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EFFECT OF OIL PRICE AND EXCHANGE RATE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA

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Abstract

Controversies abound over the nexus between oil price and exchange rate volatility on economic growth. However, previous related studies in Nigeria only focused on either the impact of oil price shock on economic growth or the effect of exchange rate volatility on economic growth without examining the joint effect of the two variables on economic growth. The study equally examined the dynamic relationship that exists among oil price, exchange rate volatility and economic growth in Nigeria. Secondary data were used for this study. The variables are real gross domestic product, exchange rate, money supply and inflation rate which were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin, while oil price was sourced from energy price indicator. The econometric techniques employed were co-integration analysis and vector autoregressive model. The result showed that oil price volatility has negative but insignificant relationship with economic growth as 1 per cent increase in oil price volatility reduces real gross domestic product by 1.7 per cent. In the same vein, exchange rate volatility has insignificant adverse effect on real GDP as 1 percent increase in exchange rate volatility brings about 2.6 per cent decrease in real GDP. The study concluded that oil price volatility

depresses economic growth more than volatility in exchange rate, a scenario that may attribute to mismanagement of oil revenue in the country. Based on the findings of this study, it was recommended that there should be a reduction in the proportion of expenditure on imported commodities by Nigerians and urges them to patronise locally made goods.

Keywords: Oil Price, Exchange Rate, Economic Growth, Impulse Response, Variance Decomposition

INTRODUCTION

It has been observed that exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, competiveness of traded goods and services, allocation of resources, productive capacity of goods and services and investment decision Odusola (2003). Besides, Exchange rate is a key variable in the context of general economic policy making as its appreciation or depreciation affects the performance of other macroeconomic variables in any economy. In the light of its importance, every country pays so much attention to the appropriateness of her foreign exchange policy and the stability of the exchange rate becomes the formidable bedrock of all economic activities. Since the adoption of the Structural Adjustment Programme (SAP) in July, 1986, Nigeria has moved to various types of floating regimes of exchange rate from the fixed/pegged regimes between 1960s and the mid-1980s. Floating exchange rate has been shown to be preferable to the fixed arrangement because of the responsiveness of the rates to the foreign exchange market Nwankwo (1980).

Exchange rate volatility is a risk associated with unexpected changes in exchange rate, this is caused by some economic factors such as inflation rate, interest rate, and balance of payments Ozturk (2006). Crude oil became an export commodity in Nigeria in 1958 following the discovery of the first producible well in 1956. The discovery of crude oil in Nigeria led to what is commonly referred to as the “Dutch disease”. The Dutch Disease (DD) refers to the paradoxical deleterious consequence of natural resource booms on the countries where they occur. The concept was coined from the experience of Netherlands in the 60s when, as a result of exploitation of the newly discovered large deposit of natural gas in the North Sea, the non-oil tradable sector became less competitive and declined, Olusi and Olagunju (2005). Thus, the performance of the manufacturing sector remained less impressive and that of agriculture declined. In the early 1960s, manufacturing activities consisted of partial processing of agricultural commodities, textiles, breweries, cement, rubber processing, plastic products, and brick making. The economy gradually became dependent on crude oil as productivity declined in other sectors.

As a mono-product economy, Nigeria remains susceptible to the movements in international crude oil prices. During periods of favourable oil price shocks triggered by conflicts in some oil - producing areas of the world, the surge in the demand for the commodity by consuming nations, seasonality factors, trading positions, etc; the country experiences favourable terms-of-trade quantified in terms of a robust current account surplus and exchange rate appreciation. On the converse, when crude oil prices are low, occasioned by factors such as low demand, seasonality factors, oil glut and exchange rate appreciation, the Nigerian economy experiences significant drop in the level of foreign exchange inflows that often result in budget deficit and or slower growth.

It is observed that a significant number of studies have looked at the relationship between oil price and selected macroeconomic variables (including exchange rate) in both developed and developing countries. Some studies surveyed reported positive result, while some reported negative result. Some of the studies even show no relationship. Though, the work of Aliyu (2009) assessed the impact of oil price shock and exchange rate volatility on economic growth, his study did not capture the recent fluctuations in oil price between 2008 and 2009. Hence, this study differs from the early studies conducted in relation to the investigation of the impact of oil price shock on the economic growth in many ways. (a) updating the data so as to capture the recent fluctuations in oil price between 2008 and 2012. (b) method of data analysis, using VAR instead of VEC. (c) examine the impact of oil price and exchange rate on economic growth at disaggregated level, and (d) examine the dynamic interrelationship that exists among the variables since it is possible or the variable in the model to affect one another. It is against this background that this study intends to fill these gaps.

The rest of the paper is organised as follows: section two is on literature review. Section three presents the methodology, while section four discusses the results. Section five concludes and makes recommendations.

LITERATURE REVIEW

Brief Empirical Literature

Hang et al (2005) examines the effect of oil price change and its volatility on economic activities in the United State, Canada, and Japan. Their findings show that when oil price change and volatility exceed a threshold, they possess significant explanatory power for the outcome variables such as industrial production and stock market return.

