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Oil Price Shocks and Variations in Macroeconomic Variables in Nigeria

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Abstract
The study was an evaluation of the impact of oil price fluctuations on specific macroeconomic variables in Nigeria for the period, 1981-2017. This was examined to establish the innovations oil price will caused on some selected macroeconomic variables such as government revenue, government expenditure, money supply, inflation, real gross domestic product and unemployment. Using results from impulse responses and variance decompositions from a VAR, the result showed that oil price fluctuations largely accounted for the variations in six out of seven macroeconomic variables namely government revenue (GREV), government expenditure (GEXP), money supply (MS2), real gross domestic product (RGDP) and unemployment (UEMP) while its impact on inflation (INF) was found to be insignificant thus, providing evidence that oil price is not inflationary in an open economy such as Nigeria. The result of the impulse response function (IRF) also revealed that aside from inflation which had a negative response to oil shock, all other six variables such as government revenue, government expenditure, money supply, real gross domestic product and unemployment had a positive significant response to oil shock throughout the 10th quarters.From the empirical investigation, it can be concluded that a combination of fiscal and monetary policies could provide effective instruments for the stabilization of the economy after an oil shock.
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1.0 Introduction.

Nigeria, a member of the Organization of Oil Exporting Countries (OPEC) is ranked the sixth oil producing nation in the world. The structure of the Nigerian economy is heavily reliant on oil to fund its trade balance. Commercial quantity of oil was first discovered in Nigeria in 1956 in a riverine town of Oloibiri, Rivers State. The discovery of oil in commercial quantities and its subsequent boom in the 1970s, led to a marked divergence of government attention from once an agrarian economy, with agriculture accounting for about 80% of the country's revenue.

Nigeria's crude oil (Bonny Light) has been found to have the lowest sulphur content and as such, has ready international markets in five continents of the world. These are America, Europe, Oceania/Pacific, Asia /Far East and Africa as indicated in table 1 below.

Table 1: 10-Year Crude Oil Export by Region (mb)

Year	America	Europe	Oceania/Pacific	Asia/Far East	Africa
2004	511.62	114.97	-	176.28	68.39
2005	478.23	148.05	-	147.97	69.28
2006	469.12	162.92	-	116.17	69.18
2007	505.89	120.74	-	99.07	68.06
2008	406.33	172.13	-	77.09	68.92
2009	355.95	163.63	-	111.37	137.94
2010	429.27	172.88	9.45	147.38	105.72
2011	351.06	246.63	18.09	136.03	70.29
2012	260.32	333.89	20.92	140.12	75.51
2013	181.08	326.48	16.96	152.98	84.69
2014	117.75	354.54	10.39	193.27	97.87
Total	**4,066.62**	**2,316.86**	**75.81**	**1,497.73**	**915.85**

Source: NNPC Annual Statistical Bulletin, 2014.

Table 1 shows a 10-year crude oil export from Nigeria by region in million barrels between 2004 and 2014. The report shows that America is the largest market for Nigeria's crude oil with a total import of 4,066.62 mb, followed by Europe, Asia/Far East, Africa and Oceania/Pacific for the ten year period. However, the trend of export of crude by region shows that America's demand for Nigeria's crude continues to 'nose- dive' on an annual basis, as the crude export from Nigeria reduced from 511.62mb in 2004 to 117.75mb in 2014, representing a 77%

decline in demand for Nigeria's crude oil. The reason for the drastic decrease in demand for Nigeria's crude oil by America may be associated with the sudden growth in US shale oil, occasioned by invention of new technologies, availability of suitable rigs and skilled manpower. This has made US a net supplier of crude oil in the world market. As US shale oil production grows from 0.4 mbpd in 2007 to 4mbpd in 2014, expectations are high that the American market for Nigeria's crude may completely shrink; a development which may further worsen the nation's economic outlook. The trend analysis of Nigeria's crude oil export by region/continent is as shown below.

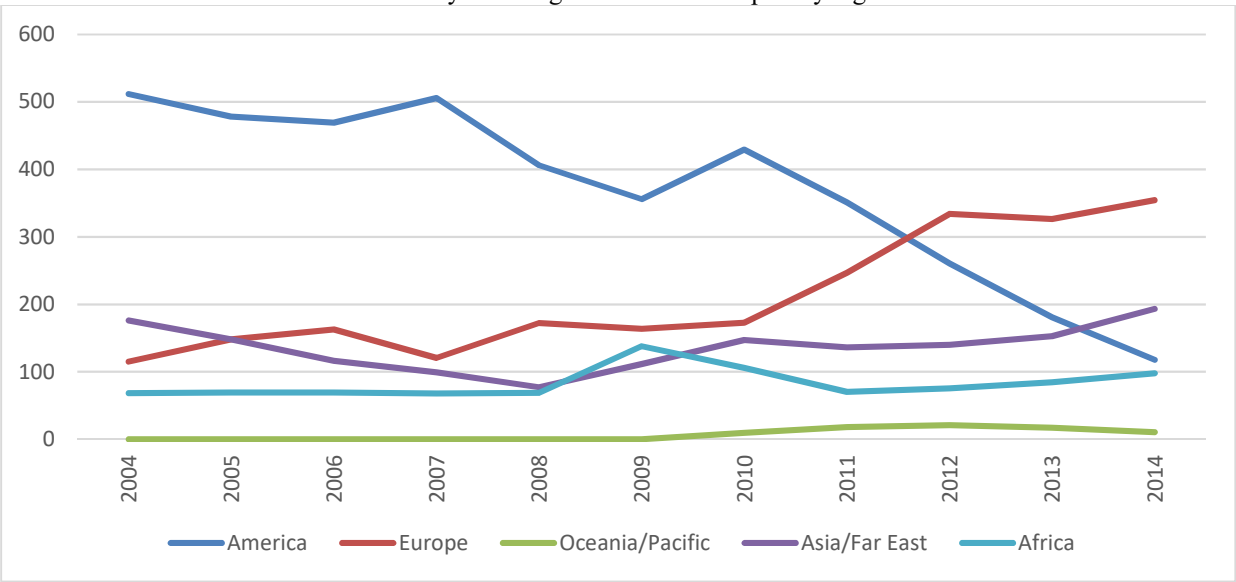

Figure 1: Trend Analysis of Nigeria's Crude Oil Export by Continent
Source: CBN Quarterly Report, 2017

Aside from the shrinking market share of Nigerian crude, oil price volatilities in the international market is another dimension of the concerns facing oil dependent nations, Nigeria inclusive, that heavily depend on oil revenue to finance its infrastructural deficits. The fluctuations in oil prices in the global oil market will lead to increase vulnerability of country as an exporter of crude oil with its attendant macroeconomic implications for Nigeria's economy through the demand and supply transmission mechanisms. On the supply side, the effect has to do with the fact that oil is an input to production and a rise or fall in the price of oil will either increase or decrease the cost of production, thus serving as inducement for firms to lower or increase output as the case may be. However, the demand side effect of an increase or fall in oil prices deals with consumption and investment.

