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CRUDE OIL PRICE FLUCTUATION AND THE NIGERIAN ECONOMY

Apere ,T.O and Eniekezimene, A.F

Department of Economics, Niger Delta University
Bayelsa State, Nigeria.

ABSTRACT

Fluctuation in oil prices has been occurring since the end of the Second World War. These days, the rate of fluctuation in oil price is more pronounced. This has made serious impact on Nigeria as a country practicing a mono cultural economy. This work thus examines the Crude Oil Price Fluctuation and Nigerian Economy (1981–2013), a period of 32 years. Using the VAR Model (VAR) the impact of oil price fluctuation on the economy of Nigeria was examined. In the model, the results shows that changes in oil price has a significant impact on the Nigerian economy (gross domestic product) used in this study. From the regression result, oil prices show positive relationship with GDP. In order to explain the three key variables (crude oil price, exchange rate and gross domestic product) employed in this study, the researcher discovered that a decrease in oil prices have a negative impact on the GDP and also fluctuation in exchange rate has both negative and positive impact on crude oil price and the GDP. Thus, the need to diversify the economy is the paramount issue, so as to strengthen the economy even without oil. Nigerian policy makers are being advised to save more when oil price increases so as to assist developmental expenditures and also to encourage investment when oil price falls.

Keywords: Nigerian economy, Crude oil price, Exchange rate, Gross domestic product.

1. INTRODUCTION

Oil prices traditionally have been more volatile than any other commodity or asset price since World War II. The trend of demand and supply in the global economy coupled with activities of OPEC consistently affects the price of oil. The recent changes in oil prices in the global economy are so rapid and unprecedented. This is partly due to increased demand of oil by USA, China and India.

ISSN: 2455-8834

Volume:01, Issue:06

However, the current global economy melt down suddenly counteracted the skyrocketing oil prices. At the beginning of the crisis oil price crashed below $40/b in the world market which had serious consequences on Nigeria fiscal budget which led to the downward review of the budget oil bench mark price oscillating between $60/b and $75/b. Today with the withdrawal of the united states as a buyer of Nigeria crude oil, oil price fluctuate between $51/b and $46/b far below the 2015 bench mark for 65/b upon which the budget is prepared (Leadership, 2015).

The objective of this study is to examine the impacts of crude oil price fluctuation on the Nigerian economy for the period 1981-2013

2. IMPACT OF CRUDE OIL FLUCTUATION ON THE ECONOMY

A number of empirical works on the relationship between oil price fluctuations and economic activity has been carried out using different estimation approaches and by looking at the channel of transmissions of oil price fluctuation to the larger economy. Many researchers have argued that fluctuations in oil prices are linked to macroeconomic performance.

The VAR model analysis by Blanchard and Gali, (2007) found that the relationship between oil price increase and GDP in 6 countries (US, England, Germany, France, Italy and Japan) changed from negative to positive from the 2000s shock in comparison to shocks in the 1970s and 1980s, in addition to minimal impacts on GDP, unemployment, wage and CPI for the period. Lardic and Mignon (2006) studied 12 European countries for the period 1970 to 2003 and found asymmetric relationship between oil price and economic activities, implying that rising oil prices retard aggregate economic activity more than falling oil prices stimulate same.

Still (2007) in a study on the US economy found that a 10% increase in the price of oil is associated with about 1.4% drop in the level of US real GDP, while increase in oil prices have no significant effect on US inflation. Nevertheless, the evidence suggests that the recent rise in prices has worked to restrain domestic output growth. Gounder and Bartleet (2007) used both linear and non-linear oil price shock and economic growth in New Zealand, followed by substantial effect on inflation and exchange rate. Also Chen and Chen (2007) found a co-integrating relationship between real oil prices and real exchange rates.

Jin (2008), in a comparative analysis, discovered that oil price increases, exert a negative effects on economic growth in Japan and China and a positive effect on Russia. Specifically, a 10 percent increase in international oil prices is associated with a 5.16 percent growth in Russian GDP and a 1.07 percent decrease in Japanese GDP.

