Analysis of the Effect of Oil Price Shock on Industry Stock Returns in Nigeria

by

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Abstract

This study focus on the impact of oil price fluctuation on the sector level activities of the stock market in Nigeria. Five industry sectors were examined based on availability of data while included macroeconomic factors were selected guided by economic theory and existing literature. Study results suggest that changes in oil prices significantly affect stock returns of all the sectors, except food beverages and tobacco. Consistent with the findings of McSweeney and Worthington (2007) and Agusman and Deriantino (2008) for the Australian and Indonesian stock markets, respectively, the parameter estimates of market returns for the banking, insurance, food beverages and tobacco, oil and gas and industrial sectors significantly exceeded unity, suggesting a high risk exposure of these sectors vis-à-vis market returns. The food beverages and tobacco and oil and gas sectors exhibit significantly negative sensitivity to exchange rate risk, indicating the debilitating effect of the depreciation of the domestic currency on the returns of these sectors. The implications are enormous. First, the negative response of all sectors to exchange rate movement calls for prudent management of reserves plus informed and timely intervention in the market by the monetary authority to keep the rate stable. Secondly, the insensitivity of the food beverages and tobacco to oil price movement is an indication of the inefficiency instituted by the subsidy on petroleum products that insulate domestic consumption from market fundamentals. Subsidies distort the efficient allocation of resources by the market and in the case of Nigeria abet and aid corruption.

Key Words: Stock market shocks, oil price fluctuation, industry sector returns

JEL Classification: F42, E52

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1. Introduction

The role of oil resource and the implications for its changing prices on the global economy has been extensively examined in the literature (Hamilton, 1983; Mork, 1989; Jones and Kaul, 1996; Balaz and Londarev, 2006; Kilian, 2007; Rault and Arouri, 2009; Jones et al, 2004; 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 per cent of global energy consumption, and over 61.0 per cent of global trade in 2013 (BP, 2014). This significant role underscores the extensive literature on the implications oil price changes on key macroeconomic indicators as inflation rate, exchange rate, interest rate, stock prices, international debt and output growth[2]. Though these studies differ markedly in their findings, they nevertheless, affirm the degree of risk the global economy is exposed to in the face 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 eventually slowed down 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),

The Nigerian economy is overly dependent on crude oil exports, which contribute about 98 per cent of export earnings, 83 per cent of Federal government revenue and a key contributor to GDP (CBN, 2001). The proceeds from crude oil exports in 2002 accounted for over 70 per cent of government revenue, 90 per cent of foreign exchange earnings, and 26 per cent 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 per cent, respectively, while in 2010 earnings from oil alone contributed approximately 94.0 per cent of total foreign exchange (CBN 2010b).

These statistics underscores the vulnerability of the economy to the vagaries of international crude oil price. Theoretically, an increase in oil price should indicate

[2] Hamilton (1983); Chen et al (1986); Gisser and Goodwin (1986); Mork (1989); Huang et al (1996); Jones and Kaul (1996); Sadorsky (1999); Koranchelin (2005); Balaz and Londarev (2006); Barsher and Sadorsky (2006), Kilian (2007); and Kilian and Park (2008); Rault and Arouri, 2009; Jones et al, (2004); and Chittedi, (2012).

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, but might rather cascade into severe fiscal hiccups, restraining 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 literature[3] were mixed, ostensibly due to the different methodologies and data frequencies employed (Adebiyi *et al*, 2009 and Aliyu, 2009). Some other studies undermined the significant contribution of the stock market in the conduct of monetary policy by excluding stock market indicators in their models (Umar and Kilishi, 2010; Iwayemi and Fowowe, 2010; and Olomola and Adejumo, 2006). Invariably, conclusions from these studies are very likely to be bias, misleading and not devoid of meaningful contributions to monetary policy formulation due to mis-specification and/or other errors.

In the spirit of globalization and economic integration, research interest has generally shifted to examining the impact of oil price on the stock market returns plausibly due to the growing importance of 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 heterogenous and industry specific features of the sectors. However, there is an emerging body of literature that is focused at 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 making study results veritable input to portfolio investors' decision making process and the conduct of monetary policy. It has also facilitated monetary authority's better understanding of the role of the stock market as a channel of monetary policy transmission mechanism and identifies 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. To the best of

[3] This include Ayadi, et al (2000); Ayadi (2005); Olomola and Adejumo (2006); Sill (2007); Aliyu (2009); Omisakin *et al (*2009); Adebiyi *et al (*2009); and Iwayemi and Fowowe (2010).

our knowledge, no study has so far attempted to use this approach in the context of Nigeria.

Thus, this study attempts to fill this gap by i) including stock market variables in the model to capture the interaction and dynamics between oil price and stock market returns, ii) employing high frequency data, which according to Basher and Sadorsky (2006) contain richer information than lower frequency data, and iii) following the stock market classification, adopting the microeconomic approach, with a view to analyzing the relative impact of oil price change on the activities of these individual stock returns.

The objective here is two-pronged: first, to investigate the degree of vulnerability or otherwise of industry level stock returns to oil price shock, and secondly to examine the persistence of oil price shocks in Nigerian stock market. To achieve this, the study followed an approach prevalent in the literature (Faff and Brailsford, 1999; Sadorsky, 2001; Sadorsky and Henriques, 2001; Driesprong, et al, 2004; McSweeney and Worthington, 2007; and Broadstock, et al, 2012) to first estimate an extended standard multifactor model to determine the impact of oil price shock on industry stock returns. The preference for this estimation technique is informed by its ability to reveal the degree of exposure or level of vulnerability of the various activity sectors in the model sample to fluctuations in oil price. Consequently, three models would be estimated to measure the sensitivity of individual sector returns to changes in oil price.

The study is structured into five sections. Following this introduction is Section two, which reviews both the theoretical, methodological and empirical literature. Specifically, empirical studies were reviewed with a view to establishing the theoretical platform for the study. Section three highlights the evolution and developments in the Nigerian stock capital market as well as the movements in oil price during the sample period. Section four focused on the methodology, which incorporates the data, model specification and technique of analysis. The summary and conclusion and study limitations and areas for further study are the focus of Section five.

