in the Insurance sector's stock returns followed by a sharp rise in the return until it turned positive after 3 months, thereafter, the shock effects fizzled out in the 7th month just like the banking sector.

The food, beverages, and tobacco sector's stock returns' response to precautionary demand oil shock was negative on impact, the negative effect gradually declined until it turns positive in the 4th month and ceases in the 9th month. The figure also shows that the oil and gas sector's stock returns responded negatively to precautionary oil-demand shock. It can be seen clearly that the negative effect of precautionary oil-demand shock on oil and gas sector's stock returns quickly diminished and turned to positive just before the 2nd month. The shocks eventually stopped in the 6th month. This result is at variance with the findings of Effiong (2014) and Wang et al. (2013) which are positive and significant, and understandably so because even though Nigeria is a crude oil-exporting country, it depends mainly on imported refined petroleum products for its domestic consumption. Due to Nigeria's heavy reliance on imported refined petroleum products, an increase in oil price caused by precautionary oil demand shocks means increase in production costs for firms and industries in the form of rise in cost of power generation (as most firms generate majority of the power or energy they consume), or transportation cost incurred in moving persons, goods and services from one location to another. The negative relationships between oil price increase caused by the precautionary oil demand shock and sectoral stock returns in Nigerian stock market is intuitive. This result is in agreement with the findings of Kilian and Park (2009) to the extent that both stock markets experienced negative effects on impact, but while the negativity persisted in the work of Kilian and Park, the Nigerian sectoral returns returned to positive after an average of 3 months.

Table 2: VAR lag selection result

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.40e+21	71.39411	71.60253	71.47846
1	1268.671*	4.46e+15*	58.73267*	60.60839*	59.49181*
2	77.70068	6.43e+15	59.07652	62.61955	60.51045
3	52.42928	1.22e+16	59.65746	64.86780	61.76618
4	68.42963	1.78e+16	59.91612	66.79377	62.69963
5	55.11279	3.09e+16	60.26201	68.80696	63.72031
6	50.53975	5.72e+16	60.55103	70.76330	64.68412
7	59.46998	8.53e+16	60.44801	72.32758	65.25589
8	77.52662	7.19e+16	59.51296	73.05985	64.99563

