IS THE IMPACT OF OIL PRICE SHOCKS ON CONSUMER GOODS STOCK INDEX IN NIGERIA ASYMMETRIC?

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Abstract

The study applied the NARDL model to examine the asymmetric impact oil price, and exchange rate on NSE consumer goods Index of the Nigerian Stock Exchange from 2009 to 2016. The standard ARDL model was also implemented to account of symmetric impact of oil price is not asymmetries. Evidence from the study shows that an increase in oil price reduces NSE Consumer goods index and similarly, a (an increase) depreciation in the exchange rate will also depress NSE Consumer goods stock index. The study concludes that macroeconomic shocks that affect consumer demand are transmitted into the stock market. The Nigeria Government should stabilize the fast depreciating Naira/dollar exchange rate in Nigeria and reduce reliance and exposure of the manufacturing sector on oil by providing stable and cheap electricity to reduce cost and increase profitability subsequently improve NSE consumer goods index of the Nigerian Stock Exchange Market.

Keywords: Asymmetry; Nonlinear; Oil price shocks; exchange rate; NSE Consumer Goods; NARDL

Introduction

Nigerian economy is fast growing and this growth is largely driven by small and medium scale businesses which are highly integrated with oil. Energy has become a major input in to production process but the lack of stable electricity supply in the country has caused businesses to rely on oil bye products like fuel, and diesel to generate their own electricity and power their plants for production of goods and services. This means that variations in oil price will have implications on most consumer goods and services and this variation is capable of influencing the direction of movement in prices of consumer goods. The extent to which oil price affects movement in prices of consumer goods and services will depend on how oil is treated(Oladapo & Dasauki, 2019). If oil is treated as an output in the production process, then an increase in oil price will certainly be desirable and favorable. In this case, higher oil price will mean higher income, and profitability of producers for consumer goods. High profitability of listed companies will be transmitted to positively influence the consumer goods stock value(Fama & French, 2015, 2017). On the other hand, if oil is an input in the production process of the business, then an increase in oil price will bring about higher production cost and higher final prices of consumer goods in the market. Higher prices will induce consumers to reduce demand and lower demand will mean lower profitability of firms.

Theoretical stock valuation models have been used to explain the relationship between stock prices and macroeconomic variables. The current prices of equity share is equal to the present value of al discounted future cash flow(Sadorsky, 2003). This suggests that when macroeconomic variables succeed in influencing the rate of return and cash flow of any underlying asset, such macroeconomic variablesare also capable of influencing the share value of that asset as well (Gursida, 2017; Huda, Sinaga, & Andati, 2015). it is in this light that oil price shocks are capable of causing variations and distortion in consumer goods share index while exchange rate has been identified as a channel through which oil price shocks impacts on consumer goods and the stock market index (Dornbusch & Fischer, 1979).In this way, increases in oil price gets transmitted in to the stock market as expensive fuels is translated in form of higher cost of transportation, heating, cooling and production cost which will significantly depress earnings (Baumeister & Kilian, 2014). On the other hand, rising oil price can be inflationary in nature and this will depress consumer confidence and actual spending. Thus, higher oil prices add to cost of production and businesses are forced to raise prices to remain profitable, sales will reduce as a result of the higher prices, and as a result, the willingness to invest in form of stocks and bonds will reduce. The reverse is the case when oil price falls.

We identified two strands of literature. The first strand conducted a sectoral analysis of the impact of oil price on stock market indices (Babatunde, Adenikinju, & Adenikinju, 2013; Fowowe, 2016; Hedi Arouri, Foulquier, & Fouquau, 2011; Izedonmi and Abdullahi, 2018; Kapusuzoglu & Karacaer Ulusoy, 2015; Odusami, 2009)while most of the studies in the same strand conducted an aggregated study, using ASI composit index as proxy for the stock market(Chen, Roll, & Ross, 1986; Cheung & Ng, 1998; Khorram & Fallah, 2018). A major setback the use of aggregated stock index is that the idiosyncratic response of individual stock market sector index such as consumer goods index, Banking index, Oil and gas index etc will be hidden.