The stylized showed that oil has continued to be the mainstay of the Nigerian economy for the period under review. Yearly crude oil production fluctuated between 1,241 thousand barrels per day in 1983, reaching an all high figure of 2,627.44 thousand barrels per day in 2005. In the same vein, oil prices which are exogenously determined by the Organization of Petroleum Exporting Countries (OPEC) in the international market also witnessed fluctuations, with the highest price of US $109.45 recorded in 2012, which later fell to US$105.87 in 2013 and this downward trend of oil prices has been sustained till 2015Q1, when oil prices went down to as low as US$58 per barrel, with the resultant negative shocks on the economy.

Table 2: Stylized Facts on Oil and the Nigerian Economy

Year	Crude Oil Production/'000 bpd	Crude Oil Price/barrel(US $)	Oil Rev(N'B)	Non-Oil Rev(N'B)	GDP(N'B)	Ext. Reserves(US $'B)
1981	1.43	34	8.56	4.73	94.33	4.68
1982	1.29	32.38	7.81	3.62	101.01	1.03
1983	1.24	29.04	7.25	3.26	110.06	0.09
1984	1.39	28.2	8.27	2.98	116.27	0.46
1985	1.50	27.01	10.92	4.13	134.59	0.98
1986	1.47	13.53	12.6	8.11	134.6	1.58
1987	1.34	17.73	19.03	6.35	193.13	5.21
1988	1.45	14.24	19.83	7.77	263.29	6.02
1989	1.72	17.31	39.13	14.74	382.26	3.66
1990	1.81	22.26	71.89	26.22	328.61	3.36
1991	1.89	18.62	82.67	18.33	545.67	4.05
1992	1.94	18.44	164.08	26.38	875.34	2.78
1993	1.96	16.33	162.1	30.67	1,089.68	4.9
1994	1.93	15.53	160.19	41.72	1,399.70	7.94
1995	1.99	16.86	324.55	135.44	2,907.36	2.7
1996	2.00	20.29	408.78	114.81	4,032.30	2.16
1997	2.13	18.86	416.81	166	4,189.25	6.12
1998	2.15	12.28	324.31	139.3	3,989.45	7.81
1999	2.13	17.44	724.42	224.77	4,679.21	5.31
2000	2.17	27.6	1,591.68	314.48	6,713.57	7.59
2001	2.26	23.12	1,707.56	903.46	6,895.20	10.28
2002	2.12	24.36	1,230.85	500.99	7,795.76	8.59
2003	2.28	28.1	2,074.28	500.82	9,913.52	7.64
2004	2.33	36.05	3,354.80	565.7	11,411.07	12.06
2005	2.63	50.59	4,762.40	785.1	14,610.88	24.32
2006	2.44	61	5,287.57	677.54	18,564.59	37.46
2007	2.35	69.04	4,462.91	1,264.60	20,657.32	45.39
2008	2.17	94.1	6,530.60	1,336.00	24,296.33	58.47
2009	2.21	60.86	3,191.94	1,652.65	24,794.24	44.7
2010	2.46	77.38	5,396.09	1,907.58	54,612.26	37.34
2011	2.55	107.46	8,878.97	2,237.88	62,980.40	32.58
2012	2.52	109.45	8,025.97	2,628.78	71,713.94	38.09
2013	2.37	105.87	6,809.23	2,950.56	80,092.56	45.61
2014	2.23	63.28	6,793.82	3,275.03	67,152.79	34.24
2015	2.08	37.8	3,830.10	3,082.41	69,023.93	28.28
2016	1.58	53.48	2,693.91	2,985.13	67,931.24	26.99
2017	1.96	65.11	4,109.80	3,207.90	68,490.98	39.35

Source: CBN Statistical bulletin 2017

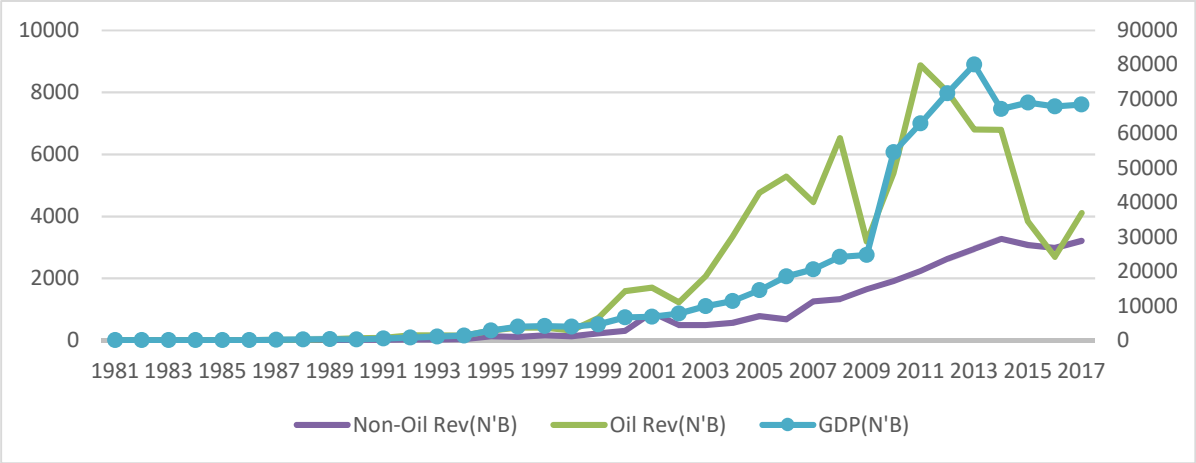

Figure 2: Oil and Non-oil Revenue and Gross Domestic Product for Nigeria.
Source: CBN Statistical Bulletin, 2017