2. Review of Empirical Literature

Authors	Focus	Methodology	Findings
Huang, et al, (1996)	examines the co-movements between daily returns of oil future with stock returns during the 1980s	multivariate vector autoregression (VAR) approach	could not find any correlation between oil future and stock returns
Hunt and Witt (1995)	Examines the influence of energy price, income and temperature on energy consumption in UK	Johansen Maximum likelihood procedure	L-R relationship between energy demand, income and price but S-R effect of temperature
McSweeney and Worthington (2007)	examine the impact of oil prices on the stock returns of nine industries in the Australian market	multifactor model	strong positive covariance between oil price changes and the energy industry even though the banking, materials, retailing and transportation industries, exhibited negative relationship
Yurtsever and Zahor (2007)	the reaction of stock returns to oil price shocks as well as the symmetry of this shock on firms and industries in the Netherlands	standard market model, augmented by the oil price factor	result shows a significant negative effect of oil price shock on the stocks of some industries and individual firms (including banks and chemical industries)
Bredin and Elder (2011)	the exposure of 18 industry level stock returns to oil price changes in the US	the linear factor model (Arbitrage Pricing Theory (APT))	a weak direct exposure of majority of the industry returns to oil price changes was also demonstrated

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Eryigit (2009)	Examined oil price change and the sectoral indices of the Istanbul Stock Exchange (ISE)	ordinary least square technique	changes in oil price having statistically significant effects on industry level returns of all the sectors except transport, banks
Fan and Jahan-Parvar (2011)	the predictability of the spot and futures oil price fluctuations on forty-nine industry-level returns in the US stock market.	Jump-GARCH model	only very few industry returns (20 per cent) are predictively sensitive to oil spot price innovations,

Overall, it could be deduced from the ample empirical evidence that the impact of oil price change on industry stock returns, though mixed, cannot be disregarded. Inference from the review of industry stock returns revealed that the level of exposure of risk varies across industries. While many studies found no statistically significant correlation between oil price and industry stock returns, others recorded contemporaneous reaction of stock prices to oil price shock. This is of particular interest to investors and policymakers especially as the sensitivity across industries informs them about the transmission mechanism of oil price shock to the economy, the source of such shocks and the likely direction of shift in demand for goods and services. This calls for further research, especially as it was noted that several of these studies focused on advanced economies, ostensibly due the sophistication of their stock market and efficient data collection mechanism compared with those of less developed economies. The dearth of literature for sub Saharan Africa cum Nigeria was noted while the methodology and data frequency used were fraught with limitations. These observed gaps served as the motivating factors, which this study intends to contribute to and fill.

3. Data and Variables Definition

3.1 Data

Data used in this study are sourced from various relevant institutions and agencies. The all-share-index (ASI) – an indicator of returns in the equity market - and inflation rate, derived from consumer price index (CPI) – were sourced from the Nigeria Stock Exchange (NSE) and the National Bureau of Statistics (NBS) databases, respectively. While real interest rate (RIR) and average nominal exchange rate (EXR) are sourced from the Central Bank of Nigeria Statistical Bulletin, oil price (OPR) is obtained from the Energy Information Administration (EIA) of the U.S. Department of Energy. A dummy (dum07) is incorporated to capture the systemic influence of the global financial crisis on equity market returns in Nigeria.

The selection of variables was guided by economic theory and related empirical literature centered on the assumptions of small open economy. Consequently, interest rate is included in the model to capture the effect of monetary policy, inflation rate measures real economic activity, the exchange rate reflects the transmission channel in an open economy, while the role of the dummy variable to capture the effect of the global financial crisis. The choice of variables is hinged on the fact that stock prices are known to be susceptible to oil price change and also to changes in other macroeconomic or market fundamentals.

The study employs monthly data spanning from 1997M1 to 2014M5. The use of monthly series is justified by previous literature on the subject (Sadorsky, 2001; Sadorsky and

Henrques, 2001; and Elsharif et al 2005). Monthly series also streamlines the various data frequencies, since most macroeconomic variables are not available at higher frequency as stock returns. Except for real interest rate that is already expressed in percentages, all other variables are expressed in log form to allow for a unit change in them to be interpreted as percentage changes. The series are also annualized (year-on-year basis) to strip them of seasonal effects as well as accommodate investors' adaptive approach to decision making process.

3.1.2 Variables Definition

The reclassification of industry sectors by the Nigeria Stock Exchange (NSE) in 2009, with a view to aligning the market with the global industry classification standards (GICS), led to the streamlining of the number of industry sectors from thirty-three to twelve. Of the twelve broad representative industry sectors, the study used only five sectors' indices namely banking, insurance, food beverages and tobacco, oil and gas and industrial (consumer goods). Other sectors were excluded from the model on the basis of non-availability of historical data or better still the discontinuation of the series after the reclassification in 2009. The selected variables are defined as follows.

In the study, industry stock returns, used as the dependent variable for each of the models, is the annualized growth rate of all share index computed as

Stock Returns $$\ln R_{i,t} = \ln\left[\frac{pi_t}{pi_{t-s}}\right] \quad (s = 12)\ ;\ i = 1,\ 2, ..., 5 \qquad (3)$$

Oil Price $$\ln opr_t = \ln\left[\frac{opr_t}{opr_{t-s}}\right] \quad (s = 12) \qquad (4)$$

Market Returns $$\ln mkt_t = \ln\left[\frac{mkt_t}{mkt_{t-s}}\right] \quad (s = 12) \qquad (5)$$

Exchange Rate $$\ln exr_t = \ln\left[\frac{usd / exr_t}{usd / exr_{t-s}}\right] \quad (s = 12) \qquad (6)$$

Inflation Rate $$\ln cpi_t = \ln\left[\frac{cpi_t}{cpi_{t-s}}\right] \quad (s = 12) \qquad (7)$$

where $\ln R_{i,t}$, $\mathrm{lnop_t}$, $\mathrm{lnmkt_t}$, $\mathrm{lnexr_t}$ and $\mathrm{lncpi_t}$ are defined as the log of the returns of industry, oil price, market, exchange rate and consumer price index, respectively, i is individual sectors at time t, $s = 12$ reflects the year-on-year changes, while pi_t and pi_{t-s} represent the current and lagged value of equity price index of an industry in month t and $t-s$, respectively. Equally, real interest rate, was computed, in consonance with the conventional Fisherian equation as

$$\Delta rir_t = \left[\left(\frac{1+ir_t}{1+\inf_t}\right)-1\right] - \left[\left(\frac{1+ir_{t-s}}{1+\inf_{t-s}}\right)-1\right] \qquad (s = 12) \tag{8}$$

following the arguments by Chen et al (1986) that "term premium measures the changes in the real rate of interest" (McSweeney and Worthington, 2007. p11). Where (ir_t) and $(\inf_t)$ are interest and inflation rates, respectively.