The second strand of literature is based on linear or nonlinear/asymmetric model. It has been widely argued in literature that the impact on oil price on the stock market and other is not entirely linear but nonlinear in nature Studies (see El, Arouri, & Youssef, 2010; Hedi Arouri

et al., 2011(Lin, Wesseh, & Appiah, 2014; Mordi & Adebiyi, 2010; Riga, Indriana, & Rahmanto, 2016)) Badeeb & Lean, 2018; Ibrahim, 2015; Kilian & Park, 2009; Balcilar, Gupta, & Miller, 2015; Huang, An, Gao, & Hao, 2016; Sharma & Thuraisamy, 2013; Narayan & Sharma, 2011). This assumption of a linear relationship or symmetry implies that positive and negative oil price shocks will impact the stock market alike. The application of a symmetric model that in modeling the impact of oil price will mute the impact of positive and negative shocks when asymmetries are present (Shin, Yu, & Greenwood-Nimmo, 2014;Phan, Sharma, & Narayan, 2015)argued that future studies should not ignore the possible presence of asymmetries in oil – stock prices relationship. The presence of linear relationship between oil price and stock prices does not imply a complete absence of nonlinear dependence (Borenstein, Cameron, & Gilbert, 1997; Kamaruzzama & Ismail, 2011; Narayan & Narayan, 2007; Radchenko, 2005; Wang, Liu, Zhang, & Li, 2013). It is based on the aforementioned that this study examines the response of NSE consumer goods stock index to Asymmetric impact of oil price shocks. The study will cobine both linear and nonlinear-Asymmetric models and compares the results to find the model that best explains the impact of oil price shocks on NSE Consumer goods stock index in Nigeria.

Literature Review

Chen, Roll, & Ross, (1986) examined seven macroeconomic variables and oil prices from 1952 to 1984. The study found evidence that stock market returns are significantly explained by macroeconomic variables. The study concluded that the returns of stock are exposed to economic news that the market prices at the end of the day.

Cheung & Ng, (1998) applied Johansen cointegration to examine five stock market indexes, oil price and other macroeconomic variables in search for evidence of long-run co-movements. Evidence of negative correlation between oil prices and stock prices was found. The study concluded that increases in cost of production are explained by oil price movements which further brings about sluggish economic activities.(Basher & Sadorsky, 2006)found evidence that risk associated with oil price significantly impacts on stock returns in emerging markets.

Kapusuzoglu & Karacaer Ulusoy, (2015) examined the relationship between stock market (ISE)and Brent oil prices in Istanbul over a period of ten years using Johansen cointegrationtes and Granger Causality test. The evidence supports the presence of cointegration and uncovered one way causality to oil price. (Cong, Wei, Jiao, & Fan, 2008) found evidence that manufacturing stock index are largely explained by oil price shocks in China.

Hedi Arouri, Foulquier, & Fouquau, (2011) found evidence of long-run asymmetric impact of oil price and stock indices in Europe especially in the case of positive oil price shocks. The study concluded that oil prices have an increasing and statistically significant on food and beverages and industrial stock index. Similarly oil price has a positive impact on other stock indices of mostly oil intensive industries including Automobile and Oil & Gas, while the impact on stock stocks industries that do not use oil intensively.

Riga, Indriana, & Rahmanto, (2016) examined the impact of oil price on stock prices in Indonesia using both symmetric and asymmetric models. The study found evidence that the sensitivity of the impact of oil price shocks on stock prices varies across sectors and that an increase in oil price will increase all sector stock prices. The evidence further showed that the

impact of oil price is asymmetric for consumer goods stock market index as well as for agriculture.

Khorram & Fallah, (2018)found evidence that oil price movement causes upward trends in Kuala Lumpur Composite stock index (FSTE KLCI) market return. Oil price is also found to positively impact on consumer staples sectoral index returns In GCC stock markets.

Fowowe,(2013) applied GARCH-jump models to examine oil price and returns relationship on Nigerian Stock Exchange. The study found evidence that oil price has an insignificant negative impact on stock returns on the Nigerian stock exchange. The study attributed the negative relationship to the existence dominance of the banking sector and to the existence of too many oil related firms that creates a path through which oil price shocks are transmitted to the stock exchange.

