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Monetary Transmission Mechanism, Oil Price Shocks and Economic Growth of Nigeria

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Abstract: The paper investigated the relationship between monetary transmission mechanism, oil price shocks and Nigerian economic growth from 1980 to 2018. Data were collected on major variables such as oil price, balance of payment, interest rate, exchange rate, inflation rate and GDP growth rate. Structural Vector Auto-Regression (SVAR) technique was applied and the results show that oil price shocks affect the channels in the MTM differently. While some channels in the MTM are significantly responsive to oil price shocks, some are not. The effect of oil price shocks on domestic price level in the economy is not direct. The exchange rate shocks have the highest influence on the domestic price level in Nigeria despite the fact that inflation rate does not respond significantly to oil price shocks but it does to exchange rate shocks and the economy responds significantly to inflation shocks. This sequence of reactions underscores the importance of both exchange rate and price channels in transmitting the shocks from oil price to the domestic economy.

Keywords: Oil price; Monetary Transmission Mechanism; Economic Growth

JEL Classification: E42; E52; O42

1. Introduction

Over the years monetary policy has been one of the important macroeconomic tools used by policy makers to achieve macroeconomic objectives of economic stability, full employment and price stability among others (Gul, Mughal, & Rahim, 2012) (Mogaji, 2015). However, its effectiveness in achieving all these macroeconomic objectives rests on some factors which are more of structural and institutional setup of each country. Countries all over the world have different economic powers in terms of what they can produce and what they have comparative advantage on in terms of production when compared with other countries. Nigeria as a country is one of the largest producers of oil in the World and the largest producer in Africa, these

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attributes, over the year, have made crude oil revenue to be the major source of foreign exchange earnings for the country. About 80% of the foreign exchange earning of Nigeria is from sales of crude oil; thereby making oil the mainstay of Nigerian economy(Berg & Ostry, 2017); (IMF, 2017).

Despite the huge revenue accruing from oil over the years, Nigeria has been struggling with various macroeconomic instabilities and this has prevented her from having sustainable economic growth. According to Omolade, Nwosa and Ngalawa (2019), the performance of Nigeria's economy measured by economic growth has been grossly dependent on oil price. Various periods when Nigeria achieved high growth rates coincided with major spikes in crude oil price across the globe. For instance, between 1978 and 1982, Nigeria witnessed her first oil boom when the price of oil rose astronomically in the international oil market and the growth rate of Nigeria during this period was between 3 % to 4% which has not been witnessed before this period. The most recent spike in crude oil was between 2013 and 2014 when the price of oil rose from less than 65 USD to as high as 100 USD per barrel (IMF, 2016). During this period, Nigeria's economy was growing at 4.5%, such growth rate had not been witnessed ten years prior to this period. Figure 1 shows the movement of oil price and Nigeria GDP growth rate over the years. It should be noted in the figure that various oil price spikes have been coinciding with high GDP growth rate while oil price lows have been coinciding with low GDP growth rate. Hence it appears both oil price and Nigerian GDP growth rate exhibit the same pattern of movement over the years. However, it is believed that with huge revenue from oil Nigeria should be able to manage her economy by reinvesting the oil wind falls into the real economy and achieve sustainable economic growth but this appears not to be the case.