ISSN: 2455-8834

Volume:01, Issue:06

In recent study, Elmi and Jahadi (2011) used growth fluctuations in selected OPEC and OECD countries for the period 1970-2008, and found that both OPEC and OECD countries are affected by oil price shock albeit at different degrees. Akpan (2009) using VAR model analysis found a positively significant asymmetric effect of oil price shocks on real government expenditure in Nigeria, while such effect on industrial output growth was found to be marginal with observed significant appreciation of the real exchange rate. These findings reinforced results obtained in earlier studies by Olomola and Adejumo (2006) and Ayadi (2005) on Nigeria. Similarly Aliyu (2009) used a non-linear approach and found evidence of both linear and non-linear effects of oil price shocks on real GDP in Nigeria; precisely, the study found that asymmetric oil price increases in the non-linear models have larger positive impacts on real GDP than in other specification. The study which focused on the effects of oil price shocks and real exchange rate volatility on real economic growth in Nigeria, found an uni-directional causality running from oil prices to real GDP and bidirectional causality from real exchange rate to real GDP and vice versa, while further results indicate that oil price shock and appreciation in the level of exchange rate exert positive impact on real economic growth in Nigeria.

Omisakin et al (2009) examined the short run implications of oil price shocks on Nigerian economy using vector Error correction model (VECM) on data period of 1970-2006 and found that a 10 percent increase in oil price brought about 79 percent increase in money supply, 11% short run, which thus implies that the Nigerian economy is vulnerable to international oil price volatility.

Chuku et al. (2011) studied the linear and asymmetric impacts of oil price shocks on the Nigerian economy for the period 1970 Q_1-2008 Q_4 using VAR model and Granger causality test approach; and found that oil price shocks are not a major determinant of macroeconomic activity in Nigerian in the linear model; while Granger causality results indicate that world oil prices do not influence macroeconomics activity and that non-linear specification results shows that the impact of world oil price shocks on the Nigerian economy are asymmetric similarly, Tang et al. (2010) study the Chinese economy emphasized the price transmission mechanisms and employed a structural VAR model to show that an oil-price increase negatively affects output and investment, but positively affects inflation rate and interest rate. However, with price control policies in China, the impact on real economy, represented by real output and real investment, lasts much longer than that on price/monetary variable. Also Du et al. (2010) used the multivariate VAR method on a monthly time series data for period 1995:1 to 2008:12, and found that world oil price affects economic growth and inflation significantly in China.

Ayadi et al. (2000) studied the effects of oil production shocks of Nigeria, as a net exporter of oil for the period 1975-1992 using the VAR approach, and found that output respond positively to

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Volume:01, Issue:06

positive oil production shock, while inflation response was negative after a positive oil production shock to the extent that an oil price increase leads to an oil production increase. The authors' results thus suggest that output increases; inflation decreases and the national currency depreciate following a positive oil-price shock in Nigeria.

The IMF (2000) found, in a study on the impact of price increase on the global economy, that the differential impact of an oil price increase of US 5 dollar per barrel is greater for developed countries than for developing countries as a group, with differences in terms of the relative size of oil importing to exporting countries accounting for much of the disparity; while oil price shocks was precisely shown to lower aggregate demand by redistributing income between net oil importers and exporters. The study further indicated that differences in oil intensity levels in domestic production exports and imports, and degree of openness also accounted for some of the observed discrepancy. Additional results indicate that oil price change is positively correlated with economic growth in oil producing countries, while estimate of the first round impact of higher oil prices on GDP growth for some ASEAN countries, viz Indonesia (+0.5%), Malaysia (+0.2%), Philippines(-0.5%) and Thailand (-0.4%), were found to be mixed.

Olomola and Adejumo (2006) found that contrary to the previous empirical findings, oil price shocks was found to significantly affect output and inflation in Nigeria, while oil price shocks was found to significantly influence the real exchange rate. This result is slightly different from that obtained by Ayadi (2005), which suggest that oil price changes, significantly influence economic development in Nigeria via industrial production. The results further suggest that oil changes affect industrial production indirectly through its effects on change rate albeit insignificantly.

3. MATERIAL AND METHOD

This research used time series technique of econometric simulations for its analysis and employed the VAR method of estimation. Vector Autoregressive Model was developed by Sims (1980) in response to the problem of simultaneity among variables in a system. According to Sims, if there is true simultaneity among variables, they should be treated on an equal footing; there should be no apriority distinction between endogenous and exogenous variables. The term autoregressive is due to appearance of the lagged value of the dependent variable on the right-hand side, and the term vector, is due to the fact that we are dealing two or more variables.

Sims (1980) recommended against differencing. He opined that differencing "throws away" information concerning variables (Ender, 1995). According to him, the goal of the VAR analysis is to determine the interrelationship among variables in the system and not parameter estimates. To estimate this model, we consider a vector autoregressive model developed by Sims.

ISSN: 2455-8834

Volume:01, Issue:06

Following Sims (1980) seminal paper, the vector autoregressive VAR model has become one of the leading approaches employed in the analysis of dynamic economic interaction (Adrangi and Allender, 1998, and Palm, 1983), especially in investigations of the oil price fluctuation and its macroeconomic relationship.