Mordi & Adebiyi, (2010) applied a structural model to examine the asymmetric impact of oil price shocks on output and prices in Nigeria using monthly data from 1999 to 2008. The study found evidence that positive and negative oil price shocks will have an asymmetric impact on output and prices.

Chuku, (2012) applied a structural autoregressive model to examine both linear and asymmetric oil price impact on Nigerian economy using quarterly data from 1970Q1 to 2008Q4. The study found evidence of asymmetric oil price shocks and that positive shocks oil price shocks has greater impact on the economy than negative oil price shocks. Evidence from granger causality test shows that oil price shocks granger cause output and inflation in the short-run. The study concludes that oil is an exogenous variable for the Nigerian Economy.

Izedonmi and Abdullahi, (2018) applied OLS method to examine the Arbitrage Pricing Theory in the Nigerian stock exchange using monthly data from 2000 to 2004 for 20 sectors. The study found no evidence that inflation, exchange rate and market capitalization have influenced the stock exchange.

Lin, Wesseh, & Appiah,(2014) applied VAR-GARCH, VAR-AGARCH and DCC-GARCH framework to examine the dynamic volatility transmission between oil the stock market returns of Ghania stock exchange. The study found evidence of significant volatility spillover in Nigeria than Ghanian stock exchange while the Ghanian stock exchange is found with more apparent transmission of volatility from oil to stock. The Garch DCC result showed evidence of effective hdge in the two markes compared to the VAR-GARCH and VAR-AGARCH model.

Methodology

Time series quarterly data from 2009 to 2016werecollected from the Central Bank of Nigeria (CBN) Statistical Bulletin and Nigeria Stock Exchange Market for oil price, reel effective exchange rate and sectoral stock market prices. This study applied the Nonlinear ARDL model, which is an extension to ARDL approach to co-integration which is superior to the standard cointegration approach due to its ability to account for long-run asymmetry. The nonlinear Auto regressive distributed lags model (NARDL) was applied to investigate the asymmetric impact of oil price shocks on consumer goods stock price index of the Nigeria Stock exchange (NSE). The choice of the NARDL is first based on its applicability regardless of order of integration of the variables of interest, as long as none of the variables is integrated of order 2. Secondly, unlike the standard co integration tests, the NARDL is built to account for long run and short run asymmetric impact of oil prices shocks (Shin et al., 2014).

$$\Delta lNSECONG_t = \beta_0 + \beta_1 lo\&g_{t-1} + \beta_2 OP_{t-1} + +\beta_2 Exc_{t-1} + \sum_{i=1}^{P} \alpha_1 \Delta lNSECONSG_{t-1} + \sum_{i=0}^{q} \alpha_2 OP_{t-1} + \mu_t \quad 1$$

The model specification in (1) above is a symmetric model to be implemented using an Autoregressive Distributed Lags (ARDL) cointegration approach. The model assumes that positive and negative oil price shocks will have impact of the same magnitude on the stock market index return.

$$\Delta NSECONSG_t = \alpha_0 + \beta_1 NSECONSG_{t-1} + \beta_2 EXCH_t + \beta_3 OP_{t-1}^{+} + \beta_4 OP_{t-1}^{-} + \sum_{i=1}^{P} \emptyset \Delta NSECONSG_{t-1} + \sum_{i=0}^{q} \gamma \Delta EXCH_{t-1} + \sum_{i=0}^{s} (\theta_t^{+} \Delta OP_{t-1}^{+} + \theta_{t-1}^{-}) + \varepsilon_t. \quad 2$$

Where p, q and s are lag orders, $\sum_{i=0}^{s} \theta_i^{+}$and $\sum_{i=0}^{s} \theta_i^{-}$ are respectively the short-run positive and negative impact of oil price shocks.β_3 and β_4 arerespectively represents the long-run impact of positive oil price shock and negative oil price shocks.

To test if the impact of positive and negative oil price shock is asymmetric, we will apply Wald F statistics to test the null hypothesis of symmetry that$\beta_3 = \beta_4 = 0$. If otherwise the impact is asymmetric.