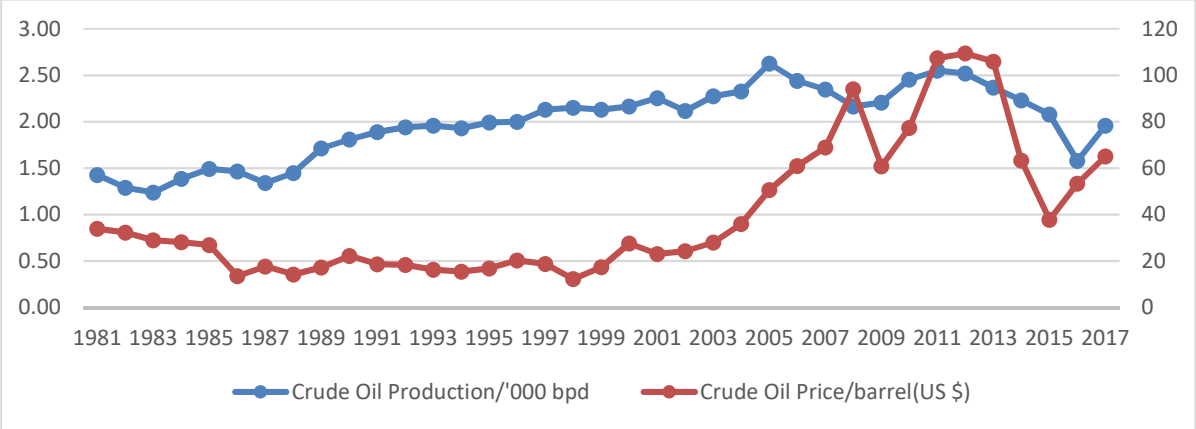

Figure 3: Crude oil Production and Price
Source: CBN Statistical Bulletin, 2017

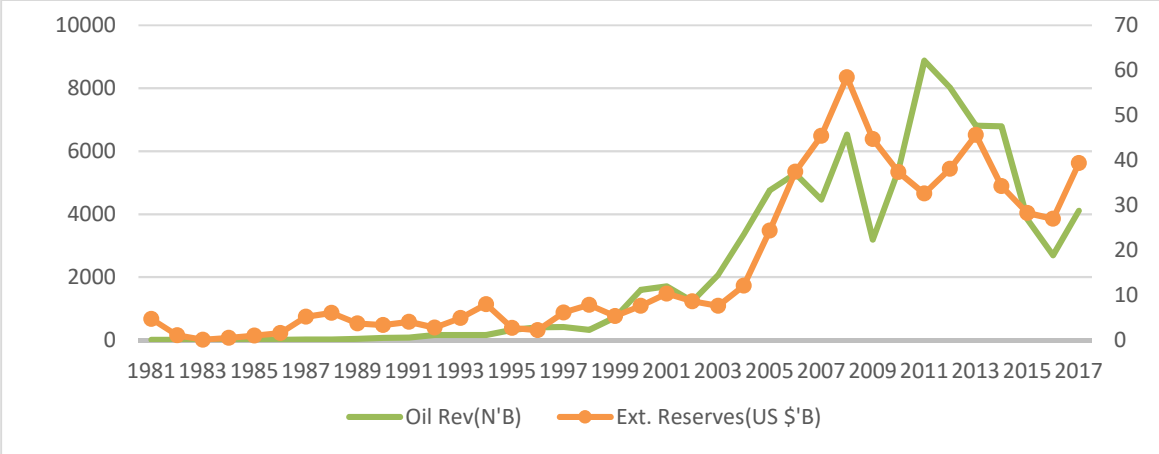

Figure 4: Oil revenues and International Reserve Position for Nigeria.
Source: CBN Statistical Bulletin, 2017

Also, the stylized facts revealed that oil revenue far outweighed non-oil revenue, with the former contributing on the average about 14.95% to gross domestic product (GDP) while the latter's contribution to GDP stood at 4.52% for the period under consideration.

Nigeria's external reserve (official public sector foreign asset) is principally funded by the proceeds of crude oil production and sales such as direct sales by NNPC, petroleum profit tax (oil companies), royalties, penalty for

gas flaring and rentals. The country's reserve also witnessed fluctuations in value as a direct reflection of the changes in oil prices in the international market. As at 2013Q4, Nigeria's external reserve as indicated on the stylized facts stood at US$45.61 billion and the value has suffered sustained depreciation thereafter due to worsened outlook of crude oil prices, with value of US$30.84 billion as at September10, 2015(CBN).The implications of the sustained external reserve downswing on the Nigerian economy are enormous and not limited to loss of confidence in domestic currency, lag in settlement of trade obligations, poor credit worthiness and reputation, erosion of buffer against external shocks and absence of fall back for the 'rainy day'.

Crude oil has been a major driver of Nigeria's economy since the 1970s after its discovery in commercial quantities. This resulted in the divergence of government investment focus from the agricultural and manufacturing sectors, a phenomenon called The Dutch Disease Syndrome (DDS). However, the volatilities of oil prices in the international oil market, coupled with the discovery of shale oil by United States and the subsequent drastic cut in demand for Nigeria's crude oil, will further worsen the vulnerability of the nation as an oil exporting country.

This study is motivated by the fact that Nigeria is a mono- product economy, with heavy reliance on oil to fund its trade balance. Therefore, the continued downswing of the prices of oil, exogenously determined in the international oil market, will lead to serious budgetary deterioration with its attendant impact on Nigeria's growth and development trajectory.

The study on oil price shocks and its effect on the performance of Nigeria's macroeconomy will be of relevance to policymakers in finding alternatives to the nation's reliance on oil for survival. It will also make contributions to the existing body of knowledge on the impacts of oil shocks to Nigeria's economy. The objective of this paper therefore, is to examine the impact of oil price fluctuations on the macroeconomic variables in Nigeria.

The rest of the paper is structured as follows. Section two deals with literature review and the theoretical framework. Section three discusses data collection and methodology, while section four analyses the empirical results. Section five focuses on the policy implications of oil price shocks on the Nigerian economy and finally, section six contains the recommendations and conclusion.

2.0 Literature Review.

2.1Theoretical Underpinning

The theoretical underpinning of this study is derived from the Dispersion Hypothesis put forward by Liliens in 1982. The hypothesis asserts that sectoral shifts in demand could lead to a substantial amount of unemployment in the economy which requires time for the reallocation of labour as a factor of production. This is done by the allocative disturbances exogenously causing the allocation of the factor inputs of labour, capital and fiscal variables. However, with the assumption of oil price fixity, the dispersion of unemployment and fiscal variables will have minimal residual explanatory power for fluctuation in aggregate unemployment rate and fiscal variables (Loungani, 1986). He therefore posited that oil price shocks may have significant re-allocative shocks on the economy of United States.

Federer (1996) indicated that "aggregate unemployment rises when relative price shocks become more variable. This implies that volatility in oil prices would reinforce disturbance of sectoral adjustment in the labour market, thus resulting in increase in unemployment rate.