3.2 Model Specification

In the study, the industry level exposure to oil price change is measured, adopting the standard multifactor regression model that use ordinary least squares (OLS) technique. Three models were estimated in all. Model 1 follows the works of Khoo (1994), Chan and Faff (1998), Faff and Brailsford (1999), Sadorsky (2001), Sadorsky and Henrique (2001) and McSweeney and Worthington (2007). The model is specified as

$$\ln R_{i,t} = \alpha_o + \alpha_1 \ln opr_t + \alpha_2 \ln mkt_t + \alpha_3 \ln exr_t + \alpha_4 \Delta rir_t + \alpha_5 \ln \mathrm{cpi}_t + \alpha_6 dumCr_t + \varepsilon_t \tag{9}$$

where $\ln R_{i,t}$, $\ln opr_t$, $\ln mkt_t$, $\ln exr_t$ and $\ln \mathrm{cpi}_t$ are the log of return on stock index of industry i at period t $(where\ i = 1, 2, ..., 5)$, change in oil price (WTI), return on the market portfolio, average nominal exchange rate and consumer price index, respectively, while Δrir_t is the change in real interest rate. All the variables are expressed in the logarithm form except real interest rate. A multiplicative dummy variable ($dumCr$) was introduced to capture the impact of the global financial crisis of 2007 and is computed as dummy*lnopr (where the period between 2008M12 and 2011M07 = 1 and otherwise = 0)[4]. The slopes (α_1 ... α_6) are the parameters sensitivities for the i^{th} industry to be estimated and ε_t is the standard error term.

The second model investigated the sensitivity of stock returns of individual industries to oil price change as well as account for the structural breaks that may occur in all the parameters. Equation 9 is modified to include two interactive dummy variables namely $dumR$ and $dumF$, indicating the direction of oil price change. The modified model is, thus, specified as

[4] The inclusion of a multiplicative dummy variable for each of the explanatory variables allows the intercept and each partial slope to vary, implying different underlying structures for the two conditions (0 and 1) associated with the dummy variable (Asteriou and Hall, 2007).

$$\ln R_{i,t} = \alpha_o + \alpha_1 \ln opr_t + \alpha_2 \ln mkt_t + \alpha_3 \ln exr_t + \alpha_4 \Delta rir_t + \alpha_5 \ln \mathrm{cpi}_t + \alpha_6 dumF_t + \alpha_7 dumR_t + \varepsilon_t \qquad (10)$$

where $dumF = do * opr$, $dumR = (1-do) * opr$. Here do indicate a decline or fall in oil price and carries the value zero while $(1-do)$ represent an upward movement in oil price, and is assigned the value 1. In order to avoid the incidence of dummy trap with the use of these two variables, these values are multiplied by the prevailing oil price to derive the interactive dummies. Other variables in the model remain as previously defined. These models assume market efficiency in both the oil and stock sectors, suggesting a contemporaneous response by the stock market to a change in the price of oil (Huang et al, 1996; Faff and Brailsford, 1999; and Sadorsky, 2001)[5].

Model three measure the persistence of the effect of oil price change on stock returns in the market beyond contemporaneous response. A dynamic model that relaxed the market efficiency assumption of model 2 is estimated. In other words, the model investigates the relationship between stock returns and lagged oil price for each industry and the regression is estimated for each of the five industry sectors for the entire sample as

$$\ln R_{i,t} = \alpha_o + \alpha_1 \ln opr_t + \alpha_2 \ln opr_{t-1} + \alpha_3 \ln opr_{t-2} + ... + \alpha_{13} \ln opr_{t-12} + \alpha_{14} dumCr_t + \varepsilon_t \qquad (11)$$

The model is specified with industry returns, change in contemporaneous oil price, twelve lags of oil price change and the dummy capturing the global financial crisis. The inclusion of the dummy accounts for structural breaks in the data series, while the number of lags is chosen based on the rule of thumb that the series are monthly.

4. Preliminary Estimation and Analysis

Before proceeding with the OLS estimation of the multifactor model, since the interest in this section is to ascertain whether or not oil price provides information about the behavior of industry stock returns, the stationarity properties of the series is first examined adopting the standard unit root test procedures. The unit root test displays the non-stationary characteristics of the series, a common and dominant behavior of aggregate economic time series data. In other words, it basically shows how the movement of the series grows around or deviates from the population mean. Where the elements in the series are found non-stationary, the series is transformed, usually by differencing, to achieve stationarity.

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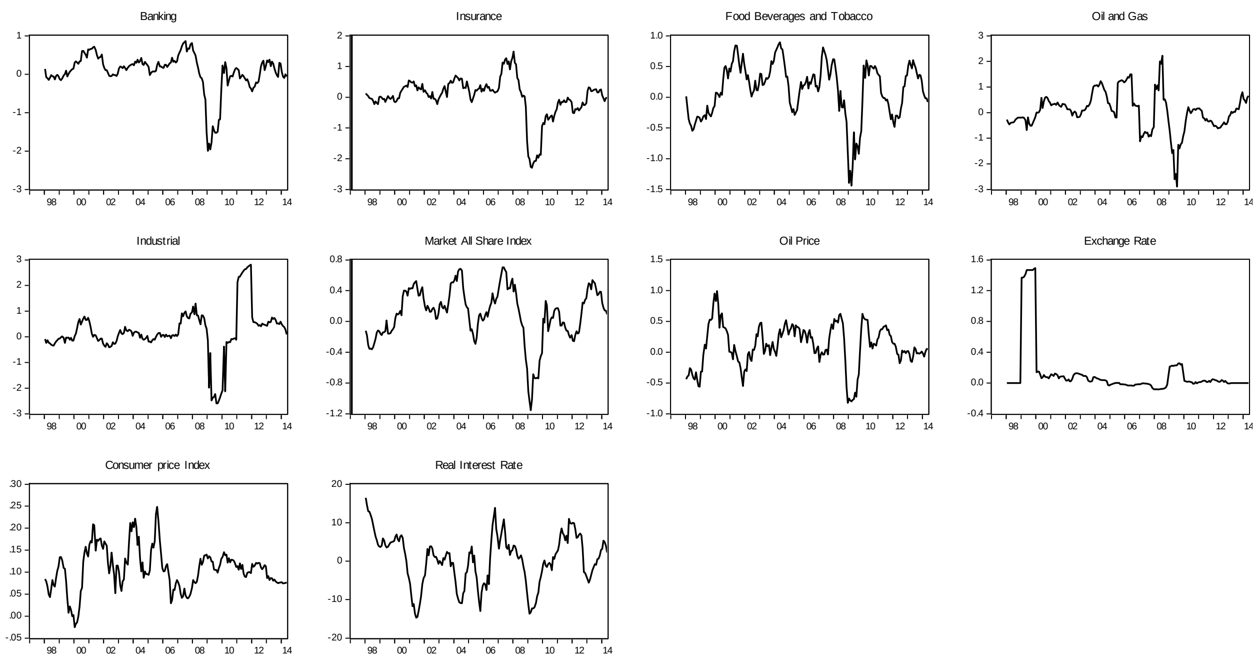
[5] An efficient market is that "in which firms make production-investment decisions, and investors can choose among the securities that represent ownership of firms' activities under the assumption that security prices at any time "fully reflect" all available information" (Fama, 1969:1).