Table 1: Descriptive Statistics

	OP	LNSECONS	LEXCH
Mean	8.76	6.61	4.38
Median	8.924	6.66	4.35
Maximum	9.29	6.99	4.59
Minimum	7.71	6.025	4.15
Std. Dev.	0.40	0.24	0.13
Skewness	-0.94	-0.47	0.13
Kurtosis	2.99	2.61	1.59

Table 2: Unit Root Test Result

Panel A 1 Lag Augmented Dickey Fuller (ADF)				Panel B 1 Lag NG-Perron			
Variables	ADF Unit root Test Statistics with Intercept	ADF Unit root Test statistics with Intercept & Trend	Order of Integration	Variables	NG-Perron Unit root test statistics with Intercept	NG-Perron Unit root test statistics with Intercept & Trend	Order of Integration
LNSECONS	-2.20	-2.06		LNSECONS	-1.44	-1.99	
D (LNSECONS)	-3.88**	-3.84**	I(1)	D (LNSECONS)	-2.26**	-2.45	I(1)
LOP	-1.41	-1.76		LOP	-1.41	-1.76	
D (LOP)	-4.51**	-4.97**	I(1)	D (LOP)	-2.22**	-4.93**	I(1)
LOP_Pos	-0.10	-2.37		LOP_Pos	-0.07	-2.57	
D(LOP_Pos)	-3.55*	-3.68**	*I(1)*	D(LOP_Pos)	-2.38**	-2.42	*I(1)*
LOP_Neg	1.11	-1.38		LOP_Neg	0.49	-0.97	
D(LOP_Pos)	-4.02**	-5.01**	*I(1)*	D(LOP_Pos)	-2.50**	-4.33**	*I(1)*
LEXCR	-1.03	-2.15		LEXCR	-0.32	-1.83	
D(EXCR)	-4.14**	-3.52**	I(1)	D(EXCR)	-2.03**	-2.05	I(1)

** Represents 5% level of significance

Table 3: Result from Symmetric – ARDL Model

Short runEstimates	Lags			
	0	**1**	**2**	**3**
D(LNSECONS)	-	0.40 (2.42)**	-	-
D(LOP)	0.23 (0.07)	-	-	-
D(LEXCH)	-0.43 (-0.77)	-	-	
ECT	-0.33 (-2.73)**	-	-	-
R-Squared	0.83	-	-	-
Adj. R-Squared	0.78	-	-	-
F-Statistics	2.65	-	-	-
LM Serial Correlation Test		0.41	0.34	
ARCH _Heteroschedasticity		0.03	1.38	
JB_Normality Test	0.31			
	Long-Run Estimates			
Varibles	LOP	LEXCH	C	
Coefficients	0.44 (2.29)**	-1.66 (-2.81)**	10.00 (4.80)*	-

( ) t-statistics
***,** , * represents 10%, 5% and 1% respectively

Table: 4: Asymmetric NARDL Result

Short-run Variables	Lags			
	0	**1**	**2**	**3**
D(LNSECONS)	0.39 (2.30)**	-	-	-
D(LOP_Neg)	0.45 (1.88)***	-	-	-
D(LOP_Pos)	-0.03 (-0.10)	-	-	-
D(LEXCH)	-0.69 (-1.07)	-	-	-
ECT	-0.33 (-2.63)**	-	-	-
R-Squared	0.85	-	-	-
Adj. R-Sqd	0.79	-	-	-
F_{Bounds}	1.96	-	-	-

LM_Serial Correlations	-	0.88	0.29		
ARCH_Heteroschedasticity	-	0.94	0.03		
JB_Normality	-		-	-	
Ramsey Reset	0.80	-	-		

Long-Run Estimates

Variables	LOP^+	LOP^-	LEXCH	C
	0.07	0.399	-2.60	18.40
	(-0.16)	(1.59)	(-2.47)**	(0.001)