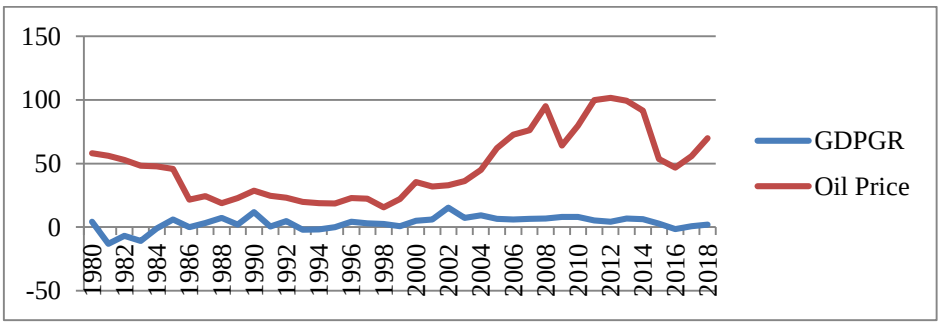


Figure 1. GDP Growth Rate and Oil Price Trends in Nigeria

Source: Author's Computation, 2020

Monetary policy has been a major tool being used by the government to manage the economy in order to mitigate the negative effects of oil price shocks on the economy since one of the aims of monetary policy is credit allocation. Over the years, different approaches of monetary policy have been used ranging from tight to expansionary

type yet the economy is still subservient to oil price shocks. Major economy downturns in Nigeria have been traced to fall in oil price. The most recent one happened between 2015 and 2016 when the oil price fell from about 100 USD in 2014 to as low as 25 USD per barrel in 2016. During this period the economy slipped into recession further recording two negative growth rates for two consecutive quarters. Despite various monetary interventions of the Central Bank of Nigeria (CBN) during this periods like currency devaluation and monetary tightening, the economy continued to wallow in recession until the oil price picked up in early 2017 (CBN,2019).

According to the World Bank, one of the reasons why the efforts of the CBN appeared not to be working or failed to have the desired effect on the economy might not be unconnected to their inability to identify the transmission mechanism through which oil price shocks affect the Nigerian economy. According to Romer (1994), monetary transmission mechanism is the process by which general economic activities are affected as a result of monetary policy decisions. The implication of this is that there is the need to ascertain monetary transmission mechanism through which oil price shocks affect Nigerian economic growth. According to Adeoye and Shobande (2017), Stock and Watson (2013), there are various channels through which monetary policy decisions affect the economy apart from the traditional interest rate channels. Other channels include the exchange rate, asset price, balance sheet, bank credit and expectation channels. A country like Nigeria needs to identify which of these channels is more effective in transmitting monetary policy decisions taken as a result of oil price to the economy.

According to Omolade & Ngalawa (2016) a country which depends heavily on importation and have very low domestic capacity in terms of output might have her monetary policy decisions affected by the exchange rate hence exchange rate channels might be very important in the Monetary Transmission Mechanism (MTM) of such country. However, exchange rate channels might not be as dominant in the MTM channel for a country with high domestic production capacity and that is less dependent on importation credit channels, asset price channels might play more significant role in transmitting the effect of monetary decisions to general economy.

Based on the foregoing, identification of the MTM channel through which oil price shocks affect the Nigerian economy will go a long way to translate various monetary policy decisions to economic prosperity for Nigeria.

Literatures on oil price shocks, monetary transmission mechanism and economic growth in Nigeria have been divided along three major lines. Some focused on monetary transmission mechanism and economic growth (Adeoye & Shobande, 2017*)* while the attention of some were on oil price shocks and economic growth (Akinleye & Stephen Ekpo, 2013). However, there are few studies that combined oil price shocks and monetary transmission mechanism in Nigeria. These few studies

like Omolade, Nwosa and Ngalawa (2017) and Omojolabi (2014) focused on the effects of oil price shocks and monetary transmission mechanism effects on the manufacturing sector and macroeconomic indicators respectively and not the economic growth of Nigeria. Notwithstanding, there are other studies outside the country with similar focus but not on Nigeria where oil is the mainstay of the economy (Cheng, 2006).

Consequently, the major objective of the study is to investigate the relationship among monetary transmission mechanism, oil price shocks and Nigerian economic growth. Other sub-sections of the paper are the literature review, methodology, results and discussion conclusions and recommendations.