Milani (2009) estimates a structural general equilibrium model to examine the changing relationship between oil price and macroeconomic variables to fit the data on the United State using quarterly series for the 1960:1- 2008:1sample. His findings suggest that oil price affect the

economy through an additional channel, i.e, through their effect on the formation of agent beliefs. The estimated learning dynamics indicates that economic agent's perceptions about the effect of oil price on the economy have change over time. Oil price were perceived to have large effects on output and inflation in the 1970s, but only a milder effect after the mid-1980.

Al-Mulali, (2010) examines the impact of oil price shocks on the real exchange rate and the gross domestic product in Norway using time series data from 1975 to 2008. The vector auto-regressive has been implemented using the co-integration and the granger causality test. The results of the study show that the increase in oil price is the reason behind Norway's GDP increase and the increase of its competitiveness to trade by its real exchange rate depreciation.

Daussa (2008) investigates the significant impact of exchange rate shock on prices of Malaysians imports and exports. In methodology, the study adopts error correction (ECM) model and prices of export covering the period of 1999 to 2006. Exchange rate significantly affects the fluctuation of import prices. These results imply that import prices are more sensitive than export prices to shock in nominal exchange rates. Shock in nominal exchange rates, however, does not give significant impact on both export prices and money supply.

Olomola and Adejumo (2006) in their empirical study on the oil price shock and aggregate economic activity in Nigeria used a VAR model with quarterly data from 1970 to 2003. Volatility was measured as the conditional variance of the percentage change of the nominal oil price. The five variables used for the empirical study were real gross domestic product, proxied by industrial production index (y), domestic money supply, the real effective exchange rate (REER), the inflation rate (CPI), and real oil price. The specification used for the model is the scaled specification, a non-linear transformation of oil price that takes volatility into account. The findings showed that while oil prices significantly influence exchange rate, it does not have significant effect on output and inflation in Nigeria. They concluded that an increase in the price of oil results in wealth effects which appreciates the exchange rate and increases the demand for non-tradable, a situation that would result in "Dutch disease".

Aliyu (2009) assesses the impact of oil price shock and real exchange rate volatility on the real gross domestic product in Nigeria using quarterly data that span the period 1986-2007. He used the Johansen VAR-based co integration technique to examine the sensitivity of real GDP to change in oil prices and real exchange rate volatility in the long-run while the vector error correction model was used in the short-run. The result of the long-run analysis indicated that a 10.0 per cent permanent increase in crude oil prices increases the real GDP by 7.72 per cent, similarly a 10.0 per cent appreciation in exchange rate increases GDP by 0.35 per cent. The short-run dynamic was found to be influenced by the long-run equilibrium condition. He recommended the diversification of the economy and infrastructural diversification.

Ayadi (2005) analyses directly the effects of oil-price shocks for Nigeria over the 1980-2004 periods employing standard VAR. This VAR process is similar to Ayadi, *et al* (2000), that the responses of the macroeconomic variables- output, inflation, and the real exchange rate- to oil-price shocks are small. More precisely, the contributions of the oil price shock to the variance of output, inflation and real exchange rate are 1.1 and 0 percent at impact respectively, and about 7.1 and 5 percent after a year. In comparison, the contributions of the oil price shock to the variance of oil prices are 100 percent at impact and about 97 percent after a year.

Mordi (2006) contends that exchange rate volatility in Nigeria is explained by fundamentals such output growth (GDP) rates, inflation, balance of payments position, external reserves, interest rates movements, external debt position, productivity and other macroeconomic shocks.

Ogun (2004) analyses the effects of real exchange rate misalignment and volatility on the growth of non-oil exports. It is found that irrespective of the alternative measures of misalignment adopted, both real exchange rate misalignment and volatility adversely affected growth of Nigeria's non-oil export.

THEORETICAL FRAMEWORK AND METHODOLOGY

Solow Growth Model

Since the objective of the study is to examine the relationship between oil price, exchange rate volatility and economic growth, following Rasche and Tatom (1977), the study adopts the Solow growth model. Over the years, the growth theory has evolved as a major feature of economic growth and development. In analysing the impact of oil price and exchange rate volatility on economic growth, Solow's model of economic growth is premised on the proposition that output in an economy is produced by a combination of labour (*L*) and capital (K), under constant returns to scale, so that doubling input results in doubling output. Contemporary versions distinguish between physical and human capital. Thus, the quantity of output (*Y*) is also determined by inputs which capital and labour are employed. Or mathematically:

$$Y = Af(K, L) \quad (3.1)$$

Solow assumed that this production function exhibits constant returns to scale, that is, if all inputs are increased by a certain multiple, output will increase by exactly the same multiple. The Solow neoclassical growth model uses a standard aggregate production function in which

$$Y_t = AK_t^{\alpha} L_t^{1-\alpha} \; where 0 < \alpha < 1 \quad (3.2)$$

In this case, Y is gross domestic product, K is stock of capital, Lis labour and assumed to grow at n+ g

$$L_t = L_0 e^{nt} \quad (3.3)$$

$$A_t = A_0 e^{gt} \quad (3.4)$$

The number of effective units of labour, *At Lt* grows at rate *n+g*.