4.1 Graphical Plots

A precursor to the unit root test was the need to plot the graphical representation of the variables employed in the estimation. Figure 3, gives the visual impulse of the trends. An eye ball assessment of the graphs suggests that all the variables exhibit volatility that may be non-normal. Further assessment of the graphs reveals a seeming trough (or deepening) between 2008 and 2010, which coincides with the global financial crisis. The significant crash in the market and industry returns was immediately followed by the steep depreciation in the exchange rate of the local currency vis-à-vis other currencies and a rapid inflation and interest rate rise during the crisis period.

Figure 1: Plots of Market Indices and Macroeconomic variables (1997 -May 2014)



4.2 Unit Root

The relationship between oil price innovations and stock returns is examined from the individual sector perspectives. The stationarity or order of integration of the series is first determined, adopting the Augmented Dickey-Fuller (ADF), the Phillip Perron (PP) and the Kwiatkowski *et al* (1992) (KPSS) tests. The KPSS test was conducted as a confirmatory test to authenticate the ADF and PP outcomes. The results of the unit root test, presented in Table 2, show that all the variables are stationary at level, that is, integrated of order zero 1(0) at 1 and 5 per cent level of significance. This implies the rejection of the null hypothesis, thus, rendering the series suitable for regression analysis.

Table 2: Unit Root Tests

		Level			Order of integration
		ADF test-stat	PP test-stat	KPSS LM-test	
Banking		-2.427**	-2.574**	0.248*	1(0)
Insurance		-2.076**	-2.506**	0.264*	1(0)
Food, beverages and tobacco		-2.596*	-2.489**	0.112*	1(0)
Consumer Goods		-2. 977*	-3.161*	0.154*	1(0)
Oil and gas		-2.310**	-3.614*	0.182*	1(0)
Oil price		-2.515**	-3.446*	0.057*	1(0)
Market Index		-2.016**	-2.297**	0.117*	1(0)
Nominal exchange rate		-3.577*	-2.963*	0.458*	1(0)
Consumer Price Index		-3.356*	-3.268*	0.106*	1(0)
Real Interest Rate		-3.234*	-3.521*	0.122*	1(0)
Critical Values	(1%)	-2.577		0.739	
	(5%)	-1.943		0.463	
	(10%)	-1.616		0.347	

Notes: All variables are in their log form. ADF and PP tests are conducted without trend and intercept while the KPSS test was a model with the intercept only. The Bartlett Kernel spectral estimation method was selected for KPSS. *, ** and *** indicate the rejection of the null hypothesis at 1%, 5% and 10%, respectively. Source: Version 8.1 of E-views software was used in the estimation

4.3 Descriptive Statistics

The descriptive statistics for individual sector returns as well as the changes in the macroeconomic factors in their logarithm form is depicted in Table 3. The results suggest that while significant variation in the series was evident in the marked difference between the minimum and maximum values, the sample mean and median vary across sectors.

Table 3: Descriptive Statistics

	lnbnk	*lnins*	*lnfbt*	*lnind*	*lnoag*	*lnopr*	*lnmkt*	*lnexr*	*lncpi*	*Δrir*
Mean	0.062	0.001	0.118	0.184	0.059	0.107	0.096	0.122	0.108	0.415
Median	0.147	0.076	0.185	0.085	0.074	0.097	0.137	0.018	0.109	1.380
Maximum	0.865	1.487	0.896	2.809	2.220	0.995	0.704	1.495	0.249	16.480
Minimum	-1.994	-2.297	-1.440	-2.598	-2.886	-0.822	-1.155	-0.084	-0.025	-14.680
Std. Dev.	0.502	0.656	0.444	0.933	0.744	0.349	0.348	0.346	0.048	6.599
Skewness	-2.049	-1.440	-0.810	-0.151	-0.370	-0.439	-0.850	3.420	0.068	-0.317
Kurtosis	8.307	6.419	3.819	6.113	4.975	3.248	4.156	13.275	3.582	2.642
Jarque-bera	365.326	162.426	26.791	79.481	36.135	6.782	34.317	1237.943	2.901	4.302
Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.034	0.0000	0.0000	0.234	0.116

Source: Version 8.1 of E-views software was used in the estimation

In Table 3, $\ln bnk$, $\ln ins$, $\ln fbt$, $\ln ind$, and $\ln oag$ are the logarithm of banking, insurance, food beverages and tobacco, industrial and oil and gas sectors, respectively, while all other variables are as earlier defined. Adopting the standard deviation as a measure of volatility, a cursory analysis show that, among the five activity sectors, industrial sector seem to exhibit the highest index return volatility (0.93), followed by oil and gas (0.74) and insurance (0.66). For the macroeconomic factors, consumer price index exhibit most relative stability with the least volatility (0.05) while real interest rate displays high fluctuations with a standard deviation of 6.6 per cent. In terms of statistical distribution, all the series, except exchange rate and inflation, show evidence of negative skewness, implying the extreme fatness of the left tail. With respect to normality, the kurtosis indicates a leptokurtic distribution across all series, except interest rate, implying fatter tails than normal. The claim of non-normality of the distribution, as indicated by the skewness and kurtosis, is further confirmed by the high probability values of the Jarque-Bera (JB) statistic.

4.4 Correlation Matrix

Table 4 illustrates the correlation relationship among the variables in the model. The correlations between oil price and the various sector returns appear generally moderate and positive. This finding is in tandem with the observations of Arouri and Nguyen (2010) for the European countries, which showed that the positive relationship suggested higher expected economic growth and earnings in the face of rising oil price. The highest co-movements is recorded in the banking sector (0.47), followed by oil and gas (0.42) and insurance (0.38) sectors; while the lowest correlation is in the industrial stock returns (0.33), though surprisingly.

Table 4: Correlation Matrix

	lnbnk	*lnins*	*lnfbt*	*lnind*	*lnoag*	*lnopr*	*lnmkt*	*lnexr*	*lncpi*	*Δrir*
Banking	1									
Insurance	0.898	1								
Food & Bev	0.824	0.708	1							
Industry	0.433	0.541	0.286	1						
Oil & Gas	0.506	0.575	0.499	0.307	1					
Oil Price	0.472	0.381	0.349	0.327	0.418	1				
Market	0.882	0.822	0.933	0.382	0.499	0.331	1			
Exch. Rate	-0.137	-0.142	-0.288	-0.171	-0.233	0.087	-0.239	1		
Inflation	-0.063	-0.059	0.164	-0.123	0.277	-0.230	0.042	-0.208	1	
Real Interest	0.192	0.206	-0.137	0.400	-0.141	0.195	-0.015	0.081	-0.557	1

Source: Version 8.1 of E-views software was used in the estimation

An inverse relationship was observed between exchange rate and the various sector returns, indicating a dampening effect of exchange rate depreciation on the performance of the market. The positive relationship between exchange rate and oil price shows the regime of appreciation as reserves are built up in the face of increasing international oil price. Overall, there are positive co-movements between market returns index and the sector returns of the food, beverages and tobacco, banking and insurance, with 0.93, 0.88 and 0.82 correlation, respectively.