2. Literature Review

Some discussions on the existing literature review having been done under the introduction notwithstanding, this aspect of the paper discusses in detail the existing and related literatures. As it was explained previously, related literatures to the study are divided along three lines. Some focused on oil price shocks and economic growth in Nigeria and an example of such studies is that of Akinleye & Ekpo, (2013) which examined the impact of oil price shocks on macroeconomic performance of Nigeria. They applied vector autoregressive estimation technique. The paper found out that both positive and negative oil price shocks influence real government expenditure only in the long run rather than in the short run, while examining positive and negative shocks to external reserves revealed stronger implications for expenditure in the long run, with positive rather than negative oil price shocks having stronger short and long run effects on real GDP and therefore triggering inflationary pressure and domestic currency depreciation as importation rises. This implies that the country exhibits the Dutch disease syndrome in the short and long run. However, results obtained show that oil revenue shocks are capable of impeding economic growth only in the long run while raising general price levels marginally in the short run after the initial shocks, with evidence of serious threat to interest rate and the domestic currency in the short and medium term, as the volume of imports increases significantly along with the external reserves. Findings on the asymmetric effects of oil revenue shocks revealed that positive shocks to oil revenue stimulate expansionary fiscal posture in the Nigerian economy in the short run in line with theory, thereby creating inflationary pressure and domestic currency depreciation. The combined implications of these discoveries suggest the need for proper coordination of fiscal and monetary policy for sustainable macroeconomic stability to be achieved.

Another related study is that of Aliyu, (2009) who investigated the relationship between oil price shocks and macro economy of Nigeria.. Granger causality tests and

multivariate (VAR) analyses were carried out using both linear and non-linear specifications. Inter alia, the latter category includes two approaches employed in the literature, namely, the asymmetric and net specifications oil price specifications. The paper foumd evidence of both linear and non-linear impact of oil price shocks on real Gross Domestic Product (GDP). In particular, asymmetric oil price increases in the non-linear models are found to have positive impact on real GDP growth of a larger magnitude than asymmetric oil price decreases which adversely affects real GDP. The non-linear estimation recorded significant improvement over the linear estimation and the one reported earlier by Aliyu (2009). Further, utilizing the Wald and the Granger multivariate and bivariate causality tests, results from the latter indicated that linear price change and all the other oil price transformations were significant for the system as a whole. The Wald test indicated that the oil price coefficients in linear and asymmetric specifications were statistically significant

From another perspective, some studies also focused on monetary transmission and Nigerian economy without reference to oil price shocks. For instance Adeoye & Shobande (2017) investigated the relationship between monetary policy transmission mechanism and macroeconomic aggregates in Nigeria. They used a structural model estimated using the Vector Error Correction (VEC) technique to determine the effect of interest rate channel of monetary transmission mechanism on the real economy variables considered. The study's findings show that money supply, expected inflation, real interest rate and exchange rate are crucial for any meaningful economic growth, suggesting that manipulation of these variables is essential for the effectiveness of monetary policy in Nigeria. In all, the study recommended that effectiveness of monetary policy through the manipulation of interest rate and exchange rate is essential for stability in the economy

The third divisions in the literature are the studies that focused on the two that are monetary transmission mechanism and oil price shocks. An example is the study of Omolade, Nwosa, & Ngalawa (2019) who investigated the relationship between oil price shock, monetary transmission mechanism and manufacturing output growth in Nigeria. The study applied the structural vector auto regression (SVAR) modeling technique and descriptive analysis. The results of the study showed that the exchange rate was mostly affected by the oil price shock, while the monetary policy instruments and inflation rate were also very responsive to the exchange rate shock. The manufacturing sector output growth has also been shown to be strongly affected by the inflation rate and monetary policy shocks. The study revealed the most effective channel via which oil price shocks affect manufacturing output. The exchange rate channel of the monetary policy transmission mechanism is the most significant channel through which oil price shock affects manufacturing output growth in Nigeria. This shows that effective management of the exchange rate policy via the appropriate monetary policy approach can be used to minimize the adverse effect of oil price shocks on Nigerian manufacturing output.