The model assumes that a constant fraction of output, *s*, is invested. Defining *k* as the stock of capital per effective unit of labour, *k=K/AL* and *y* as the level of output per effective unit of labour, *y = Y/AL*, the evolution of *k* is governed by:

$$K_t = sy_t - (n + g + \delta)k_t \quad (3.5)$$

Where δ is the "rate of depreciation", equation (3.5) above implies that *k* converges on steady-state value *k** defined by

$$K^*([\frac{s}{n+g+\delta}])^{\frac{1}{1-\alpha}} \quad (3.6)$$

This implies that the steady-state capital-labour ratio is related positively to the rate of saving and negatively to the rate of population growth. The central predictions of the Solow model concern the impact of saving and population growth on real income. Substituting (3.6) into the production function and taking logs, we find that steady-state income per capita is

$$ln\frac{Y_t}{L_t} = A_0 + gt - \frac{\alpha}{1-\alpha}\ln(n + g + \delta) \quad (3.7)$$

The magnitudes alongside the signs of the coefficients on savings and population growth are predicted based on the fact that the model assumes that factors are paid their marginal products In the case of competitive markets being assumed, the growth rate of the economy is seen as a weighted sum of growth rates of efficiency parameter g_A and of the capital stock g_K.The weights on labour and capital are the shares of payment to labour and capital in Gross Domestic Product (GDP).

$$g_y = g_A + \alpha_1 g_L + \alpha_k g_k \quad (3.8)$$

The Solow Growth model assumes that the marginal product of capital decreases with the amount of capital in the economy. In the long run, as the economy accumulates more and more capital,g_K, approaches zero and the growth rate is determined by technical progress and growth in the labour force. However, in the short run, an economy that accumulates capital faster will enjoy a higher level of output. The above argument relates to the entire economy, but can also be extended to sub sectors of the economy such as education.

According to the traditional neoclassical growth theory, output growth results from one or three (3) factors: increases in labour quality and quantity (through population growth and education), increases in capital (through saving and investment), and improvement in technology Todaro and Smith (2004).

It is important to note that *A* is not fixed, but varies with different production functions based on the factors being studied. This production function is widely used in the literature; including Smyth (1993); Fosu (1990), and Fosu and Aryeetey (2008). Apart from the traditional input of

production, the model also assumes other conventional inputs. Literature on economic growth indicates that, there are multitudes of potential variables that can affect the TFP (*A*) in equation (3.2).

However, in order to provide appropriate linkage among the chosen variable, various channels through which change in the price of crude oil affects the growth of an economy have been identified in the literature on crude oil and economic growth. Channels identified in the literature include the supply side effect, inflation effect, and the real balance effect Brown and Yücel (2002): Jiménez-Rodríguez and Sánchez (2005): Chuku, et al (2010) and Bhanumurthy, et al, (2012).

Model Specifications

This study employs vector autoregressive (VAR) methodology to study the effect of oil price volatility and exchange rate volatility on economic growth in Nigeria. The model is specified as:

$$RGDP = (OILPVO, EXRVO) \quad (3.9)$$

Realizing the importance of the influence of monetary variables on output in this kind of study, the authors incorporate inflation rate (INFR) and money supply (M2) into the model as control variables. The inclusion of these variables rests on the ground that they influence the economic growth in any country. Hence, equation (3.1) becomes:

$$RGDP = (OILPVO, EXRVO, INFR, M2) \quad (3.10)$$

Expressing equation (3.2) in its explicit form, it becomes:

$$RGDP_t = \alpha_O + \alpha_1 OILPVO_t + \alpha_2 EXRVO_t + \alpha_3 INFR_t + \alpha_4 M2_t + \epsilon_t \quad (3.11)$$

Where $RGDP_t$ = real gross domestic product at time t,

$OILPVO_t$ = oil price volatility at time t,

$EXRVO_t$= exchange rate volatility at time t,

$INFR_t$ = inflation rate at time t,

$M2_t$ = broad money supply at time t and

ϵ_t = stochastic term.

α_i = parameters to be estimated (i = 0, 1, 2, 3, 4)

Utilizing the variables in equation (3.3), a VAR model is specified thus:

$$X_t = \alpha + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \cdots \beta_q X_{t-k} + \mu_t \quad (3.12)$$

Where X_t = {RGDP, OILPVP, EXRVO, INFR, M2}

It should be noted that X_t is a k x 1-dimensional vector of the endogenous variables, α is a k x 1-dimentional vector of constant and $\beta_1 \ldots \beta_q$ are k x k dimensional autoregressive coefficient

matrices while μ_t is a k x 1-dimensional vector of the stochastic error term which is normally distributed with the following properties:

$E(\mu_t) = 0, \quad E(\mu_t \mu_t^{'}) = \theta$ and $\quad E(\mu_t \mu_t^{'}) = 0,$

if $i \neq j$.