Lee, Ni and Ratti (1995) in a study on Oil Price volatility confirmed that Real oil price fluctuation has a greater impact on unemployment in an environment where oil prices have been stable as compared to an environment where oil price movement has been frequent and erratic due to the fact that price movement in a volatile environment are likely to be soon reversed. Their findings therefore revealed that unemployment began to rise 4 quarters after the oil shock through 8 quarters after the shock that is not offset at later dates.

It is important to note that Liliens dispersion hypothesis failed to explain the variant of unemployment under reference, as open unemployment, which is what is usually measured mostly in the developing economies, are no longer relevant in view of the existence of other variants such as under- employment, low wage employment, casual employment, low productivity employment, social exclusion and graduate employability.

2.2 Empirical Literature

Oil price shocks have been a source of concerns for researchers and policy makers over the past four decades in view of its macroeconomic implications for the developed and developing economies. Documented evidences replete the empirical literature on the impact of oil price shocks on the macroeconomic performance of the economies of oil importing and exporting countries.

Akide (2007), while investigating the impact of oil price shocks between 1970 and 2000, using the VAR model, found out that oil price shocks did not affect output and inflation in Nigeria, but significantly influenced real exchange rate.

Omolola and Adejumo (2006) analyzed the effect of oil price shocks on output, inflation, exchange rates and money supply in Nigeria by employing the VAR method using secondary data from 1970 to 2003. The result showed that oil price shocks significantly influenced real exchange rates. They argued that this could considerably

lead to wealth effect capable of appreciating the real exchange rate which could ultimately squeeze the tradable sector, thus giving rise to the Dutch Disease syndrome.

Ayadi (2005) in his study of the effects of oil price shocks in Nigeria using the VAR model for the period 1975 to 1992, found out that output responds positively to positive oil price shocks, implying that positive oil price shocks leads to increase in oil production cost. He further concluded that positive oil shocks will lead to an increase in output (GDP), decrease in inflation rate and currency depreciation.

Using the VAR method and the Granger Causality approach, Chuku, Akpan, Ndifreke and Ekpeno (2011) studied the linear and asymmetric impacts of oil price shocks on Nigerian economy for the period 1970Q1- 2008Q4, found that oil price shocks are not major determinants of macroeconomic activity in Nigeria; while granger causality results showed that world oil prices do not influenced macroeconomic activity and that non- linear specification results show that the impact of world oil price shocks on the Nigeria economy are asymmetric.

Akpan (2009) employed the VAR model analysis and found out that oil price shocks have a significant positive effect on real government expenditure in Nigeria. The study revealed that the effect of oil price shocks on industrial output growth was marginal while there was a significant appreciation of the real exchange rate.

Markwardt and Farzanegan (2007), by using the VAR method, investigated the dynamic relationship between asymmetric oil price shocks and major macroeconomic variables in Iran. Findings showed that oil price increases (decreases) had a significant positive (negative) impact on industrial output. This revelation was contrary to previous empirical findings in other oil net importing developed countries. Furthermore, the study could not unveil any significant impact of oil price volatility on real government expenditures. However, it was found that asymmetric oil price shocks had significant effect on real imports and real exchange rate. Additionally, it was also found that oil price shocks had significant and positive impact on inflation.

Hamilton (1983), on his pioneering research using the VAR model on the US economy, found out that the correlation between oil price evolution and economic output was not of historical coincidence for the 1948-1972 periods, thus, the increase in price of oil has impacted negatively on productivity and output in United Sates of America.

Burbidge and Harrison (1984) investigated the effect of oil price rises using the VAR model for five Organisation for Economic Cooperation and Development (OECD) namely United States, Japan, Germany, United Kingdom and Canada applying monthly data for the period 1961- 1982.Their findings revealed that there was substantial effect of oil price shocks on price level in US and Canadian economies, with serious pressure on industrial production on US and UK. It was also pointed that the oil price shocks of 1973 only worsened the incoming recession of that period.

3.0 Methodology:

3.1 Model Specification:

To investigate the impact of the asymmetric oil price shocks on the macroeconomic performance in Nigeria, the study employs the Vector Autoregressive model (VAR) pioneered by Sims (1980). This is based on the fact that the VAR model furnishes a multivariate framework in which changes in a particular variable (oil price) will lead to changes in its own lags and changes in other variables and their lags(joint behaviour through time of a vector of economic variables). Another advantage is that the VAR model treats all variables as endogenous without imposition of apriori restrictions on structural relationships (Akpan 2009).

The unrestricted VAR model of order p is specified thus:

$Y_t = A_i Y_t + \cdots + A_p Y_{t-p} + B_{zt} + \varepsilon_t$ ……. (1)

Z_t= [constant, D1, D2, D3, D4, D5, D6, D7]

Where;

Y_t = the nx1 vector of endogenous variables.

z_t = the vector of exogenous variables.

A_i and B = coefficient matrices.

p = the lag length.

ϵ_t= unobservable zero mean white noise process.

D1-D7 = the variables considered from 1981-2017 in the VAR model.

In order to capture the system's response to real oil price shock, the VAR system is transformed to its moving average representation as shown below:

$$Y_t = \mu + \sum_{i=0}^{\infty} \gamma_i \, \varepsilon_{t-1} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where;

$\gamma_{0=}$ identity matrix.

μ = mean of the process.

The moving average representation is relevant in order to obtain the forecast error variance decomposition

(FEVD) and the impulse response function.

The endogenous variables used in the VAR model are consistent with the Cholesky ordering and they include Oil Price (OILP), government revenue (GREV), government expenditure (GEXP), money supply (MS2), inflation (INF), real gross domestic product (RGDP) and unemployment (UEMP). The basis of the ordering is as stated below.

Oil prices are ordered first because the residuals in the equation are not likely to be contemporaneously affected by any other shocks in the system except their own shocks. The implication of this restriction is that oil prices do not respond contemporaneously to other variables in the system of equations as a result of the fact that it is exogenously determined. Hence, oil price is considered to a greater extent, as exogenous variable in Nigeria, based on the fact that Nigeria, although a global player in the oil market, her production quota and oil prices are exogenously determined by OPEC. Therefore, a shock in oil prices will contemporaneously affect all other variables in the system.

The second variable to be ordered is government revenue (GREV). This is because the major driver of Nigeria's revenue base is oil, accounting for over 76% of the total revenue of the country. Thus, oil price shock has a significant impact on government revenue. Therefore, both oil price (OILP) and government revenue (GREV) will have influence on the rest of the variables in the model, while their own behaviour will be least influenced by other variables in the system (model).

The third ordering is government expenditure (GEXP). This is because government revenue determines the expenditure pattern of the government, whether recurrent or capital expenditure. Hence, both government revenue and expenditure considerably influenced other variables in the model and conversely, their behaviour will be least affected by other variables in the system.