( ) T-Statistics
***,** , * represents 10%, 5% and 1% respectively

Results

In this study, we implemented both the standard cointegration test using ARDL model and a newly developed NARDL model, an asymmetric extension of the standard cointegration. The NARDL captures the asymmetric impact of oil price on the Consumer goods stock index which is usually concealed when the standard cointegration approach is applied. Before the presentation of this result we present the descriptive statistics are reported in Table 1. The descriptive statistics indicates oil price with a maximum and minimum value of 9.29 and 7.71 respectively, a mean value of 8.76. The standard deviation is 0.40. Oil price is negatively skewed and platekurtic. NSE Consumer index has a mean value of 6.61, and a minimum and maximum value of 6.02 and 6.99 respectively. The NSE consumer goods index is negatively skewed and Platekurtic. On the other hand exchange rate is positively skewed and also platekurtic, with a mean value of 4.38, median, maximum, minimum and standard deviation of 4.38, 4.35, 4.59, 4.15, and 0.13 respectively.

The Augmented Dickey Fuller (ADF) and NG-Perron Unit root test statistics are reported in Panel A and Panel B of Table 2 respectively. Both ADF and Ng-Perron test shows that all the variables (exchange rate, oil price and NSE Consumer goods stock market index, including the decomposed negative and positive oil price shocks) are stationary at first difference and none of the variables is integrated of order 2. Table 3 and 4 reports the test statistics from Symmetric ARDL model and Asymmetric (NARDL) model respectively. If the test of asymmetry reveals that there is no long-run asymmetry, then the symmetric model results reported in Table 3 will be taken as more reliable estimates than the asymmetric test result in Table 4. The bound test result reported in lower part of Table 3 and 4 shows that there is long run co integration. The evidence is further supported by the error correction term which is negative and statistically significant. The error correction term shows that deviations from equilibrium are corrected at the speed of 5%.

The result from the Asymmetric Model shows only negative oil price shocks and NSE Consumer goods index of the previous period (Lag) to be statistically significant at least at 5%. This result means that a negative oil price shock will bring about an increase of 0.45% in NSE Consumer goods stock price index while a NSE Consumer goods stock index of the previous period will cause a 0.39% increase in current NSE consumer goods stock market index. This also implies that market information of the previous periods do have a statistically significant impact on the market in the current period. Consequently, investors can make use of historical market information to outperform the market and market supernormal profit.

Although Short-run impact of negative oil price impact is not statistically significant, it has a negative coefficient of 0.03, implying that an increase in negative oil price shocks will depress the consumer goods stock index by 0.03% in the short-run. The error correction term is statistically significant at 5% with coefficient of -0.33, indicating that deviations from equilibrium are corrected at the speed of 33%,

The long run Asymmetry result reported in the Lower portion of Table 4. In this section of the table, both Positive and negative oil price shocks are positively related to NSE consumer goods stock market index but are not statistically significant. The long run coefficient for exchange rate is statistically significant at 5%. i.e a 1% increase (depreciation) in exchange rate will depress NSE consumer goods stock index by 2.6% in the long-run. A depreciation in exchange rate implies that foreigners will find domestic goods cheap, while the Nationals will find foreign goods more expensive. Nigerians have high preference for foreign/imported goods than the locally made goods.When there is a persistent demand for imported goods despite the high prices of foreign goods triggered by deprectiation in exchange rate, the domestic firms will be impacted negatively. In addition, domestic firms imports some major raw materials, refined oil products and capital goods for the production of goods and services and exchange rate depreciation makes these goods more expensive, which raises the cost of production, prices, and the consumers will reduce demand for goods and services of the listed firm, and thus the stock index is depressed. The Nigerians must reduce preference for foreign goods and consider the domestic goods. The government should ensure availability of the major raw materials within the country in order to reduce pressure and lead to an appreciation in the exchange rate. The result shows that there is no hetroschedasticity and Serial Correlation is reported by the LM and ARCH test statistics respectively reported in Table 4.