Thus, equation (3.4) can be expressed in matrix form as follows:

$$\begin{pmatrix} X \\ X_{t-1} \\ \vdots \\ X_{t-k+1} \end{pmatrix} = \begin{pmatrix} \alpha \\ 0 \\ \vdots \\ 0 \end{pmatrix} + \begin{pmatrix} \beta_1 & \beta_2 & \cdot & \cdot & \beta_{q-1} & \beta_q \\ 1 & 0 & \cdot & \cdot & 0 & 0 \\ \cdot & 1 & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & 1 & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & 1 & \cdot & \cdot \\ 0 & 0 & \cdot & \cdot & 1 & 0 \end{pmatrix} \begin{pmatrix} X_{t-1} \\ X_{t-2} \\ \vdots \\ X_{t-k} \end{pmatrix} + \begin{pmatrix} \mu_t \\ 0 \\ \vdots \\ 0 \end{pmatrix} \qquad (3.13)$$

In a compact form, equation (3.5) can be re-stated as follows:

$$X_t = \alpha + \sum_{i=1}^{k} \Gamma_i X_{t-k} + \mu_t \qquad (3.14)$$

i = 1, 2… k.

Sources of Data

We made use of the secondary data for all the variables involved in this study. The data for all these variables are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS) and World Development indicator (WDI). Specifically, the data on real gross domestic product (RGDP), real exchange rate, money supply and inflation rate are extracted from CBN (2012) in conjunction with NBS. However, the data on oil price are extracted from the review of world energy publications

ANALYSIS AND RESULTS

Phillip-Perron (PP) Unit Root Test

Table 1: Result of Unit Root Test on Variables with both Constant alone and Constant and Linear Trend: Phillip-Perron (PP) Test

Variables	Intercept/Constant		Intercept and linear trend		Remarks
	PP Test	Critical Value	PP Test	Critical Value	
RGDP	-5.1458	1% = -3.6009	-5.9006	1% = -4.1985	I(1)
	(0.0001)	5% = -2.9350	(0.0001)	5% = -3.5236	
		10% = -2.6058		10% = -3.1929	
OILPVO	-14.4643	1% = -3.6010	-16.8213	1% = -4.1985	I(1)
	(0.0000)	5% = -2.9350	(0.0000)	5% = -3.5236	
		10% = -2.6058		10% = -3.1929	

Table 1...

EXRVO	-5.3471	1% = -3.6010	-5.7399	1% = -4.1985	I(1)
	(0.0001)	5% = -2.9350	(0.0001)	5% = -3.5236	
		10% = -2.6058		10% = -3.1929	
INFR	-9.6058	1% = -3.6010	-8.5689	1% = -4.1985	I(1)
	(0.0000)	5% = -2.9350	(0.0000)	5% = -3.5236	
		10% = -2.6058		10% = -3.1929	
M2	-3.3003	1% = -3.6210	-3.1763	1% = -4.1985	I(1)
	(0.0213)	5% = -2.9450	(0.1929)	5% = -3.5236	
		10% = -2.6058		10% = -3.1929	

As portrayed by the unit root test result in Table 1, all the examined variables are integrated of order one, I(1). The implication of this order is that the time-series variables used in this study are non-stationary at their level forms, but are only stationary after their first difference. This indicates that we can proceed to co-integration analysis.

Co-integration Test Result

Now that we realise that our time-series data are made up of variables that are I(1), the next task is to test for the existence of co-integration, or otherwise, among the variables.

Table 2: Co-Integrating Results (with a linear trend) where r is the number of co-integrating vectors

Lag interval (1 to 1)

Trace Test				**Max-Eigen Test**			
Null	Alternative	Statistic	Critical Value (5%)	Null	Alternative	Statistic	Critical Value (5%)
r = 0	r = 1	46.84076	69.81889	r = 0	r = 1	17.56709	33.87687
r ≤ 1	r = 2	29.27367	47.85613	r ≤ 1	r = 2	11.84446	27.58434
r ≤ 2	r = 3	17.42921	29.79707	r ≤ 2	r = 3	9.041459	21.13162
r ≤ 3	r = 4	8.387752	15.49471	r ≤ 3	r = 4	7.708712	14.26460
r ≤ 4	r = 5	0.679040	3.841466	r ≤ 4	r = 5	0.679040	3.841466

Trace test indicates no co-integrating equation at the 0.05 level.

Max-Eigen test indicates no co-integrating equation at the 0.05 level.

Since the co-integration result in Table 2 indicates non-existence of co-integrating equation, then the choice of estimating Vector Error Correction Model (VECM) is automatically discarded. Hence, the estimation of the Vector Autoregressive (VAR) Model becomes imperative.

