

Structural Effect of Oil Price Shocks on Some Macroeconomics Variables in Nigeria: A SVAR Method

Yakubu Musa¹, Musa Usman Bawa², Shuaibu Ahmed³Senior Lecturer, Department of Mathematics, Statistics Unit, Usmanu Danfodiyo University, Sokoto, Nigeria¹Lecturer, Department of Mathematics, School of Science, Abubakar Tafawa Balewa University, Bauchi, Nigeria²Lecturer, Department of Statistics, Kano University of Science and Technology, Wudil, Nigeria³

ABSTRACT: This study investigates the structural effect of oil price shocks on some macroeconomic variables in Nigeria using Structure Vector Autoregressive (SVAR) Model. Structural response and Structural variance decompositions were used to forecast the variability cause by oil price shocks. The result from SVAR Short-run Pattern show that Crude oil price shock is the most endogenous variable in the model affected by inflation rate, while the remaining variables do not affect crude oil price shocks while SVAR long-run pattern shows crude oil price shock has an effect on all the variables. The results from structural response indicate that crude oil price has a positive and negative effect at short run but with no effect at long run. The results from the structural decompositions indicated that exchange rate contributes more variability in explaining the variation on crude oil price with less from interest rate. The policy makers in Nigeria should focus on policies that will strengthen and stabilize the macroeconomic structure of the economy.

KEYWORDS: SVAR, VEC, Structural Impulse response and Variance decomposition

I. INTRODUCTION

Nigeria, the most populous black nation situated in western Africa is popularly known for her dominant source of revenue, crude oil. Thus, Nigeria became increasingly dependent on oil revenue, which in the last few decades has experienced shocks in its price per barrel and production. With oil revenue as the main stay of the Nigerian economy, shocks in oil prices are definitely of prime interest to economists in order to predict the effects of a drastic change-increase or decrease in oil price, on the Nigerian economy as a whole. Oil shock can be described as a sudden, unexpected change in oil price or production.

Constant fluctuations of oil price in Nigeria have been a matter of concern and its effect on macroeconomic variables which are determinant of economic growth. Crude Oil is a key source of energy in Nigeria and in the world. Oil being an important part of the economy of Nigeria plays a strong role in influencing the economic and political fate of the country. Crude oil has generated great wealth for Nigeria, but its effect on the growth of the Nigerian economy as regards returns and productivity is still questionable.

Global economic performance remains highly correlated with oil prices. Overall, an oil-price increase leads to a transfer of wealth from importing to exporting countries through a shift in the terms of trade. The magnitude of the direct effect of a given price increase depends on the share of oil in national income, the degree of dependence on imported oil and the ability of end-user to reduce their consumption and switch away from oil. As different from other commodities, oil is probably one of the few or the only production input that can affect both positively and negatively economic growth, to an extent that it might even lead to a recession [1].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

Oil prices matter in the economy in various ways. Changes in oil price directly affect transportation costs, heating bills and the prices of goods made with petroleum products. Oil price spikes induce greater uncertainty about the future, which affects households and firms spending and investments decisions. Also changes in oil prices leads to reallocations of labour and capital between energy intensive sectors of the economy and those that are non-energy intensive sector [2].

Several studies have concentrate more on using VAR/VEC model approach than Structural VAR/VEC model on macroeconomics variables, some of this literatures includes:

In [3], the authors investigated the impacts of oil price shocks on the macroeconomic performance in Nigeria using Vector Auto regression (VAR) approach. The effect of oil price shock on output, inflation, the real exchange rate and the money supply was studied in [4] using quarterly data from 1970 to 2003 in Nigeria. The VAR method was employed to analyse the data. In [5], the authors measure the impact of monetary and fiscal policy on inflation and economic growth in Nigeria using unrestricted Vector Auto regression (VAR) approach. In [6], the authors carries out a pioneer attempt at introducing threshold effects to the linkage between oil price shocks and output growth in Nigeria. The study adopted the regime dependent multivariate threshold autoregressive model, together with the characteristic impulse response functions and forecast error variance decomposition. In [7], the authors analysed the effectiveness of revenue and Expenditure on Prices and Gross Domestic Product in Nigeria using Vector Auto regression (VAR) approach. In [8], the authors investigate and measure the long and short run relationship of monetary and fiscal policies on economic growth in Nigeria. A Vector Error Correction (VEC) models technique was used.