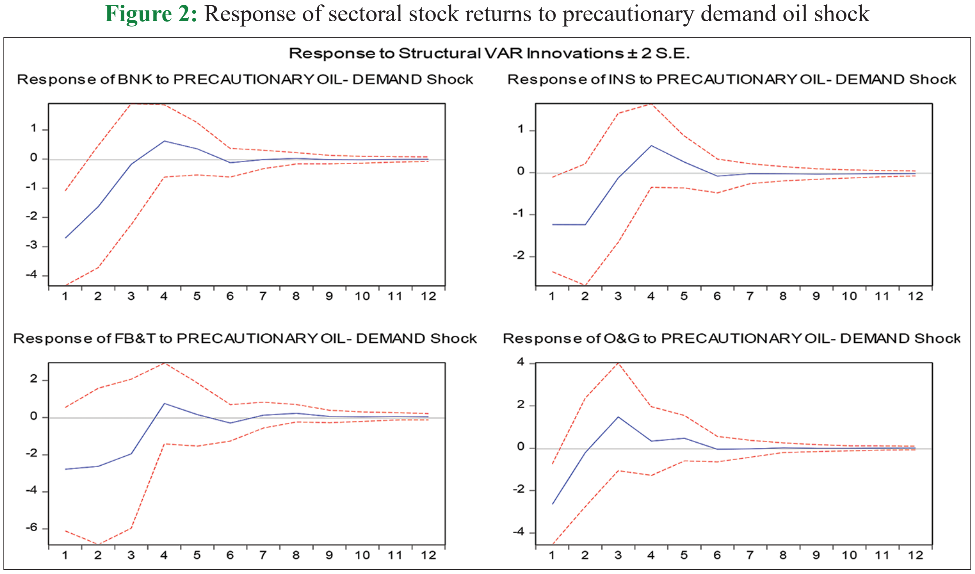
Source: Authors computation, 2019

4.4.2. Response of sectoral stock returns to aggregate-demand oil shock

Figure 3 shows that banking sector stock returns responded negatively to aggregate demand oil shock on impact although the negativity did not persist as the returns became positive before the 3rd month. The response of the Insurance sector stock returns to aggregate demand oil shock was negative on impact and further deteriorated up to the 2nd month, thereafter, the trajectory changed and became positive by the 3rd month. They, however, became negative albeit, marginally, which persisted until the 12th month before fizzling out. Food, Beverages and Tobacco (FB&T) sector stock returns, similarly to the Banking sector, responded to aggregate demand oil shock negatively on impact and thereafter, rose quickly to positive returns by the 3rd month. They got to their peak in month 4, declined thereafter and maintained a persistent positive marginal returns till the 12th month when the shocks vanished.

Conversely, the response of returns of the Oil and Gas sector to aggregate demand oil shock was positive on impact, although, marginally and temporarily declined to negative before quickly reverting to positive returns in less than a month, and eventually ceased in the 9th month. Our result, while not in agreement with the findings of Effiong (2014), is nevertheless intuitive because of Nigeria's heavy dependence on imported refined petroleum products and the attendant corruption surrounding the handling

Figure 2: Response of sectoral stock returns to precautionary demand oil shock



of the oil subsidy scheme in Nigeria (Ezeoha et al., 2016). The supposed wealth transfer from oil-importing countries to oil-exporting ones as posited by Kilian and Park (2009), Wang et al. (2013), Effiong (2014) is negated by the huge spending on the inflated cost of imported refined petroleum products hence the negative impact on almost all the sector's returns (Ezeoha et al., 2016). These findings are consistent with the work of Jung and Park (2011). Worthy of mention is that the negative returns across the sectors were not persistent as the returns reverted to positive within 1-2 months after the shocks. Oil and Gas sector's returns were, however, different from other sectors and understandably so because growth in global economic activities which induces the oil price is good news for the oil and gas sector returns (Kilian and Park, 2009; and Effiong, 2014).

4.4.3. Responses of sectoral stock returns to oil-supply shock

Figure 4 shows that the banking, insurance, and food, beverages and tobacco all reacted in a similar pattern to oil-supply shock. A positive oil supply shock that reflects the discovery of new oil fields, better extraction technologies or a possible decline in OPEC's control over oil supply causes a transitory decline in stock prices, which is good news for industries because it lowers input costs and increases firms' profitability (Effiong, 2014; and Wang et al., 2013). For the same reason, oil supply shock causes a negative response to the stock returns of the Oil and Gas sector which is intuitive because of the temporary decline in oil prices driven by increase in oil supply. This negative response persisted till the 7th month before dying out. The response pattern of Oil and Gas stock returns following an oil supply shock can be linked to the differences between short-term and long-term price elasticity of oil demand. In the short term, the price elasticity of crude oil demand tends to zero, whereas it is much higher in the long term (Hamilton, 2009a; and Wang et al., 2013). Hence, a decrease in oil price following an increase in oil supply does not induce an increase in oil demand in the short term and leads to less profits. It is worthy of note that the responses of stock returns to oil-supply shock are not significant across all the sectors which is in line with previous studies (Kilian, 2009; Wang et al., 2013; and Effiong, 2014).