Money supply (MS2) is ordered next. This is on the basis that monetary shocks will significantly have a contemporaneously affect other variables in the model.

The next ordering is inflation (INF) measured by changes in price levels. Shocks in the price levels will influence other variables in the model.

The next ordering is real gross domestic product (RGDP). Real gross domestic product is contemporaneously influenced by other variables in the model while the last ordering is unemployment (UEMP), which is influenced by growth rate of GDP.

Aside from employing the Forecast Error Variance Decomposition in analyzing the innovations in the macroeconomic variables due to oil price shocks, the dynamic response of the endogenous variables to the shocks will also be explained using the Impulse Response Function (IRF). The IRF therefore, traces the effects of a one-time shock of oil prices to the innovations on the current and future values of the endogenous variables.

3.2 Data and Sources:

The study adopts a time series secondary data between 1981 and 2014 from the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), International Monetary Fund (IMF) and the World Bank. The annual time series data employed are oil prices (OILP), government revenue (GREV), government expenditure (GEXP), money supply (MS2), inflation (INF), real gross domestic product (RGDP) and unemployment (UEMP). These variables are decomposed into quarterly observations (1981Q1- 2017Q4) in order to achieve increased data points and provide greater degree of freedom.

4.0 EMPIRICAL RESULTS.

Table 3: Unit Root Test Results.

Variable	*ADF*		*PP*		*Conclusion*	
	1ST DIFF	2ND DIFF	1ST DIFF	2ND DIFF	ADF	PP
OILP	6.167*		6.251*		*I(1)*	*I(1)*
GREV	6.098*		6.052*		*I(1)*	*I(1)*
GEXP		8.416*	6.662*		*I(2)*	*I(1)*
INF	5.170*		8.036*		*I(1)*	*I(1)*
MS2		4.920*		9.778*	*I(2)*	*I(2)*
RGDP		6.227*		6.947*	*I(2)*	*I(2)*
UEMP	6.608*		6.669*		*I(1)*	*I(1)*

** represents stationarity at 1% significance level based on MacKinnon critical value.*

Source: Computed by Author

The result of the test using Augmented Dickey Fuller(ADF) showed that four of the time series data namely oil price (OILP), government revenue (GREV), inflation (INF) and unemployment (UEMP) were stationary at first difference (*I1*), that is, they are integrated of order 1; while government expenditure (GEXP), money supply (M2) and real gross domestic product (RGDP) were stationary at second difference (*I2)*, thus the variables were integrated of order 2.

However, the result of stationarity test using Phillip Peron (PP) showed that all five of the variables namely oil price(OILP), government revenue(GREV), government expenditure(GEXP), inflation(INF) and unemployment(UEMP) were stationary at first difference *(I1*), indicating that they are integrated of order 1while the other two variables such as money supply (MS2) and real gross domestic product(RGDP) were stationary at second difference(*I 2*), hence said to be integrated of order 2.

4.2 Cointegration Analysis:

Johansen cointegration test is important in the determination of long run relationships between times series data. Cointegration implies that the variables have similar stochastic drift. Thus, a vector of variables integrated of order 1(I1) is said to be cointegrated if there exist a linear pair of the variables that are stationary. The Johansen (1991) analysis was employed, using the trace and maximum eigenvalue test statistics as shown in table 2.

Table 4: Johansen (1991) Cointegration test Results

Series: OILP GREV GEXP INF MS2 RGDP UEMP				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.965353	262.3059	125.6154	0.0000
At most 1 *	0.890313	158.0670	95.75366	0.0000
At most 2 *	0.646004	89.55316	69.81889	0.0006
At most 3 *	0.539306	57.36059	47.85613	0.0050
At most 4 *	0.516806	33.33496	29.79707	0.0188
At most 5	0.291111	10.78752	15.49471	0.2249
At most 6	0.003920	0.121748	3.841466	0.7271

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.965353	104.2390	46.23142	0.0000
At most 1 *	0.890313	68.51384	40.07757	0.0000
At most 2	0.646004	32.19256	33.87687	0.0783
At most 3	0.539306	24.02563	27.58434	0.1338
At most 4 *	0.516806	22.54744	21.13162	0.0314
At most 5	0.291111	10.66577	14.26460	0.1718
At most 6	0.003920	0.121748	3.841466	0.7271

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The trace test showed five cointegrating vector existing among the variables at 5% level of significance. This implies the rejection of the null hypotheses (Ho), which states that there is no cointegration among the variables considered in the model. Based on the existence of cointegration, there exists a long run relationship between the variables. Also, the Max-eigenvalue test revealed two cointegrating equations at 5% significance level among the variables.

4.3 Variance Decomposition:

Variance decomposition or forecast error variance decomposition (FEVD) explains the amount of innovations each endogenous variable contributes to each other in the model. It also determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables.

Table 5: Oil price variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	3.067199	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	5.118583	99.43992	0.039788	0.141806	0.004685	0.294701	0.079060	3.80E-05
3	6.550221	97.58584	0.027841	1.334997	0.066263	0.862438	0.119883	0.002737
4	7.559915	93.43561	0.058353	4.607718	0.264307	1.494916	0.102394	0.036698
5	8.356825	86.96537	0.216407	9.940377	0.626967	2.012323	0.088374	0.150185
6	9.048165	79.51930	0.458318	16.11412	1.106175	2.338392	0.114894	0.348803
7	9.646984	72.69407	0.682350	21.74761	1.628271	2.504689	0.171225	0.571787
8	10.13113	67.36856	0.826062	26.10539	2.141766	2.580215	0.235902	0.742103
9	10.48736	63.67301	0.884340	29.08236	2.619747	2.617660	0.302016	0.820868
10	10.72436	61.34383	0.884497	30.88498	3.043421	2.642163	0.378151	0.822959

Table 5 shows oil price variance decomposition. Apart from oil price which explains 100% of its own shocks in the 1st quarter and declines to 61.34% in the 10th quarters, government expenditure (GEXP) accounted for 4.60% of the innovations in oil price in the 4th quarters and progressively increased to 30.88% of the innovations in oil price in the 10th quarters. Next is inflation (INF) which explains about 3.04% influence on oil price followed by real gross domestic product (RGDP) with a contribution of 2.64% to oil price in their 10th quarters.