This study investigates the structural effect of oil price shocks on some macroeconomic variables using Structural Vector Autoregressive (SVAR) model.

II. MATERIALS AND METHODS

Vector Autoregressive Model

In its basic form, a VAR consists of a set of K endogenous variables. The VAR (p)-process is then defined as

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t \quad (1)$$

With A_i are $K \times K$ coefficient matrices for $i=1 \dots p$ and u_t is a k -dimensional process with $E(u_t) = 0$ and time invariant positive definite covariance matrix $E(u_t u_t^T) = \Sigma_u$ (white noise). One important characteristic of a VAR (p)-process is its stability. This means that it generates stationary time series with time invariant means, variances and covariance structure, given sufficient starting values.

Structural Vector Autoregressive (SVAR) Specification

Structural Vector Autoregressive (SVAR) model is its structural form and is defined as:

$$A y_t = A_1^* y_{t-1} + \dots + A_p^* y_{t-p} + \beta \varepsilon_t \quad (2)$$

It is assumed that the structural errors ε_t are white noise and the coefficient matrices A_i^* for $i = 1 \dots p$, are structural coefficient that differ in general from their reduced form counterparts. To see this, consider the resulting equation by left-multiplying Equation 2 with the inverse of A :

$$y_t = A^{-1} A_1^* y_{t-1} + \dots + A^{-1} A_p^* y_{t-p} + A^{-1} \beta \varepsilon_t$$

A SVAR model can be used to identify shocks by trace these out by employing Impulse response Analysis and Forecast error variance decomposition through imposing restrictions on the matrices. Incidentally, though a SVAR model is a structural model, it departs from a reduced form VAR (p) model and only restrictions for A and B can be added. It should be noted that the reduced form residuals can be retrieved from a SVAR model by $u_t = A^{-1} B \varepsilon_t$ and its variance-covariance matrix by $u_t = A^{-1} B B^T A^{-T}$ depending on the imposed restrictions.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

The case of SVAR models of type B one needs for local just-identified models $\frac{k(k-1)}{2}$.

Restrictions the co integration structure of the model provides $k(k-1)$ (restrictions on the long-run matrix. The remaining restrictions can be placed on either matrix, whereby at least $\frac{r(r-1)}{2}$ of them must be imposed directly on the contemporaneous matrix B.

Here, the primary aim of this study is to investigate the structural effect of oil price shocks on some macroeconomic variables, crude oil price as independent variable, and Gross domestic product, exchange rate, inflations, interest rate

$$LCOP = a_0 + a_1LRGDP + a_2LEXG + a_3LIR + a_4LINF + \beta\epsilon_t \quad (3)$$

a_0 = Constant term

$a's$ = The parameter to be estimated

$\beta\epsilon_t$ = Structural shocks

Where LRGDP: Log of real Gross domestic product, LCOP: log of crude Oil Price, LEXR: log of Official Exchange Rate, LIR: log of Interest Rate, LINF: log of inflations.

The Long-run SVAR approach

Given the following reduced form Vector Moving Average representation recovered from the inversion of a stationary Vector Autoregressive Representation (VAR):

$$y_t = A_1^{-1}(L) \quad (4)$$

Where y_t is the vector of the variables included in the model $A_1^{-1}(L)$ is the inverted dynamic coefficient matrix; ϵ_t is the Error terms.

We define $A^{-1}(L) = \phi(L)$ and obtain a process expressed as a linear combination of the past innovations in accordance with the Wold composition

$$y_t = \phi(L)u_t = \sum_{h=0}^{\infty} \phi_h u_{t-h} \quad \text{where} \quad \phi_0 = I_m \quad (5)$$

But, in order to recover the unobservable relevant shocks (ϵ_t) out of the observable reduced form innovations a structural VAR representation has to be considered and a set of restrictions has to be imposed. Given the following Structural VAR form:

$$A_0 y_t = \sum_{i=1}^p A_i^* y_{t-i} + B \epsilon_t \quad \epsilon_t \sim N(0, I_m) \quad (6)$$

Where A_0 is the (m x m) contemporaneous effects matrix; A_i^* is the (m x m) lagged effects matrix and B is the (m x m) structural shocks "short-run response" matrix. What follows is the system of structural equations linking u_t to ϵ_t which we have to restrict in order to univocally identify them.

$$A_i^* u_t = A_0^{-1} B \epsilon_t$$

Among the existent different identification strategies, short-run restrictions on B, cholesky triangularizations on A_0 , restrictions of both A_0 and B.