Vector Autoregressive (VAR) Model Estimation

Table 3: Vector Autoregressive (VAR) Model Result

	LNRGDP	OILPVO	EXRVO	INFR	LNM2
LNRGDP(-1)	0.833065***	-10085664	-1639.209	0.539775	-0.033797
	(0.08750)	(1.5E+07)	(1014.16)	(1.11305)	(0.03103)
	[9.52043]	[-0.68510]	[-1.61632]	[0.48495]	[-1.08925]s
OILPVO(-1)	-1.73E-10	0.288070*	2.20E-05**	1.16E-09	-2.70E-10
	(1.0E-09)	(0.16771)	(1.1E-05)	(1.3E-08)	(3.5E-10)
	[-0.17396]	[1.71770]	[1.96620]	[0.09185]	[-0.76419]
EXRVO(-1)	-2.63E-06	1217.455	0.836008***	-0.000119	4.23E-07
	(7.5E-06)	(1266.91)	(0.08728)	(9.6E-05)	(2.7E-06)
	[-0.34896]	[0.96096]	[9.57870]	[-1.24227]	[0.15831]
INFR(-1)	-0.005444	-2602379.	117.1454	0.534184***	0.007113*
	(0.01121)	(1885323)	(129.881)	(0.14254)	(0.00397)
	[-0.48584]	[-1.38034]	[0.90195]	[3.74749]	[1.78997]
LNM2(-1)	0.075382	16688351	1454.138*	0.989903	1.003093***
	(0.07479)	(1.3E+07)	(6175.43)	(0.95131)	(0.02652)
	[1.00795]	[1.32634]	[1.67760]	[1.04057]	[37.8251]
C	1.375602	-12652956	3026.106	-7.987338	0.474522
	(0.53282)	(9.0E+07)	(6175.43)	(6.77756)	(0.18893)
	[2.58173]	[-0.14115]	[0.49002]	[-1.17850]	[2.51157]
R-squared	0.955656	0.586110	0.957762	0.704376	0.998608
Adj. R-squared	0.949497	0.528625	0.951896	0.663317	0.998415
F-statistic	155.1671	10.19592	163.2635	17.15528	5166.681

Note: (i) Standard errors are in ( ), (ii) t-statistics are in [ ],
(iii) ***, ** and * denote the level of significance at 1%, 5% and 10% respectively.

Impulse Response

Table 4: Impulse Response

Panel A	**Response of LNRGDP**				
	Period	**LNRGDP**	**OILPVO**	**EXRVO**	**INFR**	**LNM2**
	1	0.323305	0.000000	0.000000	0.000000	0.000000
	3	0.227908	-0.0184	-0.01151	-0.028	0.014201
	6	0.135700	-0.02297	-0.01929	-0.01582	0.023285
	9	0.082956	-0.02181	-0.02288	-0.0026	0.026965

Table 2...

	10	0.071010	-0.02132	-0.02353	0.000487	0.027575
Panel B	**Response of OILPVO**					
	Period	LNRGDP	OILPVO	EXRVO	INFR	LNM2
	1	-2144021	54350229	0.000000	0.000000	0.000000
	3	-4797549	5341311.	7432667.	-7480001	2246499.
	6	-6710199	2739289.	5551726.	939149.7	2786697.
	9	-6601545	1877101.	3323607.	2620085.	3402294.
	10	-6363531	1540472.	2708796.	2792210.	3563798.
Panel C	**Response of EXRVO**					
	Period	LNRGDP	**OILPVO**	EXRVO	INFR	LNM2
	1	-72.5772	**136.0534**	3743.945	0.000000	0.000000
	3	-1034.29	**1424.474**	2561.166	480.8914	341.1470
	6	-1638.72	**941.5736**	1616.568	563.3065	725.6866
	9	-1712.49	**549.4160**	959.3221	730.3231	945.4498
	10	-1672.07	**443.7184**	781.8434	767.8791	996.1247
Panel D	Response of INFR					
	Period	LNRGDP	OILPVO	EXRVO	INFR	LNM2
	1	-0.12838	0.156228	-0.69523	4.048239	0.000000
	3	0.286053	-0.10791	-0.8155	1.096196	0.158396
	6	0.486151	-0.34759	-0.63134	0.132214	0.136446
	9	0.509442	-0.29764	-0.46992	-0.00705	0.076898
	10	0.500278	-0.27332	-0.42528	-0.02355	0.060076
Panel E	Response of LNM2					
	Period	LNRGDP	OILPVO	EXRVO	INFR	LNM2
	1	0.012663	-0.013	-0.0122	-0.00489	0.112430
	3	-0.00622	-0.02896	-0.02169	0.043133	0.113194
	6	-0.01499	-0.03356	-0.03947	0.063526	0.114520
	9	-0.01285	-0.03977	-0.05215	0.066140	0.114136
	10	-0.01101	-0.04155	-0.05537	0.065984	0.113605
	Cholesky Ordering: LNRGDP OILPVO EXRVO INFR LNM2					

As portrayed in Table 4, Panel A indicates how real GDP responds to shock in other variables in the model. It is, however, observed in the Panel that real GDP does not respond to shock in any of the other variables in the first year, as real GDP solely responds to its own shock in this first period. One standard deviation shock in oil price persistently decreases real GDP throughout the periods as from the second year. Hence, the response of real GDP to shock in oil price conforms with a priori expectation. This result buttresses the VAR result that there is inverse

relationship between oil price volatility and real GDP. The result is at variance with studies by Jin (2008), Aliyu (2009) and Agbede (2012) which find significant positive relationship between oil price and real GDP. Also from Table 4, Panel B demonstrates how oil price volatility responds to shock in other variables in the estimated model. One standard deviation shock in real GDP brings about a persistent decrease in oil price volatility, even though mixed responses are expected. Conversely, the oil price volatility shows a persistent increase to shock in exchange rate volatility throughout the periods. The relationship experienced here is in conformity with a priori expectation.