4.5 Serial correlation and Heteroscedasticity tests

A preliminary regression of equation (4:10) is conducted for the five industry sectors to investigate whether or not the classical assumptions of least square residual are satisfied. The test for the presence of serial correlation and heteroscedasticity, as depicted in Table 5, are conducted using the standard Breusch-Godfrey Lagrange multiplier and White's heteroscedasticity procedures. Where serial correlation and heteroscedasticity are detected, the Newey and West method is used for correction. Finally a check for multicollinearity was also carried out using the variance inflationary factor (VIF).

Table 5 shows the serial correlation and heteroscedasticity test results. The results reject the null hypothesis of no serial correlation and no heteroscedasticity for all the industry sectors, suggesting the presence of serial correlation and heteroscedasticity in these models at different orders.

Table 5: Serial Correlation and Heteroscedasticity Tests

		Industry Sectors				
		Banking	**Insurance**	**Food & Bevg**	**Oil & Gas**	**Industrial**
Serial Correlation*	F-Stat	**225.708**	**180.346**	**56.166**	**178.383**	**248.510**
	p-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	LM-stat	**138.098**	**128.656**	**73.424**	**128.176**	**141.898**
	p-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Heteroscedasticity**	F-Stat	**8.091**	**4.169**	**3.506**	**2.630**	**12.101**
	p-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	LM-stat	**40.018**	**22.903**	**19.625**	**15.102**	**54.464**
	p-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Resid 1	Coefficient	0.805	0.709	0.623	0.731	0.600

	p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Resid 2	Coefficient	0.047	0.130	-0.021	0.103	0.295
	p-value	(0.519)	(0.066)	(0.772)	(0.161)	(0.000)

Notes: *Breuch-Godfrey Langrange Multiplier Test, **White Heteroscedasticity test, excluding White Cross terms. Source: Version 8.1 of E-views software was used in the estimation

These conclusions are drawn from the relatively high values of both the LM-stat and F-stat and the small p-values that are less than 0.05 for a 95 per cent confidence interval, which suggest the rejection of the null hypothesis of no serial correlation. It is also noted that the first and second lagged residual terms are statistically significant at 5 per cent significance level, indicating that serial correlation is of first and second order. The rejection of the null hypothesis implies that economically, the variance of the dependent variable across the data in the regressions is influenced by the volatility in oil price. To correct for the bias that could be introduced by the observed autocorrelation and heteroscedasticity in the models, the estimation procedures for standard errors and *p-values* incorporated the HAC Newey-West (1987).

The check for the presence of multicollinearity, a common challenge with multifactor modelling in the literature, the variance inflationary factor (VIF) was computed[6]. The result indicates that the VIF values for all the macroeconomic factors, except market index, are far from the restrictive critical value (VIF > 5). This implies that though multicollinearity is present in the model, it is at a tolerable level and do not pose any serious threat to the overall result.

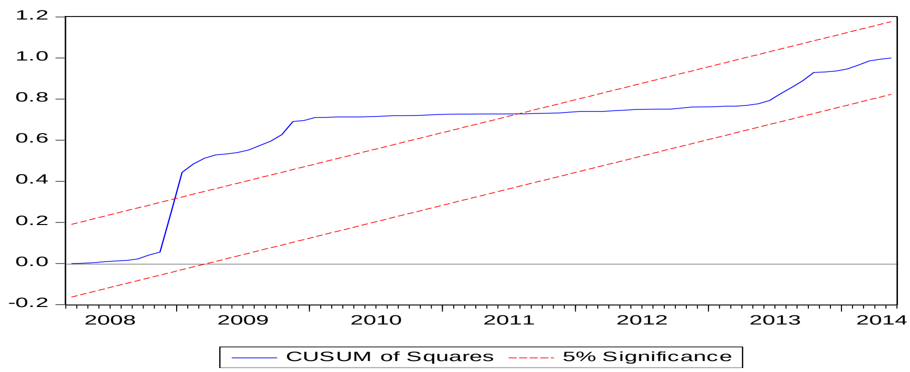
4.6 Structural Stability Test

The classical Chow (1960) structural stability test was conducted to detect evidence of potential structural break. The CUSUM squared result presented in Figure 4 rejects the hypothesis of coefficient stability at five per cent significance, suggesting the presence of structural change in the model. This is an indication that, though most of the residuals are within their confidence interval limits or bounds, structural breaks potentially occur in the model at 2008M12 and lasted through 2011M07 during which point the residuals drifted upward and departed from the confidence bands.

[6] Variance Inflationary Factor is computed as $VIF = \frac{1}{1-R^2}$ where R^2 is the unadjusted R-squared or correlation coefficient.

While there is no table of formal critical VIF values, a common rule of thumb is that if a given VIF is greater than 5, then multicollinearity is severe and if it is less than 5, it is considered to be at a tolerable level. (Studenmund, 2011).

Figure 2: CUSUM of Squares Stability Test



This break point period coincided with the global financial crisis, which though heralded in 2007 only had effect on the Nigerian economy from end-2008. This informed the inclusion of a dummy ($dumCr$) that correspond with the structural break period with a view to accounting for its influence on the model.

5 Results and Analysis

The ordinary least squares estimates of the market models for the five industry sectors that include real interest rate and the logarithm of oil price, market returns, exchange rate, and inflation as control variables are reported in Table 2. The Table shows the parameter estimates, the standard errors and the p-values of the coefficients used in evaluating model robustness. The explanatory power of the models, measured by the adjusted R^2, the goodness of fit, measured by the F-statistic as well as its p-values are also reported under the diagnostics section of the table.

5.1 Model 1: Estimated Contemporaneous Multifactor Model by Industry

The regression results shown in Table 2 are quite instructive and informative especially when benchmarked against the fundamentals of the Nigerian economy. A close scrutiny reveals the positive and significant sensitivity of all sector stock returns, except industrial, to oil price shocks. The level of exposure or industry risk ranged from 0.09 per cent for food beverages and tobacco to 0.97 per cent for oil and gas sector. This outcome is in line with the findings of Faff and Brailsford (1999), McSweeney and Worthington (2007) and Bredin and Elder (2011) for the US and Australian industry stock returns, respectively.

Generally, it could be inferred from the foregoing that returns in the banking, insurance, food beverages and tobacco and oil and gas sectors are significantly influenced by the movements in oil price and the aggregate market index. Similarly, the food beverages and tobacco, oil and gas and industrial sector returns are sensitive to changes in exchange rate and consumer price index. Though the outcome of real interest rate are mixed, all sectors except the oil and gas, respond significantly to movements in real interest rate. The estimates also show that the dummy variable tracking the effect of the global financial crisis is significant for all the sectors except industrial sectors with the impact being more on the insurance and oil and gas sectors. These conclusions are affirmed by the adjusted R^2. The explanatory power of the models was adjudged to be very adequate as the ability of the models to explain the sensitivity of stock returns vary from 34 per cent for the industrial sector to 92 per cent for food beverages and tobacco sector. The F-statistics with the associated p-values indicate the goodness of fit of the models.