At first we deal with a 5 variables ,real gross domestic product (RGDP), crude oil price (COP), exchange rate (EXCR), and interest rate (IR), inflations (INF). On total, the number of restrictions we have to impose is:

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

$$k(k-1) = 20$$

Since we deal with a 5 variables SVAR -which are imposed on the long-run C (1), matrix, according to a cholesky triangular factorization:

$$C(1) = \begin{bmatrix} \text{variables} \\ LCOP_t \\ LR GDP_t \\ LEXR_t \\ LIR_t \\ LIN F_t \end{bmatrix} \begin{bmatrix} \varepsilon^{LCOP_t} & \varepsilon^{LR GDP_t} & \varepsilon^{LEXR_t} & \varepsilon^{LIR_t} & \varepsilon^{LIN F_t} \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \text{variables} \\ u_t LCOP_t \\ u_t LR GDP_t \\ u_t LEXR_t \\ u_t LIR_t \\ u_t LIN F_t \end{bmatrix}$$

$$= \begin{bmatrix} \varepsilon^{LCOP_t} & \varepsilon^{LR GDP_t} & \varepsilon^{LEXR_t} & \varepsilon^{LIR_t} & \varepsilon^{LIN F_t} \\ b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{bmatrix} = \begin{bmatrix} \varepsilon^{LCOP_t} & \varepsilon^{LR GDP_t} & \varepsilon^{LEXR_t} & \varepsilon^{LIR_t} & \varepsilon^{LIN F_t} \\ 1 & 0 & 0 & 0 & 0 \\ NA & 1 & 0 & 0 & 0 \\ NA & NA & 1 & 0 & 0 \\ NA & NA & NA & 1 & 0 \\ NA & NA & NA & NA & 1 \end{bmatrix}$$

The non-zero coefficients b_{ij} and NA, in matrices indicated that any residual j in matrices ε_t and u_t has an instantaneous effect on variable i . This section discusses the SVAR model identifying assumptions and the estimation procedure. This research identify five structural shocks: crude oil price shock, real gross domestics shock, exchange rate shock, interest rate shock, inflation rate shock. To achieve identification, the research makes use of structural factorization, short-run restrictions and long-run restrictions.

To impose restrictions for short-run restrictions that is

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \quad B = \begin{pmatrix} NA & 0 & 0 & 0 & 0 \\ 0 & NA & 0 & 0 & 0 \\ 0 & 0 & NA & 0 & 0 \\ 0 & 0 & 0 & NA & 0 \\ 0 & 0 & 0 & 0 & NA \end{pmatrix}$$

While for long-run restriction we can imposed

$$LR = \begin{pmatrix} NA & 0 & 0 & 0 & 0 \\ 0 & NA & 0 & 0 & 0 \\ 0 & 0 & NA & 0 & 0 \\ 0 & 0 & 0 & NA & 0 \\ 0 & 0 & 0 & 0 & NA \end{pmatrix}$$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

$$C(1) = \begin{bmatrix} \text{variables} \\ LCOP \\ LR GDP \\ LEXR \\ LIR \\ LINF \end{bmatrix} \begin{pmatrix} \varepsilon^{COP_t} & \varepsilon^{RGDP_t} & \varepsilon^{EXR_t} & \varepsilon^{IR_t} & \varepsilon^{INF_t} \\ 1 & 0 & 0 & 0 & 0 \\ c_{21} & 1 & 0 & 0 & 0 \\ c_{31} & c_{32} & 1 & 0 & 0 \\ c_{41} & c_{42} & c_{43} & 1 & 0 \\ c_{51} & c_{52} & c_{53} & c_{54} & 1 \end{pmatrix}$$

The first equation in the macro econometric model assumes that crude oil price is the most endogenous variable in the model: but does not recently affected by shock to all other variables in the model. The second equation indicate that shock to real gross domestics product recently affected crude oil price but does not affect exchange rate, interest rate and inflations. The third equation indicate that shocks to crude oil price, real gross domestics product recently affected exchange rate, but does not affect interest rate and inflations rate. Forth equation indicate that shocks to crude oil price, real gross domestic product ,exchange rate , recently affected interest rate but does not affect inflations rate .