Panel C of Table 4 captures how exchange rate volatility responds to shock in other variables in the model. The second objective of the study which is to examine the effect of oil price volatility on exchange rate volatility is catered for in this Panel. Panel C shows that one standard deviation shock in oil price volatility brings about a persistent increase in exchange rate volatility throughout the periods in accordance with a priori expectation. This implies that an unexpected increase in oil price volatility increases the exchange rate volatility and vice-versa. Appendix 1 also buttresses the information presented in Table 4.

Variance Decomposition

Table 5: Variance Decomposition

Panel A	**Variance Decomposition of LNRGDP:**						
	Period	**S.E.**	**LNRGDP**	**OILPVO**	**EXRVO**	**INFR**	**LNM2**
	1	0.323305	100.0000	0.000000	0.000000	0.000000	0.000000
	3	0.482101	99.04744	0.203623	0.077872	0.553389	0.117673
	6	0.564336	97.70325	0.623533	0.336620	0.836155	0.500446
	9	0.594241	96.47864	0.984062	0.711545	0.800114	1.025642
	10	0.599944	96.05389	1.091672	0.851918	0.785039	1.217485
Panel B	**Variance Decomposition of OILPVO:**						
	Period	**S.E.**	**LNRGDP**	**OILPVO**	**EXRVO**	**INFR**	**LNM2**
	1	54392501	0.155375	99.84463	0.000000	0.000000	0.000000
	3	59357094	1.115975	91.20744	2.646293	4.787132	0.243159
	6	61845353	4.150617	84.70806	5.640995	4.750036	0.750296
	9	63808108	7.232175	79.93843	6.517190	4.846885	1.465317
	10	64359746	8.086344	78.63127	6.583092	4.952375	1.746924
Panel C	**Variance Decomposition of EXRVO:**						
	Period	**S.E.**	**LNRGDP**	**OILPVO**	**EXRVO**	**INFR**	**LNM2**
	1	3747.119	0.037515	**0.131833**	99.83065	0.000000	0.000000

Table 5...

	3	5966.336	4.150874	**10.57575**	83.60872	1.262632	0.402026
	6	7683.600	13.88827	**12.74419**	69.05023	2.114865	2.202439
	9	8781.101	22.07217	**11.54527**	58.24329	3.422394	4.716877
	10	9071.583	24.07862	**11.05697**	55.31578	3.923231	5.625395
Panel D	Variance Decomposition of INFR:						
	Period	S.E.	LNRGDP	OILPVO	EXRVO	INFR	LNM2
	1	4.112478	0.097448	0.144315	2.857944	96.90029	0.000000
	3	4.927696	0.468799	0.205512	7.559325	91.61203	0.154335
	6	5.204381	2.592033	1.278597	12.15876	83.57240	0.398210
	9	5.387034	5.096360	2.252528	14.16691	78.01457	0.469631
	10	5.434164	5.855875	2.466608	14.53469	76.66908	0.473742
Panel E	Variance Decomposition of LNM2:						
	Period	S.E.	LNRGDP	OILPVO	EXRVO	INFR	LNM2
	1	0.114641	1.220082	1.286094	1.132856	0.181838	96.17913
	3	0.208336	0.463167	3.945843	1.988206	5.656490	87.94629
	6	0.316514	0.736709	4.729692	4.364418	13.04409	77.12509
	9	0.405371	0.811129	5.491451	6.935981	15.84565	70.91579
	10	0.431855	0.779743	5.764118	7.755177	16.29624	69.40472
	Cholesky Ordering: LNRGDP OILPVO EXRVO INFR LNM2						

Variance Decomposition

Panel A of Table 5 reveals that real GDP's own shock solely accounts for all (100%) its forecast error variance in the first year but its influence slightly decreases in the longer horizons as it still accounts for 96% in the tenth year. Thus, oil price volatility, exchange rate volatility, inflation rate and money supply all account for negligible proportion of real GDP forecast error variance throughout the periods. Each of oil price volatility and money supply barely contributes more than 1% while each of exchange rate volatility and inflation rate accounts for less than 1% all through. However, all the other variables (apart from inflation rate) still have the tendency of contributing more in the longer horizons as their respective influences increase throughout the periods while inflation rate reaches its peak of 0.84% in the sixth year and starts declining in the longer horizons. This suggests that every of the variables in the model have influence on one another. However, this also confirms the results of the VAR model above, as it can be seen from the panel A of table 5. Apart from own shock, the most dominant variable is oil price.