The one lag period of NSE Consumer goods index (i.e. index of the previous period) has a statistically significant impact on current NSE stock index for consumer goods. this means that the index of the previous period determines the index of the current period. All the short run coefficients of oil price and exchange rate are not statistically significant in the short-run however, the error correctionterm and Bound test statistics suggests the presence of long run co integration.The long-run coefficients for the exchange rate and oil price are statistically significant in the long run for the symmetric model. The result shows that an increase in oil price by 1% will induce and increase of 0.44% in the NSE consumer goods stock index while an increase in the exchange rate (Depreciation) will depress the NSE stock index by 1.66% in the long run for the symmetric model.The post estimation test statistics are reported in Table 3 showing LM (Breausch Godfrey) serial correlation test statistics and ARCH test of heteroscedasticity are all suggesting that there is no serial correlation nor heteroskedasticity in the model at lag 2. The Cusum test result is reported in Figures 4.5.3B showing that the model is stable.The study also implemented the CUSUM test of stability to check if model 6 is stable. The result of the stability test for Model 6 is presented in Figures 4.5.3B. Model 6 is stable as seen on the graph within 5% level of significance.

Conclusion

We found evidence that the impact of oil price on the consumer goods stock index of Nigerian stock exchange is symmetric. This means that the impact of a positive shock on consumer goods stock index returns has the same magnitude as that of negative oil price shock.

The long-run symmetric impact of oil price and exchange rate exerts a statistically significant impact on Consumer goods stock index return. Further, that an increase in oil price reduces the stock market index for consumer goods and vice versa, while an increase or depreciation in the exchange rate will depress the stock return of consumer goods of the Nigerian stock exchange.

The study concludes that positive and negative oil price shocks will impact the NSE consumer goods stock index return in the same fashion. The listed consumer goods companies in the Nigerian stock exchange will make significant gains from good news coming from the oil market as much as losses from bad news emerging from the oil market. As a result, the government in Nigeria should put policies in place to address the poor power supply in Nigeria to reduce the reliance of business and manufacturing firms on Oil and reduce the extent to which oil is used as an input in the production process.

This effort will reduce the power of oil prices is increasing the cost of production and subsequently depressing the consumer goods stock index returns due to low consumer demand as a result of high prices created by the high cost of production through rising oil prices. More efforts should also be put in place to stabilize the Nigerian exchange rate, increase the local production of most of the imported goods to reduce to pressure on the Naira exchange rate to the dollar. This effort will bring about an appreciation in the Naira/Dollar exchange and further boost the stock returns of consumer goods stock index in the Nigerian Stock Exchange.

Figure1: Cusum for ARDL and NARDL Model

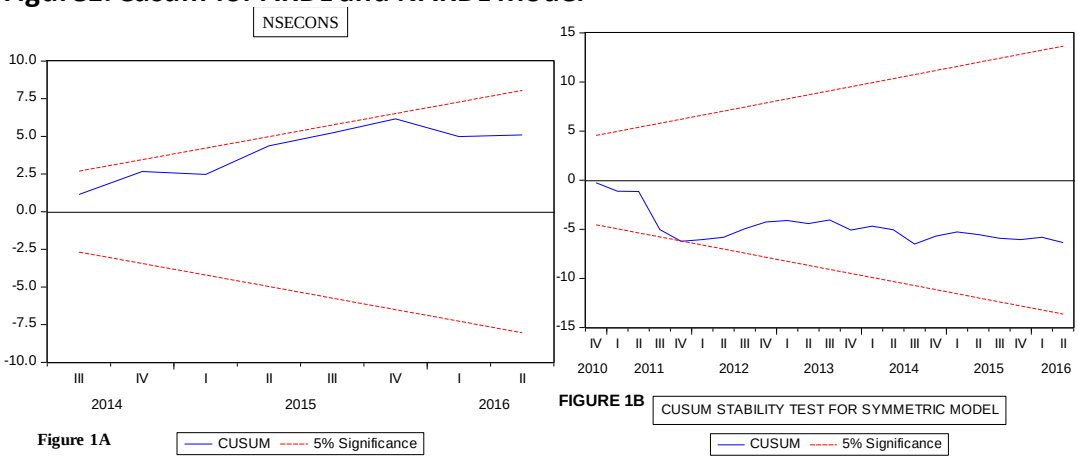

Figure 1A

FIGURE 1B

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