Figure 3: Response of sectoral stock returns to aggregate-demand oil shock

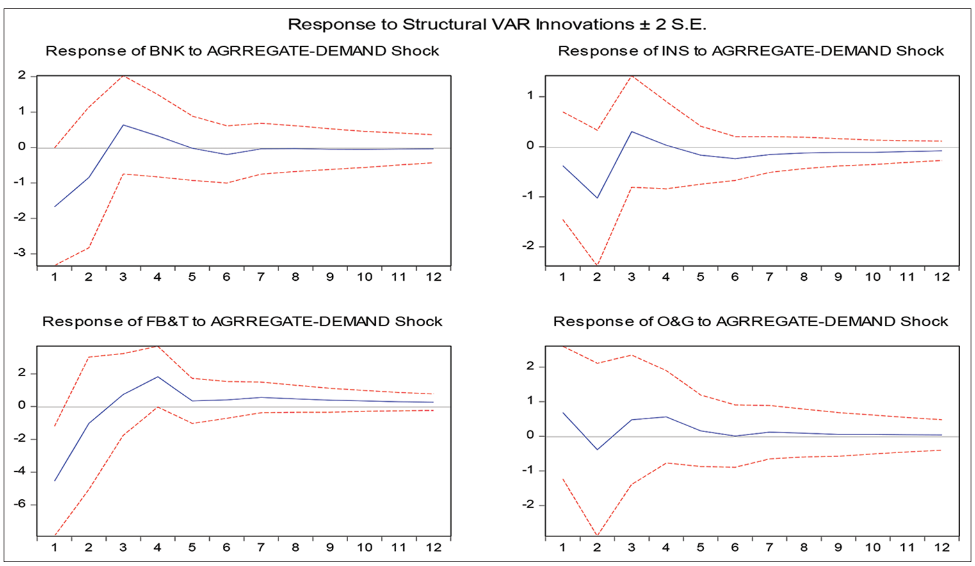
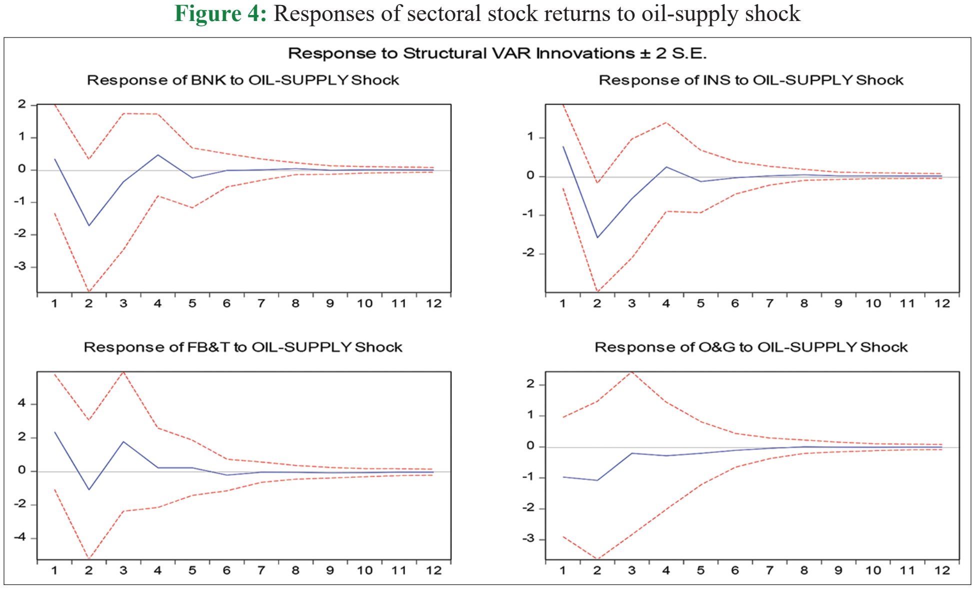


Figure 4: Responses of sectoral stock returns to oil-supply shock



5. CONCLUSION

This study has empirically examined the impact of oil price shock on the sectoral stock returns in the Nigerian stock market. In line with other previous studies (Effiong, 2014; Kilian, 2009; Kilian and Park, 2009; and Wang et al., 2013), we disentangled the sources of oil price shocks into precautionary demand oil shock, aggregate demand oil shock, and oil supply shock and tested how each of the sources impacted the returns of various sectors in the Nigerian stock market. The sample sectors selected were Banking, Insurance, Food, Beverages, and Tobacco, as well as Oil and Gas.

Overall, this study has established empirically, that the Nigerian sectoral stock returns mainly responded negatively to precautionary and aggregate demand oil shocks and positively to oil supply shocks with a few exceptions. This stock returns behavior is similar to the response of stock returns in oil-importing countries as witnessed by some oil exporting economies such as the UK, Canada, and Norway. We were also able to establish that the impact of various sources of oil shocks to the Nigerian sectoral stock return was mainly insignificant.

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