This research follows suit by employing the VAR model to examine the short and long-run impact of oil price fluctuation on the Nigerian economy. The VAR approach is founded on Granger's (1969) specification of causality. Causality in Granger's sense is inferred when values of variables say (X_t), has explanatory power in a regression of Y_t on lagged values of X_t and Y_t. Following, we consider a VAR model of order K, thus

$$Y_t = C^o + \sum_{i=1}^{k} \Phi i \, Y_t - _1 + \varepsilon_t \ldots\ldots\ldots\ldots (3.2)$$

Where Y_t= (GDP, COP, EXR) is an n x 1 vector of two endogenous variables. While $Y_t - _1$ is the corresponding lag term of order i. Φi, is the n x n matrix of autoregressive coefficient vector Y_t-$_1$ for I = (1, 2… k). C_0= (C_1, C_2…Cn) is the intercept vector of the VAR model. ε_t = (ε_{1t}, ε_{2t}…ε_{nt}) the (nx1) vector of white noise process. K is the number of lagged terms. VAR estimation is very sensitive to lag structure variables.

Vector Autoregressive (VAR) technique is employed for estimation purpose through the Impulse Response Function and Decomposition analysis. In adopting the VAR methodology, we agree with the argument put forward by Hamilton (1994) which suggest that one could ignore the non-stationarity of included variable altogether and simply estimate the VAR in levels, relying on standard T- and F- distribution for testing any hypothesis .

The research employs yearly data for the period 1981-2013. The data employed are: Crude Oil Prices (COP), Gross Domestic Product (GDP) and Exchange Rate (EXR).

4. ANALYSIS

4.1 Variance Decomposition

Variance decomposition analysis is used to determine the proportion of the movement in time series that are due to shocks in their own series as opposed to shocks in other variables.

The table below demonstrates the variance decomposition of the VAR model in symmetry definition of oil price fluctuation. oil price fluctuation stimulates volatility of other variables in the model to varying degrees.

ISSN: 2455-8834

Volume:01, Issue:06

Table 1. Variance Decomposition Test (Quarterly)

Variance Decomposition of GDP:				
Period	S.E.	GDP	COP	EXR
1	3404.963	100.0000	0.000000	0.000000
2	5842.371	69.53232	22.76395	7.703728
3	7059.144	66.18767	21.84553	11.96681
4	8432.217	67.79970	17.84186	14.35844
5	10196.11	65.81513	16.25627	17.92859
6	12080.46	62.83397	15.15839	22.00763
7	14173.72	60.21936	14.02062	25.76002
8	16600.13	57.33133	13.36851	29.30016
9	19361.51	54.32343	13.05422	32.62235
10	22489.41	51.50826	12.90613	35.58561
Variance Decomposition of COP:				
Period	S.E.	GDP	COP	EXR
1	10.87207	2.116437	97.88356	0.000000
2	12.74284	15.18630	80.52553	4.288176
3	13.85448	15.05125	68.54174	16.40701
4	14.91648	13.76848	61.68861	24.54290
5	16.03332	13.32031	53.83287	32.84683
6	17.33334	12.19419	46.17114	41.63467
7	18.67099	10.98213	40.12822	48.88965
8	20.08870	10.01719	35.45259	54.53022
9	21.64394	9.196289	32.05626	58.74745
10	23.28665	8.566340	29.71201	61.72165
Variance Decomposition of EXR:				
Period	S.E.	GDP	COP	EXR
1	15.03572	1.087330	6.862434	92.05024
2	20.98655	1.352779	9.415525	89.23170
3	25.47038	1.359890	11.63234	87.00777
4	29.25595	1.226101	14.17779	84.59611
5	32.55434	1.062109	16.71772	82.22017
6	35.45030	0.901604	19.07258	80.02582
7	38.06642	0.798566	21.27247	77.92896
8	40.49319	0.817864	23.28153	75.90061
9	42.80212	1.029860	25.04438	73.92576
10	45.07519	1.509697	26.53175	71.95855

ISSN: 2455-8834

Volume:01, Issue:06

Cholesky Ordering: GDP COP EXR
Source: Author's computation with EViews

4.1.1 Variance Decomposition of GDP

In the first quarter, GDP strongly accounts for its own fluctuation as 100% variation is explained by itself while COP and EXR accounts for no variation. In the 10TH quarter, 51% fluctuation is explained by own variation whiles the COP accounts for12% and EXR accounts for the remaining 35%.