The dummy variable introduced to capture the effect of the 2007 global financial crisis satisfies the *apriori* expectation for three of the four sectors. The negative coefficients are consistent with economic literature that hypothesises increased cost of production during depressions or financial crisis periods. The increased cost of doing business, in addition to contagion and panic selling, translates to a decline in cash flow as well as prices and returns in the stock market. In Nigeria, this loss was as much as 46 per cent in stock returns in 2008. Estimates suggest that the risks are highest for the insurance and oil and gas sectors with 0.007 per cent each. Counterintuitively, the industrial sector that depend highly on imported raw and intermediate materials, industrial equipment as well as technology for productive purposes, show no response to global crisis. However, the banking sector, with 0.02 per cent exhibits some measure of resilience to the global crisis pressures, owing largely to the banking sector consolidation exercise embarked on in 2004, and the subsequent huge bail outs and other intervention measures by the central bank during the crisis. These interventions strengthened the capital base of banks and insulated the sector from the full impact of the global turbulence until the second round effect of the crisis in 2008.

Table 2: Regression Analysis of Multifactor Market Models by Industry

		Model 1: Impact of Oil Price Change on Industry Stock Returns					Model 2: Sensitivity Analysis of Industry Stock Return on Oil Price Change				
		Banking	**Insurance**	**Food & Bevg**	**Oil & Gas**	**Industrial**	**Banking**	**Insurance**	**Food & Bevg**	**Oil & Gas**	**Industrial**
Constant	Coefficient	**-0.142***	**-0.201***	**-0.104***	**-0.513***	-0.213	0.016	-0.068	-0.029	**-0.413***	**-0.845***
	Std Errors	(0.081)	(0.111)	(0.034)	(0.208)	(0.222)	(0.085)	(0.151)	(0.044)	(0.231)	(0.269)
	p-values	0.079	0.072	0.002	0.014	0.339	0.852	0.654	0.504	0.076	0.002
LNOPR	Coefficient	**0.274***	**0.272***	**0.089***	**0.974***	0.479	**0.307***	0.228	**0.147***	**0.912***	0.294
	Std Errors	(0.082)	(0.110)	(0.045)	(0.252)	(0.316)	(0.072)	(0.159)	(0.055)	(0.275)	(0.321)
	p-values	0.001	0.014	0.051	0.000	0.131	0.000	0.152	0.008	0.001	0.361
LNMKT	Coefficient	**1.121***	**1.230***	**1.213***	0.403	**0.807***	**1.174***	**1.475***	**1.112***	**0.657***	**0.918***
	Std Errors	(0.103)	(0.119)	(0.039)	(0.266)	(0.369)	(0.093)	(0.143)	(0.041)	(0.272)	(0.370)
	p-values	0.000	0.000	0.000	0.131	0.030	0.000	0.000	0.000	0.016	0.014
LNEXR	Coefficient	-0.037	-0.025	**-0.046***	**-0.363***	**-0.330***	-0.047	-0.059	**-0.109***	**-0.375***	0.071
	Std Errors	(0.043)	(0.070)	(0.024)	(0.138)	(0.146)	(0.018)	(0.098)	(0.025)	(0.140)	(0.092)
	p-values	0.932	0.718	0.057	0.009	0.024	0.329	0.550	0.000	0.008	0.440
LNCPI	Coefficient	0.783	1.308	**0.689***	**5.286***	2.546	0.459	0.669	**0.769***	**4.683***	**3.172***
	Std Errors	(0.717)	(0.860)	(0.259)	(1.537)	(1.710)	(0.734)	(1.126)	(0.365)	(1.544)	(1.682)
	p-values	0.276	0.130	0.008	0.001	0.138	0.532	0.553	0.036	0.002	0.061
RIR	Coefficient	**0.015***	**-0.021***	**-0.005***	-0.005	**0.064***	**0.016***	**0.024***	**-0.005***	-0.003	**0.061***
	Std Errors	(0.005)	(0.006)	(0.003)	(0.012)	(0.020)	0.005	0.006	(0.002)	0.013	(0.017)
	p-values	0.001	0.001	0.043	0.652	0.001	0.001	0.0002	0.006	0.832	0.0004
dumCr	Coefficient	**-0.002***	**-0.007***	**0.002***	**-0.007***	-0.001					
	Std Errors	(0.001)	(0.002)	(0.001)	(0.003)	0.006					
	p-values	0.0002	0.0003	0.005	0.005	0.924					
dumF	Coefficient						**-0.003***	**-0.003***	-0.001	-0.002	**0.007***
	Std Errors						0.007	(0.001)	(0.0004)	(0.0002)	(0.002)
	p-values						0.0001	0.010	0.119	0.275	0.0014
dumR	Coefficient						**-0.002***	**-0.003***	-0.001	-0.002	**0.011***
	Std Errors						0.001	0.001	(0.0004)	(0.002)	(0.003)
	p-values						0.002	0.015	0.114	0.220	0.001
Diagnostics											
Adjusted R2		0.86	0.82	0.92	0.50	0.34	0.87	0.74	0.89	0.44	0.44
F-Stat		193.22	144.05	366.11	33.92	17.48	181.87	80.95	249.91	22.62	22.43
p-value		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Wald Test (χ^2)							0.0002	0.0000	0.0211	0.9805	0.0011

5.2 Model 2: Examining the Sensitivities of Industry Returns on Oil Price Changes

To measure the degree of sensitivity of the five industry stock returns to upward or downward swings in oil price, equation (4.12) was estimated to include two interactive dummies ($dumR$ and $dumF$) to capture the swings, respectively. The five estimated dynamic regression models for the entire sample period, along with the coefficients and standard errors, are presented as model 2 on the right hand side of Table 2.

Regression results indicate general consistency with the theoretical expectations in the literature, albeit some exceptions. Specifically, the sensitivity of the industry stock returns to oil price spike and declines, as measured by the interactive dummies, was largely asymmetric as the risk factors for both the up or downward movements trended in the same direction. For instance, both price rise and fall measured by $dumR$ and $dumF$, respectively, exert negative and statistically significant impact on the banking and insurance, but a positive effect on industrial sector stock returns. The negative impact is in consonance with the literature (Sadorsky 2001, and IMF (2000), which generally associated oil price increase with rising cost of production and weakening firms' profit margin. The implication is that a contemporaneous increase in oil price hikes firms' production cost, erodes their cash flow positions, decreases investment and eventually diminishes the firm's returns on stocks through lower stock prices.