Table 6: Government revenue variance decomposition:

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	70382.33	63.04820	36.95180	0.000000	0.000000	0.000000	0.000000	0.000000
2	117316.9	63.54696	36.04287	0.000704	0.000646	0.338083	0.000802	0.069935
3	147483.7	63.46394	35.09772	0.094615	0.012637	1.013846	0.100332	0.216909
4	165231.7	62.52397	33.97177	0.475640	0.047689	1.734784	0.884547	0.361604
5	176494.8	60.39885	32.51272	1.100981	0.095334	2.194241	3.255857	0.442018
6	185743.2	57.02110	30.64369	1.610937	0.128289	2.258234	7.882034	0.455711
7	195573.2	52.56481	28.37486	1.706360	0.131832	2.060201	14.72785	0.434092
8	207502.1	47.26263	25.76079	1.519112	0.117624	1.884885	23.05242	0.402537
9	222608.1	41.38343	22.89573	1.515707	0.108610	1.981105	31.73635	0.379073
10	241641.0	35.30692	19.93338	2.095579	0.118851	2.450958	39.71023	0.384082

Table 6 is the variance decomposition of government revenue (GREV). It shows that apart from its own shock of 36.95% in 1st quarter, which decreased to 19.93% in the 10th quarters, oil price contributed the largest shock of 63.04% in the 1st quarter to government revenue, with a gradual decline to 35.30% in the 10th quarters. Real gross domestic product (RGDP) accounted for 3.25% of the innovations in government revenue in the 5th quarters, and the variation increased steadily to 39.71% in the 10th quarters.

Table 7: Government expenditure variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	57852.86	26.06401	55.87910	18.05689	0.000000	0.000000	0.000000	0.000000
2	96679.36	27.88775	52.26566	19.09722	0.001100	0.605350	0.067715	0.075211
3	123385.1	27.74654	49.29709	20.41711	0.001746	2.104253	0.078633	0.354632
4	140936.2	26.55905	46.85718	21.42113	0.002639	4.200395	0.074358	0.885242
5	152839.6	25.06927	44.94711	21.54771	0.007856	6.394987	0.399002	1.634067
6	161877.7	23.63550	43.45506	20.59179	0.033536	8.183677	1.582370	2.518057
7	170285.6	22.24223	42.04970	18.82965	0.115754	9.203959	4.129434	3.429270
8	180067.3	20.71718	40.26710	16.89224	0.296284	9.299738	8.291385	4.236075
9	192895.3	18.95268	37.75750	15.43256	0.586383	8.571865	13.89493	4.804078
10	209815.5	16.99213	34.49785	14.76478	0.944604	7.355186	20.39252	5.052933

Variance decomposition of government expenditure (GEXP) is as shown in table 7. Apart from its own shock of 18.05% in the 1st quarter which declined gradually to 14.76%, government revenue accounted largely to the innovations in government expenditure to the tune of 55.87% in the 1st quarter and later declined to 34.49% in the 10th quarters. This was followed by oil price which contributed a shock of 27.74% in 3rd quarters to government expenditure and RGDP with a shock of 20.39% in the 10th quarters to government expenditure.

Table 8: Money supply variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	90896.51	33.48888	8.434463	17.66802	0.319258	40.08938	0.000000	0.000000
2	164783.8	31.10907	9.116847	14.31222	0.173280	45.13114	0.007641	0.149798
3	231284.9	30.79736	9.308370	10.72969	0.088050	48.73528	0.004528	0.336720
4	292361.3	31.75358	9.247974	7.677369	0.089465	50.78904	0.007888	0.434679
5	350478.2	33.43104	9.069996	5.461976	0.157529	51.41294	0.030922	0.435597
6	407106.4	35.41418	8.851438	4.055567	0.258994	50.95820	0.078796	0.382832
7	462586.4	37.40829	8.634912	3.274850	0.368925	49.83645	0.159459	0.317113
8	516526.6	39.23895	8.442682	2.914139	0.475026	48.37840	0.291537	0.259267
9	568265.4	40.82882	8.286153	2.802876	0.573268	46.78566	0.508457	0.214764
10	617206.1	42.16005	8.171226	2.814947	0.662813	45.14804	0.860866	0.182056

Table 8 shows money supply variance decomposition. The result reveals that money supply (MS2), otherwise called broad money accounted for 40.09% of its own shock in the 1st quarter and increased to 45.14% in the 10th quarters, whereas, oil price (OILP) contributed to 33.48% shocks in money supply in the 1st quarter and later increased to 42.16% in the 10th quarters. Government expenditure accounted for 17.66% innovations in money supply (MS2) in the 1st quarter, followed by government revenue (GREV) with shocks of 8.43% in the 1st quarter and later increased to 9.24% in the 4th quarters.

Table 9: Inflation variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	4.152230	1.247860	12.78131	10.34150	75.62933	0.000000	0.000000	0.000000
2	7.657460	0.906888	9.291175	10.14108	79.62353	0.025426	0.001061	0.010843
3	10.66028	0.795314	6.964067	10.08668	81.99284	0.108441	0.007694	0.044962
4	13.03422	0.793197	5.428067	10.09166	83.30142	0.254153	0.026474	0.105025
5	14.79232	0.840811	4.444490	10.12097	83.87763	0.459147	0.067732	0.189214
6	16.01812	0.897022	3.839464	10.15636	83.94929	0.718775	0.147416	0.291665
7	16.82481	0.934227	3.484116	10.18045	83.68084	1.029665	0.287142	0.403569
8	17.32970	0.941776	3.284740	10.17371	83.18437	1.388905	0.511268	0.515237
9	17.63809	0.926283	3.175729	10.12041	82.52593	1.792052	0.841088	0.618503
10	17.83430	0.906117	3.113470	10.01744	81.73466	2.231678	1.288203	0.708429

Variance decomposition analysis of inflation is as shown in table 9. The result revealed that inflation accounted largely for 75.62% of its own shocks in the 1st quarter and increased to 81.73 % in the 10th quarters. Other variables such as government revenue and government expenditure contributed 12.78% and 10.34% of the innovations in inflation in the 1st quarter respectively and later declined. Oil price (OILP) shocks on inflation were very marginal, declining from 1.24% in the 1st quarter to 0.79% in the 4th quarters. This is an indication that oil price shock is not inflationary in Nigeria.