Five equations indicate that shocks to crude oil price, real gross domestic product, exchange rate, interest rate recently affected inflations rate [9].

III. DATA ANALYSIS AND DICUSSIONS

The study chooses the range period of 1970 to 2015 for the elicitation of data and the data was obtained from CBN bulletins of the said period. The model to be used in this study is represented thus:

$$COP = f(RGDP, IR, EXR, INF) \quad (7)$$

Log of the variables were used to stabilise the variance

$$y_t = \log(RGDP, EXCR, COP, IR, \text{ and } INF)$$

unit root tests were conducted using DF-GLS and PP tests. This is necessary in order to determine the nature of the series and to avoid getting spurious result. The result of unit root test shows that all variables are stationary after first differences at 5% level of significance.

Structural VAR Estimates:

A related approach to respond to the problem of interpreting VARs has been the development of Structural Vector Auto Regressions (SVARs), which introduce theoretical restrictions to identify the underlying shocks. The SVAR approach tends to impose just enough restrictions to permit a coherent interpretation of the shocks to the system.

Table 1: Result of Structural VAR Estimates of Short- run pattern

Model: Ae = Bu where E[uu']=I				
Restriction Type: short-run pattern matrix				
A =				
1	0	0	0	0
C(1)	1	0	0	0

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

C(2)	C(5)	1	0	0
C(3)	C(6)	C(8)	1	0
C(4)	C(7)	C(9)	C(10)	1
B =				
C(11)	0	0	0	0
0	C(12)	0	0	0
0	0	C(13)	0	0
0	0	0	C(14)	0
0	0	0	0	C(15)
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.167989	0.130317	-1.289079	0.1974
C(2)	0.044273	0.264798	0.167195	0.8672
C(3)	-0.042813	0.210109	-0.203767	0.8385
C(4)	-1.813623	0.838769	-2.162244	0.0306
C(5)	-0.445189	0.366958	-1.213187	0.2251
C(6)	0.482032	0.298323	1.615807	0.1061
C(7)	-0.751759	1.242490	-0.605043	0.5452
C(8)	-0.259205	0.147272	-1.760041	0.0784
C(9)	-1.326589	0.618083	-2.146297	0.0318
C(10)	0.997490	0.740779	1.346543	0.1781
C(11)	0.164093	0.021546	7.615773	0.0000
C(12)	0.115157	0.015121	7.615773	0.0000
C(13)	0.227564	0.029881	7.615773	0.0000
C(14)	0.180478	0.023698	7.615773	0.0000
C(15)	0.719965	0.094536	7.615773	0.0000

Estimate Result of matrix A:

Crude oil price shocks will significantly affect inflation rate, the effect is statistically significant with p-value of (0.0306) at 5% level of significant. Real gross domestic product shock has affected crude oil prices but did not affect exchange rate, interest rate, inflations rate with the p- value (0.2251, 0.1061, 0.5452) at 5% level of significant

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

respectively. This shows the research assumptions were true. Exchange rate shock has affected interest rate and inflation rate. The effects are statistically significant with p-value (0.0318) at 5% level of significant and p-value of (0.0784) at 10% level of significance. Similarly, Interest rate shock has recently affected crude oil price, real gross domestic product, exchange rate but did not affect, inflation rate. Inflation rate shock has recently affected crude oil price, real gross domestic product, exchange rate, and interest rate.

Estimate Result of matrix B:

Crude oil price has recently affected real gross domestic product, exchange rate, interest rate, inflation, and is statistically significant with P-value (0.0000) is less than 0.05. Real gross domestic product shock has recently affected on crude oil price, exchange rate, interest rate, inflation, and is statistically significant because P-value (0.0000) is less than 0.05. Exchange rate shock has recently affected on crude oil price, real gross domestics product, interest rate, inflation, and is statistically significant because P-value (0.0000) is less than 0.05. Interest rate shock has recently affected on crude oil price, real gross domestics product, exchange rate, inflation, and is statistically significant because P-value (0.0000) is less than 0.05. Inflation rate shock has recently affected on crude oil price, real gross domestics product, interest rate, inflation rate, and is statistically significant because P-value (0.0000) is less than 0.05.