The outcomes of a fall in oil price, measured by interactive variable *dumF,* counterintuitively replicate the *dumR* trend. This could be explained by the concept of downward stickiness of prices, a common incidence in economic literature, which assumes the willingness of some firms in an economy to adjust their prices during any given period, and the reluctance of some others due to fixed costs associated with the price change. This concept typifies the persistence of the inherently rigid oil price in Nigeria which, very often, responds swiftly to price rise but very sluggishly to price decline. In addition, the result also attests to the effects of petroleum subsidy programme that insulates domestic consumers from oil price fluctuations.

On the other hand, the industrial sector response to oil price change is asymmetric, suggesting that an increase in oil price improve the stock returns of the sector rather than diminish it. The positive significance is supported by the findings of Agusman and Deriantino (2008), which noted that though oil price increase generally brought about increased production cost and losses for investors, a decreasing oil price, to a large extent, did not simultaneously result in increased returns. Interestingly the food beverage and tobacco and oil and gas sectors show no sensitivity to oil price shocks. It is expected that changes in oil price should influence household expenditure profile via the weight of energy expenditure in the consumption basket of an average household. This is, however, not the case for Nigeria as households are shielded from international oil price shocks by the subsidy on petroleum and other related products in the country.

To test for asymptotic response for positive or negative oil price changes, the Wald chi-squared test was conducted and is reported along with other diagnostics in Table 2. With the null hypothesis stated as $Ho:\alpha_6=\alpha_7$ at 5 per cent significant level, the computed value of chi-squared for all the sectors, except oil and gas, fail to reject the null hypothesis, suggesting that price rise or fall makes significant difference in the market. However, for the oil and gas sector, the null hypothesis is rejected, concluding that there is no significant difference when the conjectures of oil price rise or fall are tested.

5.3 Model 3: Estimated Dynamic Market Model with Contemporaneous and Lagged Oil Dependencies by Industry

Finally, a dynamic regression model is estimated to determine the relative persistence of oil price shock for each of the industry sector in the system. Included in the model are market returns, the change in contemporaneous oil price and twelve lags of oil price changes. Estimates for each of the five industry sectors are made with the inclusion of the dummy capturing the financial and economic crisis of 2007 and the Newey and West (1987) heteroscedasticity and autocorrelation consistent standard errors.

An abridged version of the result of Table 1A in the appendix, is presented as Table 3 showing the estimated coefficient and standard errors (in parenthesis) for the five industries[7]. Inference from the Table shows that the banking, insurance and food beverage and tobacco sectors display significant contemporaneous oil price effect. The food beverage and tobacco also show significant lag effect at one and twelve months, which according to McSweeney and Worthington (2007), suggests the persistence of oil price shock in the industry. Other industries that exhibit persistence in oil price shocks include insurance (four-month lag), oil and gas (four and six-month lags) and industrial sector (four month lag). The implication is that apart from the contemporaneous impact, it takes approximately four months for the impulse of a price change to ultimately manifest on the sectoral activities in the market. This means that industries are more influenced by the previous four months change in oil price than the previous two or three months, suggesting the approximate cycle of time it takes for the impact of oil price change to transmit through the economy.

[7] See the full result presentation in Table 1A at the appendix

Table 3: Persistence Measurement in the Market

		Banking	Insurance	Food & Bevg	Oil & Gas	Industrial
Constant	Coefficient	**-0.124***	**-0.157***	**-0.033***	**-0.124***	-0.164
	Std Errors	(0.036)	(0.056)	(0.023)	(0.086)	(0.159)
LNMKT	Coefficient	**1.150***	**1.272***	**1.280***	**0.721***	**0.803***
	Std Errors	(0.096)	(0.116)	(0.051)	(0.291)	(0.369)
LNOPR	Coefficient	**0.307***	**0.503***	**-0.210***	0.597	0.294
	Std Errors	(0.132)	(0.247)	(0.109)	(0.391)	(0.540)
LNOPR(-1)	Coefficient	0.093	-0.229	**0.205***	-0.289	-0.205
	Std Errors	(0.121)	(0.192)	(0.112)	(0.342)	(0.405)
LNOPR(-4)	Coefficient	0.022	**0.379***	-0.021	**0.617***	**0.724***
	Std Errors	(0.957)	(0.162)	(0.085)	(0.324)	(0.353)
LNOPR(-6)	Coefficient	-0.002	0.205	0.076	**0.519***	0.852
	Std Errors	(0.080)	(0.157)	(0.092)	(0.282)	(0.558)
LNOPR(-12)	Coefficient	0.101	0.322	**-0.165***	0.257	0.477
	Std Errors	(0.153)	(0.230)	(0.099)	(0.322)	(0.680)
dumCr	Coefficient	**-0.001***	**-0.006***	**0.003***	**-0.003***	0.003
	Std Errors	(0.001)	(0.002)	(0.001)	(0.002)	(0.006)
Diagnostics						
	Adjusted R2	0.88	0.83	0.90	0.41	0.32
	F-Statistics	90.86	59.63	109.89	9.37	6.73

Notes: Version 8.1 of Eviews software was used in the estimation process. All regressions incorporate Newey and West (1987) heteroscedasticity and autocorrelation consistent standard errors. The lags are in months.

Two plausible explanations could be proffered; first crude oil sales are done mostly on futures or forward trading contract and other trading windows that hedge against the unpredictable international oil price, especially with the rising incidence of insecurity and insurgence in the Middle East and other major oil producing states. Political, ethnic and religious uprisings in these areas could adversely affect the world supply of crude. Secondly, the recognition of the capricious nature of oil price, given the country's dependence on the resource, has informed various governments in Nigeria at different times to build buffers or special accounts such as the Excess Crude Account and the Sovereign Wealth Fund, where oil revenue earned in excess of the budget benchmark is warehoused and invested to cushion the effect of future falling prices. It implies that it takes approximately four months for oil price shock to filter through the economy before impacting on the industry sectors in the economy. It could, therefore, be deduced from the above that in Nigeria oil price shock have two major episodes of impact, one at the contemporaneous and the other at four month lagged dependencies.

6.0 Summary and Conclusion

This study used monthly data spanning 1997 to May 2014 for industry level analysis of the impact of changes in oil price on stock returns in Nigeria. The motivation was informed by the absence of industry level studies, even though several studies have been conducted on the impact of oil price on the activities of the stock market in Nigeria. In other words, the study tilts away from the traditional aggregate approach to the analysis of investigating the impact of oil price shocks to the individual sector method with the prime objective of eliciting some fundamental information that could have been subsumed under the macro approach. Five industry sectors were examined based on availability of data while the included macroeconomic factors were selected guided by economic theory and existing literature. The overall results suggest that changes in oil prices affect returns of all the sectors, except food beverages and tobacco. This is unique for now.