Panel B of Table 5 shows that exchange rate volatility dominates the forecast error variance of oil price volatility in most of the periods as it dominates from the fifth year to the eighth year while real GDP becomes dominant as from the ninth year, even though their

respective contributions are very close to each other throughout the periods. It is observed here that the contributions of real GDP, exchange rate volatility and money supply to the forecast error variance in oil price volatility increase over the years while the contribution of inflation rate oscillates in the horizons (it increases from 0% in the first year to its peak of 4.96% in the fourth year and then decreases in the longer horizons The simple meaning of this is that exchange rate volatility has significant influence on oil price volatility than every other variables in the model in the short horizon, While real gross domestic product influences oil price volatility more in the model in the longer horizon.

Furthermore, Panel C of Table 5 reveals that oil price volatility is the most important source of forecast error variance in exchange rate volatility for the first five years as it reaches its peak of 12.76% in the fifth year while its influence slightly decreases in the longer horizons as it declines to 11.06% in the tenth year. Appendix 2 equally provides additional information about the result presented in Table 6.

CONCLUSION AND RECOMMENDATIONS

The study investigates the effect of oil price and exchange rate volatility on Nigerian economic growth and the findings of the study are summarised as follows:

One standard deviation shock in oil price volatility persistently decreases real GDP throughout the periods. This result buttresses the VAR result that there is inverse relationship between oil price volatility and economic growth. The implication of all these is that the income effect of the rising oil price is not felt while the output effect is prevalent in the country.

Similarly, the response of real GDP to shock in exchange rate volatility elicits a persistent decline in real GDP. This result also gives credence to the VAR model result which portrays a negative and insignificant relationship between exchange rate volatility and economic growth. However, both oil price volatility and exchange rate volatility account for negligible proportion of real GDP forecast error variance throughout the periods

In line with the findings of this study, the following recommendations are proposed. There should be a reduction in the proportion of expenditure on imported commodities by Nigerians and urges them to patronise locally made goods. Sequel to the scenario above, coupled with the fact that oil price volatility has adverse effect on economic growth, the study also recommends effective diversification of the economy which will save the country from the imminent menace of over-reliance on petroleum. More so, there is urgent need for government of Nigeria to nip in the bud the rising increase of exchange rate through a mechanism of tighten-up monetary policy.

SUGGESTIONS FOR FURTHER STUDIES

This study examines the effect of oil price and exchange rate volatility on economic growth in Nigeria with focus to determine the impact of each of these two variables on Nigerian economy. However, it is suggested that this study should be further extended to other areas that will be of immense relevance to Nigeria such as nexus between exchange rate volatility and industrial development in Nigeria and also the asymmetric effect of oil price on industrial sector in Nigeria.

REFERENCES

Agbede, M.O., (2012) "The Growth Implications of oil Price Shock in Nigeria'' Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 4(3): 343-349.

Aliyu, S.U.R (2009) '' Impact of oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation'' Research Journal of International studies-issue II

Aliyu, S.U.R. (2008) ''Exchange Rate Volatility and Export Trade in Nigeria: An Empirical Investigation

Al-mulaliUsama, (2010)."The impact of oil price on the exchange rate and economic growth in Norway".

Ayadi, O.F (2005). "Oil price Fluctuation and the Nigeria Economy OPEC review", pp 199-212.

Ayadi, O.F, A Chtterjee, and C.P. Obi (2000), "A vector autoregressive Analysis of an oil dependent emerging Economy-Nigeria'' OPEC Review, pp.33-349.

Bhanumurtly, N.R., Das, S., and Bose, S. (2012). Oil price shocks, pass-through policy and its impact on India, working paper, National institute of public Finance and policy, New Delhi.

Brown, S.P., and Yucel, M.k (2002). Energy prices and Aggregate Economic activity: An interpretative Survey. Quarterly review of Economics and finance.

Chuku, A.C, Effiong, I.E, and Sam, R.N (2010).Oil price distortions and their short and long-run impacts on the Nigerian Economy, Retrieved 11 /30/2012, from Mpra.Ub.Unimuenhen.de/ 24434.

Daussa, J. (2008), Impact of exchange rate shock on prices of imports and exports, MPRA paper No.11624, posted 18. Edward, Sebastine (1988), exchange rate misalignment in developing countries. Baltimore, MD. John Hopkins university press.

Hang, B., Hwang M.J., Hsiw-Ping. P, (2005) Price Shocks on economics activities: an application of multivariate threshold model. Energy Economics 27 (3), 455-476.

Jimenez-Rodriquez, R, and Sanchez, M. (2005) oil price shocks and real GDP growth; Empirical Evidence for Some.Applied economics, 37, 201 – 228.

Jin, G (2008) "The impact of oil price shock and Exchange Rate Volatility on Economic Growth: A comparative Analysis for Russia Japan and China''. Research Journal of International studies, issues 8, pp. 98-111

Killian, L. and R.J. Vigfusson(2009). Pitfalls in Estimating Asymetrics Effect of Energy price shocks, CEPR Discussion papers 7234.C.E.P.R. Discussion papers.

Mordi, C.N (2006). "Challenges of Exchange Rate Volatility in Economic Management in Nigeria."Bullion Vol.30, No.3. July - Sept. 2006.