Table 2: Structural VAR Estimates Result of Long- run pattern matrix

Model: $Ae = Bu$ where $E[uu'] = I$				
Restriction Type: long-run pattern matrix				
Long-run response pattern:				
C(1)	0	0	0	0
0	C(2)	0	0	0
0	0	C(3)	0	0
0	0	0	C(4)	0
0	0	0	0	C(5)
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.093952	0.012337	7.615773	0.0000
C(2)	0.356411	0.046799	7.615773	0.0000
C(3)	0.535242	0.070281	7.615773	0.0000
C(4)	0.168979	0.022188	7.615773	0.0000
C(5)	0.400330	0.052566	7.615773	0.0000
Log likelihood	-39.99406			
LR test for over-identification:				
Chi-square(10)	102.9049		Probability	0.0000

Long-run response Pattern result:

Crude oil price shock has recently affected real gross domestic product, exchange rate, interest rate, inflation and C (1) is statistically significant with p-value (0.0000). Real gross domestics product shock has recently affected Crude oil price, exchange rate, interest rate, inflation and C(2) is statistically significant with p-value (0.0000). Exchange rate, shock has recently affected real gross domestic product, Crude oil price, interest rate, inflation and C (3) is statistically significant with p-value (0.0000). Interest rate, shock has recently affected real gross domestic product, Crude oil price, exchange rate, inflation and C (1) is statistically significant with p-value (0.0000). Inflation rate shock has recently affected real gross domestics product, Crude oil price , interest rate, exchange rate and C(1) is statistically significant with p-value (0.0000). The research investigate that, if crude oil price shock does not have long-run effect on real gross domestic product, exchange rate, interest rate ,and inflations rate.

The value of test statistics is 102.9049 and p-value is 0.0000, if test statistics is greater than p- value, we reject the null hypothesis and accept the alternative hypothesis. That; means we accept the hypothesis at 5% level of significant., it

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

show us that crude oil price shock have long run-effect on real gross domestics product, exchange rate, interest rate, and inflations rate.

Innovations Forecasting

Shock1, shock2, shock3, shock4 and shock5 means shock to crude oil price, real gross domestic's product, exchange rate, interest rate, and inflation rate respectively.

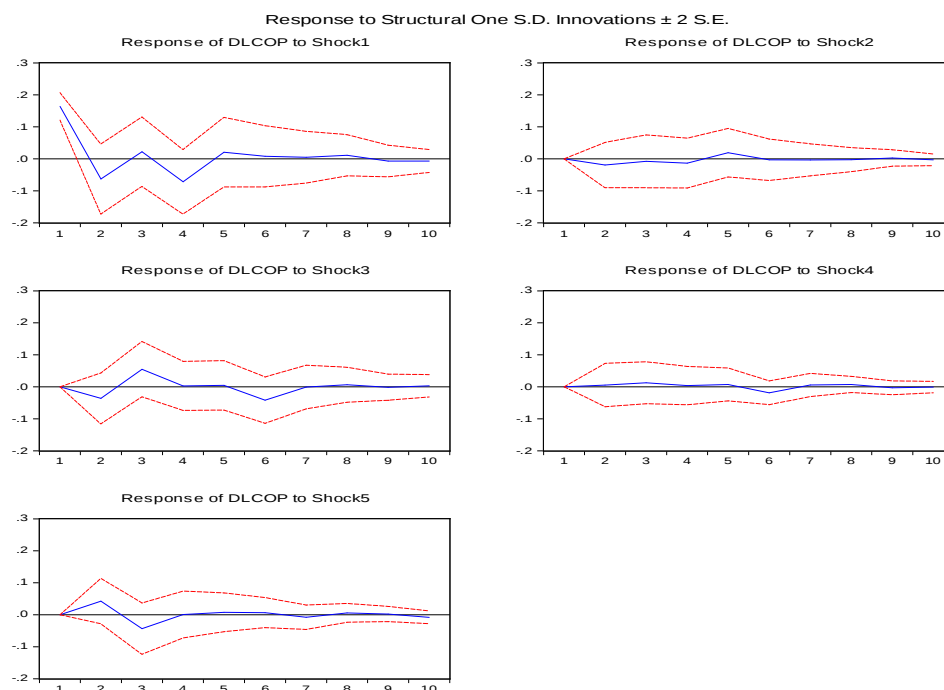


Fig 1: Graph of Structural Response for Crude Oil Price

Crude oil price has positive effect to oil price shock in 1982, 1992 and negative effect in 1978, 1987. Crude oil price has negative effect on real gross domestics product shock from 1970-1992 and positive effect from 1995-1998. Crude oil price has positive effect on exchange rate shocks in 1982, and negative effect in 1978, 1996. Crude oil price has positive effect on interest rate shock in 1996 and negative effect from 1978-1982. Crude oil price has positive effect on inflation rate shock from 1970-1978 and negative from 1982-1987.