4.1.2 Variance Decomposition of COP

97% fluctuation is accounted for by own variation in the 1st quarter, 2.1% fluctuation of COP is explained by GDP whiles EXR accounts for no variation. At the 10TH quarter, 29% fluctuation is explained by own variation, GDP accounted for 8.5% fluctuation in COP and 61% fluctuation in COP is accounted for by EXR.

4.1.3 Variance Decomposition of EXR

In the 1st quarter 92% fluctuation is explained by own variation, GDP accounts for 1% fluctuation in EXR while COP accounts for 6.8% fluctuation in EXR. At the 10TH quarter, 71% fluctuation is explained by own variation whiles GDP accounts for 1.5% and COP 26.5% of fluctuation in EXR respectively.

From the table result therefore it can be concluded therefore that on the short run, there is no relationship among GDP, COP, and EXR but on the long run there exist a significant relationship among the variables, this is at the variance decomposition of GDP.

At the variance decomposition of COP, there exist a little relationship between GDP and COP on the short run whiles on the long run; there is a significant relationship among the three variables.

At the variance decomposition of EXR, on the short run there exists an insignificant relationship among the variables, on the long run, COP shows greater relationship than GDP.

4.2 Impulse Response Function

The table and graph below show the impulse response of the variables to each other;

ISSN: 2455-8834

Volume:01, Issue:06

Table 2. Impulse Response Test

Response of GDP:			
Period	GDP	COP	EXR
1	3404.963	0.000000	0.000000
2	3484.237	-2787.488	1621.585
3	3041.157	-1765.182	1825.843
4	3901.900	-1341.645	2060.568
5	4496.079	-2052.843	2903.362
6	4824.569	-2285.092	3671.335
7	5410.997	-2458.626	4430.915
8	6083.381	-2944.865	5384.274
9	6756.962	-3478.114	6445.932
10	7541.476	-4042.236	7595.507
Response of COP:			
Period	GDP	COP	EXR
1	1.581666	10.75640	0.000000
2	4.707212	3.880357	2.638777
3	2.056902	0.897865	4.952732
4	1.320872	2.386306	4.807868
5	1.899235	1.062405	5.461699
6	1.547467	-0.576235	6.375791
7	1.283565	-1.081934	6.733722
8	1.463074	-1.783712	7.044689
9	1.629730	-2.664558	7.426211
10	1.836184	-3.308766	7.712871
Response of EXR:			
Period	GDP	COP	EXR
1	-1.567852	-3.938796	14.42570
2	-1.870817	-5.094623	13.59806
3	-1.692345	-5.830471	13.09376
4	-1.293128	-6.773885	12.63380
5	-0.872774	-7.471459	12.13630
6	-0.273128	-7.906811	11.59079
7	0.490900	-8.280081	11.11433
8	1.356047	-8.573074	10.73823
9	2.335970	-8.779043	10.47829

ISSN: 2455-8834

Volume:01, Issue:06

10	3.436037	-8.958042	10.37779

Cholesky Ordering: GDP COP EXR

Source: Author's computation Using E-Views

4.2.1 Response of GDP

From the table as well as the graph, COP has a negative response to increase in GDP while EXR has a positive response to GDP. This is as the graph shows COP below zero margin and EXR increasing as GDP increases from the first quarter to the tenth quarter. This implies that variation in GDP has a negative impact on COP and a positive impact on EXR.

4.2.2 Response of COP

From the result shown on the table and graph above, as COP decreases, EXR increases but at a slow paste meanwhile the GDP decreases almost simultaneously with COP. This is seen from the graph which shows GDP approaching zero as COP approaches negativity. Therefore GDP response to COP decrease is negative while EXR slightly responds positively.

4.2.3 Response of EXR

In the table and graph also, GDP shows a negative response to EXR from the first quarter to the sixth quarter but increasing at a very slow paste as EXR decreases, but shows positive response from seventh to tenth quarter. The COP response to EXR is negative

5. CONCLUSION

Based on the empirical results and the review of literature the study concludes that Crude Oil Price has remarkable effects on the Nigerian Economy; a negative relationship exists between crude oil price fluctuations and the Nigerian economy growth and that exchange rate has a significant impact on both oil prices and economic growth. The study recommends that: Diversification of Nigerian Economy, prudent government spending and proper investment of excess crude oil funds can put the economy on a better path to economic growth and development.

ISSN: 2455-8834

Volume:01, Issue:06

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ISSN: 2455-8834

Volume:01, Issue:06

APPENDIX