The plausible explanation for the pronounced sensitivity of the various industries to oil price factor may not be unconnected with the overt dependence of the economy on oil export for foreign exchange earnings. Consistent with the findings of McSweeney and Worthington (2007) and Agusman and Deriantino (2008) for the Australian and Indonesian stock markets, respectively, the parameter estimates of market returns for the banking, insurance, food beverages and tobacco, oil and gas and industrial sectors significantly exceeded unity, suggesting the higher risk of these sectors vis-à-vis market returns. The food beverages and tobacco and oil and gas sectors exhibit significantly negative sensitivity to exchange rate risk, indicating that the depreciation of the domestic currency severely hurt the returns of both sectors more than others, especially for high import-dependent countries like Nigeria.

The implications of the above results are enormous and should be carefully considered by policymakers in the formulation of policy. First, the negative response of all the sectors to exchange rate movement calls for prudent management plus informed and timely intervention in the market by the monetary authority to keep the rate stable. A stable rate is a precursor for stable inflation rate and will enable planning especially as an import dependent economy. It is also a clarion call for the development of the local alternatives for imports in order to lessen the dependence of the economy.

The positive response of the banking sector to real interest rate shocks is a pointer to economy managers that the grip on inflation rate must be firm. A high inflation rate usually prompts the central bank to raise its base rate (monetary policy rate) upon which the banking system interest rates are anchored. This is critical to the achievement of the plausible inclusive growth objective of government.

Another significant implication of the result is the impact of the financial and economic crisis dummy, which exerts a general depression in the market. This is a signal for the economy to expand its foreign exchange earnings base by divesting to other sectors like the processing of agricultural products for exports. This will drastically reduce the vulnerability of the economy to global vagaries and forestall or better still minimize future crisis.

Finally, the insensitivity of the food beverages and tobacco to oil price movement is an indication of the inefficiency instituted by the subsidy on petroleum products that insulate domestic consumption from fluctuations in oil prices. Subsidies distort the efficient allocation of resources by the market and in the case of Nigeria abet and aid corruption. The endless tales of abuses and mismanagement of the programme over the decades attest to the need for government to have a holistic rethink of the subsidy policy. More so, the original intention of the subsidy programme which was to serve as a safety net for the less privilege in the society as well as protect the industrial sector from the vicissitudes of the oil market has *abinitio* been defeated.

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Appendix

Table 1A: Industry Analysis of Oil Price Shock Persistence in Nigeria

		Model 3				
		Banking	**Insurance**	**Food & Bevg**	**Oil & Gas**	**Industrial**
Constant	Coefficient	**-0.124***	**-0.157***	**-0.033***	**-0.124***	-0.164
	Std Errors	0.036	0.056	0.023	0.086	0.159
	p-values	0.008	0.005	0.152	0.151	0.304
LNMKT	Coefficient	**1.150***	**1.272***	**1.280***	**0.721***	**0.803***
	Std Errors	0.096	0.116	0.051	0.291	0.369
	p-values	0.000	0.001	0.000	0.014	0.031
LNOPR	Coefficient	**0.307***	**0.503***	**-0.210***	0.597	0.294
	Std Errors	0.132	0.247	0.109	0.391	0.540
	p-values	0.021	0.044	0.057	0.128	0.587
LNOPR(-1)	Coefficient	0.093	-0.229	**0.205***	-0.289	-0.205
	Std Errors	0.121	0.192	0.112	0.342	0.405
	p-values	0.443	0.235	0.071	0.397	0.613
LNOPR(-2)	Coefficient	0.113	0.167	-0.001	0.150	0.389
	Std Errors	0.106	0.168	0.085	0.291	0.325
	p-values	0.287	0.321	0.986	0.606	0.233
LNOPR(-3)	Coefficient	-0.052	-0.079	0.023	-0.305	-0.104
	Std Errors	0.906	0.171	0.079	0.266	0.458
	p-values	0.570	0.645	0.769	0.253	0.821
LNOPR(-4)	Coefficient	0.022	**0.379***	-0.021	**0.617***	**0.724***
	Std Errors	0.957	0.162	0.085	0.324	0.353
	p-values	0.815	0.021	0.804	0.058	0.041
LNOPR(-5)	Coefficient	-0.024	-0.273	-0.107	0.127	-0.194
	Std Errors	0.098	0.170	0.098	0.290	0.357
	p-values	0.803	0.111	0.278	0.662	0.587
LNOPR(-6)	Coefficient	-0.002	0.205	0.076	**0.519***	0.852
	Std Errors	0.080	0.157	0.092	0.282	0.558
	p-values	0.978	0.193	0.407	0.068	0.129

Table 1A: Industry Analysis of Oil Price Shock Persistence in Nigeria (contd)

		Banking	Insurance	Food & Bevg	Oil & Gas	Industrial
LNOPR(-7)	Coefficient	0.056	0.026	0.019	-0.303	-0.384
	Std Errors	0.091	0.163	0.078	0.352	0.436
	p-values	0.539	0.872	0.805	0.389	0.379
LNOPR(-8)	Coefficient	-0.036	-0.141	-0.001	0.222	0.129
	Std Errors	0.086	0.147	0.081	0.327	0.499
	p-values	0.677	0.338	0.992	0.498	0.796
LNOPR(-9)	Coefficient	0.048	-0.019	0.133	-0.203	-0.113
	Std Errors	0.076	0.139	0.086	0.302	0.359
	p-values	0.530	0.891	0.122	0.503	0.753
LNOPR(-10)	Coefficient	0.027	-0.045	-0.036	0.058	0.159
	Std Errors	0.079	0.136	0.078	0.268	0.301
	p-values	0.734	0.742	0.645	0.828	0.597
LNOPR(-11)	Coefficient	-0.071	-0.063	0.005	-0.164	-0.099
	Std Errors	0.127	0.172	0.087	0.321	0.393
	p-values	0.576	0.714	0.951	0.610	0.800
LNOPR(-12)	Coefficient	0.101	0.322	**-0.165***	0.257	0.477
	Std Errors	0.153	0.230	0.099	0.322	0.680
	p-values	0.512	0.165	0.098	0.426	0.484
dumCr	Coefficient	**-0.001***	**-0.006***	**0.003***	**-0.003***	0.003
	Std Errors	0.001	0.002	0.001	0.002	0.006
	p-values	0.009	0.0004	0.0002	0.034	0.667
Diagnostics						
Adjusted R2		0.88	0.83	0.90	0.41	0.32
F-Statistics		90.86	59.63	109.89	9.37	6.73
p-values		0.000	0.000	0.000	0.000	0.000

Notes: Eviews 8 software was used in the estimation. All regressions incorporate Newey and West (1987) heteroscedasticity and autocorrelation consistent standard errors. The lags are in months.