Table 10: Real gross domestic product variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	77327.27	2.093300	9.035724	0.981851	0.945924	3.994588	82.94861	0.000000
2	143590.2	1.763447	4.596636	0.376882	0.718349	2.156350	90.26894	0.119395
3	207015.4	2.107529	2.289856	0.332681	0.522773	1.106247	93.43571	0.205201
4	268781.1	2.810091	1.522973	1.135306	0.375943	0.701652	93.27475	0.179280
5	330350.6	3.560684	1.586339	2.645155	0.274836	0.715277	91.09850	0.119209
6	392460.1	4.115285	1.923796	4.464594	0.207478	0.955624	88.21307	0.120158
7	455276.2	4.384747	2.241463	6.220806	0.162170	1.304071	85.47072	0.216022
8	518776.0	4.402773	2.445207	7.703714	0.130311	1.698729	83.23394	0.385330
9	582933.9	4.251629	2.539311	8.857310	0.106290	2.108204	81.54929	0.587968
10	647738.7	4.010828	2.558094	9.717003	0.087107	2.514046	80.32139	0.791531

Table 10 shows the variance decomposition for real gross domestic product (RGDP). The result revealed that real gross domestic product explained 82.94% of its own shock in the 1st quarter and declined to 80.32% in the 10th quarters. Government revenue and expenditure explained 9.03% and 9.71% of the shocks in real gross domestic product in the 1st and 10th quarters respectively. This was followed by oil price with 4.01% shock to real gross domestic product in the 10th quarters.

Table 11: Unemployment variance decomposition

Period	S.E.	OILP	GREV	GEXP	INF	MS2	RGDP	UEMP
1	0.950442	7.596861	26.49658	17.35802	0.259246	2.600347	0.833983	44.85496
2	1.601280	6.609865	21.10781	17.42982	0.352001	3.002608	0.382491	51.11540
3	2.060603	6.236220	17.02862	16.28633	0.589089	3.594889	0.272985	55.99186
4	2.366154	6.213140	14.04254	14.63921	1.097953	4.269148	0.529283	59.20872
5	2.571065	6.330163	12.01268	13.01135	2.024716	4.904982	1.099027	60.61709
6	2.719370	6.422170	10.75473	11.69236	3.444644	5.409258	1.891711	60.38512
7	2.838863	6.395403	10.03579	10.73627	5.289667	5.749992	2.829890	58.96299
8	2.943536	6.237346	9.636277	10.04423	7.362554	5.952427	3.881631	56.88553
9	3.039315	5.989078	9.399164	9.483075	9.419036	6.068058	5.062121	54.57947
10	3.129063	5.702816	9.233713	8.969241	11.24753	6.146129	6.415558	52.28502

Finally, table 11 is the variance decomposition of unemployment, whose result revealed that it accounted for 44.85% of its own shocks in the 1st quarter and increased to 52.28% in the 10th quarters. This was followed by government revenue (GREV) and government expenditure (GEXP) with shocks of 26.35% and 17.35% on unemployment in their 1st quarters respectively. Oil price explained 7.59% of the innovations in unemployment while inflation accounted for 11.24% shocks in the 10th quarters.

4.4 Impulse Response Function (IRF):

The impulse response function (IRF) of the endogenous variables to the one time shock in oil prices is as shown in figure 3.

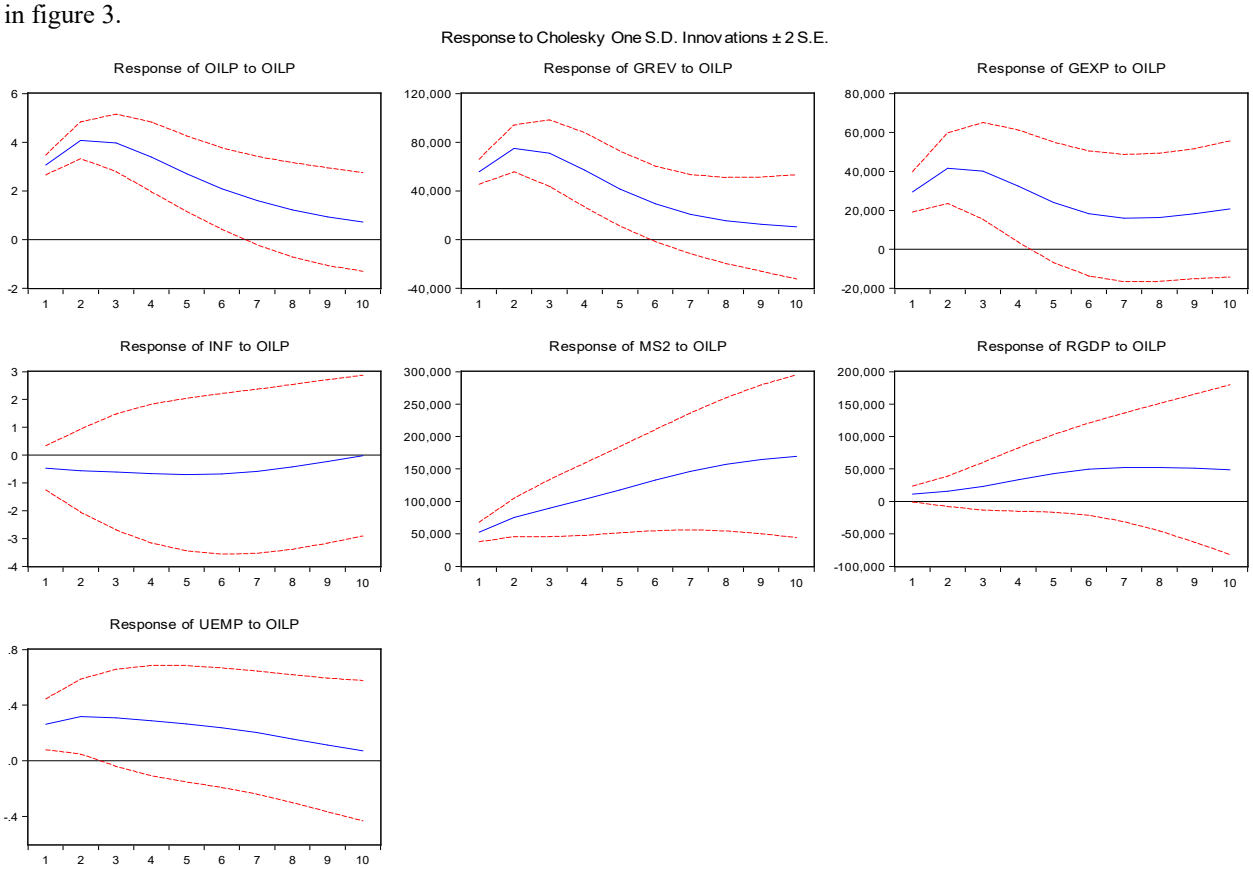

Figure 5: Impulse Response Function of the Endogenous Variables

From the impulse response functions (IRFs) above, the response of oil price to its own innovation was significantly positive, increasing from the 1st quarter to the 2nd quarters and then gradually declines. However, the response of oil price to its own shocks remained positive and lasted to the end of the 10th quarters. Similar trend was displayed by government revenue (GREV) and government expenditure (GEXP), whose responses to oil price fluctuation was positively significant throughout the 10th quarters.