Table 3: Variance decomposition of crude oil price

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.164093	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.185540	89.78424	1.090026	3.810370	0.085833	5.229534
3	0.200085	78.42300	1.092259	10.80210	0.478080	9.204559
4	0.213032	80.51811	1.364494	9.546023	0.450616	8.120755
5	0.215197	79.84113	2.119988	9.398245	0.557015	8.083625
6	0.220278	76.32760	2.042712	12.57177	1.253848	7.804068
7	0.220569	76.17370	2.061730	12.54023	1.315239	7.909105
8	0.221160	76.01967	2.066891	12.55804	1.418431	7.936965
9	0.221323	76.00621	2.077201	12.54365	1.437949	7.934990
10	0.221620	75.89621	2.093664	12.52702	1.435524	8.047583

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

The results show that crude oil price dominates its own innovations with 75.89 to 100 per cent of the variance of its forecast and Exchange rate contributes more variability and interest rate with less caused. It can be concluded that most of these causes are caused by their own shock.

IV. CONCLUSION

The Vector Error Corrections (VEC) model is more suitable model employed in the research work since there's a long-run relationship between the variables. The study revealed that crude oil price shock has long run-effect to real gross domestic's product, exchange rate, interest rate, and inflation rate. The result from SVAR Short-run Pattern show that Crude oil price shock is the most endogenous variable in the model affected by inflation rate, while the remaining variables do not affect crude oil price shocks while SVAR long-run pattern shows crude oil price shock has an effect on all the variables. Two structure innovations were used to forecast oil price shocks on some macroeconomics variables. The results from the structural response indicated that both of the variables have positive and negative impacts on one another while the result from the structural decompositions indicated that the other variables contribute little in explaining the variation in crude oil price shocks. The results show that crude oil price dominates its own innovations with 75.89 to 100 per cent of the variance of its forecast and Exchange rate contributes more variability and interest rate with less caused. There is a strong need for policy makers to focus on policies that will strengthen/stabilize the macroeconomic structure of the Nigerian economy with specific focus on; alternative sources of government revenue (reduction of dependence on oil proceeds), reduction in monetization of crude oil receipts (fiscal discipline), aggressive savings of proceeds from oil booms in future in order to withstand vicissitudes of oil shocks in future.

REFERENCES

- [1] Hamilton, J.D. (1983). "Oil and the Macro economy since World War II. *The Journal of Political Economy* 91: 228-248
- [2] Yusuf, M. (2015). An Analysis of the Impact of Oil Price Shocks on the Growth of the Nigerian Economy. *African Journal of Business Management*, 9(3)
- [3] Olusegun, O. A. (2008). Oil Price Shocks and the Nigeria Economy: A Forecast Error Variance Decomposition Analysis. *Journal of Economic Theory*, 2(4), 124-130
- [4] Olomola P. A. and Adejumo A.V. (2006). Oil Price Shocks and Macroeconomic Activities in Nigeria, *International Research Journal of Finance and Economics*, 3: 34.
- [5] Musa, Y., Asare, B.K. And Gulumbe, S.U. (2012). Measuring the impact of monetary and fiscal policy on inflation and Economic Growth in Nigeria using Unrestricted VAR methodology. *International journal of Natural and Applied Science*, 8(2): 109-124.
- [6] Adeneyi, O. (2010) "Oil price shocks and macroeconomic performance in Nigeria", University of Ibadan, Nigeria.
- [7] Musa, Y. and Asare, B. K. (2013a). Long and short Run Relationship Analysis of monetary and fiscal policy on Economic Growth in Nigeria: A VEC Model Approach. *Research Journal and Applied sciences, Engineering and Technology*, 5(10): 3044-3051.
- [8] Musa, Y. and Asare, B. K. (2013b). Analyzing the effectiveness of Revenue and Expenditure on price and Gross Domestic product in Nigeria: A VAR Method. *African Journal of Management and Administration*, 6(1): 2013.
- [9] Sadorsky, P. (1999). Oil Price shocks and Stock Market Activity. *Energy Economics*, 21: 449-469.