Nwanko, G.O (1980). The Nigerian financial system Ibadan: Macmillian.

Odusola, A. F. (2003). "Exchange Rate Policy Analysis and Management: Concept and Theoretical issues. Workshop on macroeconomic policy analysis management organized for the staff of Central Bank of Nigeria, August 2003 CBN Training School, Satellite Town, Lagos.

Ogun, O. (2004) real exchange rate behavior and Non-oil Export Growth in Nigeria.African Journal of Economic policy.Vol 11, No 1 June.

Olomola A. and Adejumo (2006): “Oil Price shock and Aggregate Economic Activity in Nigeria,’’ African Economic and Business Review, vol 4: 2, ISSN 1109-5609

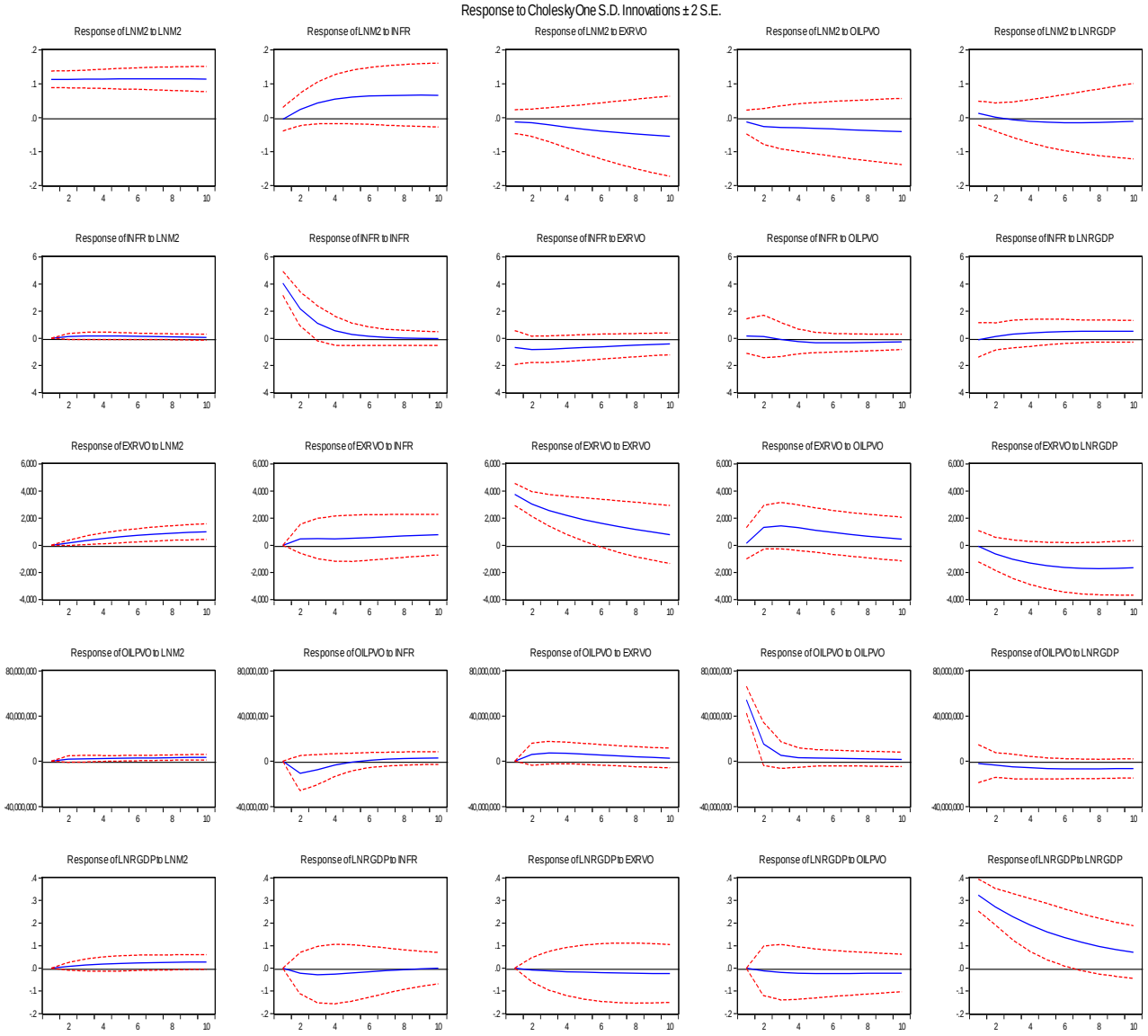
Olusi J.O. and Olagunju M. A. (2005) "The primary sector of the economy and Dutch Disease in Nigeria".

Ozturk I, (2006) “Exchange Rate Volatility and Trade: A Literature survey’’, International Journal of Applied Econometrics and Quantitative studies, vol 3-1(2006).

Todaro, M.P and S.C. Smith (2004) Economic Development (8th Edition). (India: Pearson Education Ltd). Pp 141-144, 360-417.

APPENDICES

Appendix 1



Appendix 2