For inflation, its response to oil price fluctuation was negative from the 1st quarter to the end of the 10th quarters. This is in support of the result of the Forecast Error Variance Decomposition (FEVD) which revealed that oil price shock is not directly inflationary in an open economy like Nigeria.

For money supply(MS2) and real gross domestic product(RGDP), their responses to oil price shocks was

positively significant, increasing from the 1st quarter through the 10th quarters.

Finally, the response of unemployment to the shock in oil prices was significantly positive, increasing to the 2nd quarters and then declines gradually. However, its response to the innovations in oil prices was positive throughout the 10th quarters.

5.0 Policy Implications of the Decomposition Results:

5.1 Government Revenue and Expenditure

The variance decomposition analysis showed that oil price shocks largely accounted for 63.04% and 18.05% of the innovations in government revenue (GREV) and expenditure (GEXP) in the 1st quarter respectively. This is consistent with the fact that Nigeria, as a net exporter of crude oil, is impacted by oil price shocks through government revenue and expenditure as transmission mechanisms. With the nation's over reliance on oil as its main source of revenue, oil price shocks (whether positive or negative), will have a direct impact on the nation's revenue and by extension, its expenditure. For instance, the current negative shocks occasioned by the recent fall in oil prices where a barrel of crude oil sells for $56 as at April 1, 2015, will adversely affect government revenue, thus leading to budget deterioration and increasing fiscal deficits.

It is important to note that the government (public sector) cannot be completely divorced from the other sectors of the economy hence; whatever affects the government is bound to have a transmission effect to the rest of the sectors. Consequently, the current oil price drop will adversely impact on the financial sector by reducing the funds available to banks for loan disbursement to other sectors like the manufacturing, agriculture, tourism, etc. through the Central Bank Cash Reserve Ratio (CRR) that currently stands at 31% for both public sector and retail funds. This will result in poor capacity utilization of our domestic industries thus, exacerbating unemployment, poverty and a host of other social problems.

The policy recommendation here is the diversification of the economy in order to boost the non- oil sector, as this will cushion the vulnerability of the economy to external shocks. It is advisable for all tiers of government to invest in the construction and housing sectors in view of their enormous potential to stimulate growth of the economy. This will serve as an alternative to the over reliance of the nation's economy on oil revenue.

Also, fiscal policy instrument to be applied has to be pro-cyclical, depending on the direction of switch of economic activity.

Government expenditure decomposition revealed that government revenue (GREV) explained about 55.87% of the innovations in government expenditure in the 1st quarter, followed by oil price with variation of 26.06% in the 1st quarter. The implication of this is that shocks in oil price and by extension, oil revenue, have a direct impact on government expenditure. However, government expenditure in Nigeria is often trended towards recurrent expenditure as opposed to capital expenditure, thus leading to the widening of the nation's infrastructural deficit gap. On this basis therefore, the policy recommendation requires that government expenditure, a vital demand management tool, must be properly managed by the government, as this is capable of positioning the economy on a sustainable growth and development trajectory.

Also, the decomposition of government expenditure showed that the innovation of government expenditure on unemployment was 0.07% in the 1st quarter and rose to 5.05 % in the 10th quarters. This innovation is considered low and oxymoronic considering the rising profile of government expenditure for the period under review. One explanation that could be adduced for this finding is that the chunk of government expenditure is used to fund recurrent expenditure such as purchases of goods and services, payment of salaries, operations (consumption expenditure) and current grants and subsidies(transfer payments) at the detriment of capital expenditure. It is recommended that larger share of government expenditure should be allocated to provision of infrastructures and capital projects to stimulate the growth and development of the economy.

5.2 Money Supply (MS2)

Variance decomposition analysis revealed that money supply shocks on oil price (OILP), government revenue (GREV), and government expenditure (GEXP) were significant, with innovations of 42.16%, 8.43% and 17.66% respectively. This result is expected based on the fact that the largest injection of money into the economy is from oil revenue. From the expenditure perspective, government plays a dominant role in the labour market as the largest employer of labour and doles out chunk of liquid assets (cash) into circulation in the economy through payment of salaries, compensation benefits, subsidies, grants and allocations to the three tiers of government. Therefore, the Central Bank of Nigeria (CBN) regulates the economy with suitable monetary policy instruments depending on the liquidity in the system.

5.3 Inflation

The findings revealed that inflation only accounted for 1.24% of the innovations in oil price (OILP) in the 1st quarter, and decreased to 0.79% in the quarters. This innovation is found to be very insignificant and hence, provides evidence that oil price is not inflationary in an open economy such as Nigeria. This contradicts the

findings of Oriakhi and Osaze (2013) that that oil price changes will stir up price instability in the country as their result showed 13% innovation in inflation in the 10th year period caused by oil shocks.

5.4 Real Gross Domestic Product (RGDP)

The result of the variance decomposition analysis showed that oil price shocks explained about 4.40% of the innovations in real gross domestic product (RGDP). This result affirms similar studies by Barsky and Kilian (2004) whose empirical result established a marginal impact of oil price shocks on real GDP.

5.5 Unemployment

The variance decomposition result showed that oil price shocks significantly accounted for 7.59% innovations in unemployment in the 1st quarter and gradually declined to 5.70% in the 10th quarters.

The implication of this is that negative oil shocks will result in shrinking oil revenue accruable to the Federation account. Consequently, the impact will be a reduction in the allocation (Federal Allocation Account Committee-FAAC) to the three tiers of government, delays and non-payment of salaries by some states and eventually, staff downsizing which will worsen the unemployment situation in the country. The recent loan bailout for some states that are already at their wits' end by the Federal Government to enable them honour arrears of unpaid salaries of workers lends credence to the above assertion. This development in Nigeria is consistent with the Liliens hypothesis which asserts that sectoral shifts in demand arising from extraneous shocks could lead to a substantial amount of unemployment in the economy, which requires time for the reallocation of labour as a factor of production.

6.0 Recommendations and Conclusion:

The paper has established the impact of oil price fluctuations on the macroeconomic performance of the Nigerian economy and on this basis therefore, the following policy recommendations are proffered.

i. Government should diversify the Nigerian economy by stimulating the non- oil sectors (agriculture, manufacturing, building and construction) in order to reduce over dependence on oil revenue, thus minimizing the vulnerability of the economy to external shocks.
ii. As oil prices continued to fall, culminating in dwindling oil revenue, the use of Contractionary fiscal policy (tax imposition) is recommended in order to improve the revenue base of the country. It is envisaged that an increase in value added tax (VAT) by one percentage point (1%) from the existing rate of 5% to 6%, might substantially improve the nation's revenue.

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