Another related study in this direction is that of Omojolaibi (2014) who investigated crude oil price dynamics and transmission mechanism of the macroeconomic indicators in Nigeria. The technique of estimation used in this study was the structural vector autoregressive type. This method was applied to articulate the transmission mechanism of macroeconomic effects of domestic price level, economic output, money supply and volatile crude oil price in Nigeria. The study sample covered the period between 1985 and 2010. The data used were on a quarterly basis. The results of both the impulse response functions and the forecast error variance decompositions indicated that domestic shocks were responsible for a reasonable portion of crude oil price fluctuations. Although crude oil price volatility has significant positive impacts on economic output, money supply shocks are the main cause of gross domestic product fluctuations. This study concluded that crude oil price has very important impact on the Nigerian economy and the monetary policy is the channel through which this impact transmits.

Considering all these studies, it is obvious that the studies of Omolade etal (2019) and that of Omojolaibi (2014) are the most related to this study however, while Omolade focused on their impacts on manufacturing sector, Omojolaibi (2014) concentrated on macroeconomic aggregates. The implication is that the transmission mechanism of oil price shocks to the Nigerian economic growth in particular was not given utmost preference in the two studies. Again, Omojolaibi (2014) used ordinary VAR and not Structural VAR; this might not be able to capture the existence of contemporaneous responses among the variables in the structural model.

3. Methodology

From the literature it is obvious that the most prevailing methodology used in explaining shock transmission is the Vector Auto-Regressive (VAR) Models. This study also adopts VAR but with special reference to the Structural formulation of the model which makes SVAR more appropriate for this study. Notwithstanding, the endogenous growth theory particularly the Romer (1994) model serves as a precursor for the model used in this study; In the definition of money demand function using the ISLM model, Romer (1994) postulated a relationship between inflation, money growth and interest rate in such a way that demand for real money balance is a decreasing function of interest rate and increasing function of real income. That is:

$$\frac{M}{P} = L(r, y) \tag{1}$$

This can be written in linear form thus:

$$\frac{M}{P} = \alpha y - \beta r. \tag{2}$$

Therefore:

$$\alpha y = \frac{M}{P} + \beta r \quad (3)$$

Dividing both sides by α leads to:

$$y = 1/\alpha \left(\frac{M}{P}\right) + \alpha/\beta(r) \quad (4)$$

Where $1/\alpha$ and α/β are elasticities of real money balance and interest rate respectively. The expression in equation 4 leads to the evolvement of the SVAR model variables which are described as follows.

3.1. The SVAR Model

The objective of this paper is achieved through the formulation of VECM/VAR model. The VAR model is estimated using five endogenous variables, namely, the economic growth (GDPGR), and the monetary policy channels namely Inflation rate (INF) proxy for prices channel, Interest rate (INT) for interest rate channel, Money Supply (MS) monetary policy instrument, Exchange rate (EXR) for exchange rate channel, and Balance of payment (BOP) for balance of payment channel and net domestic credit (NDC) for credit channel. However, there is one exogenous variable which is the World oil prices (WOP).

The structural equation is described in equation 5:

$$Y_t = B(L)Y_t + C(L)X_t + \mu_t \quad (5)$$

where:

$$Y_t = [GDPGR, INF, INT, EXR, MS, BOP, NDC] \quad (6)$$

$$X_t = [WOP, \quad] \quad (7)$$

where Y_t are domestic variables (endogenous variables) such that; GDPGR, INF, INT, EXR, MS,BOP and NDC. The exogenous variable X_t is WOP .

Equation (6) is a vector of the Nigerian domestic (endogenous) variables used in the study; and equation (7) represents the vector of exogenous variable that control external shocks and changes in world demand. $B(L)$ is a matrix polynomial lag that captures the relationship between the endogenous variables. $\mu_t = {B_o}^{-1} Z\varepsilon_t$ is a vector of random disturbances.

Furthermore, due to the vulnerability of long run restrictions to serious misspecification problems, we use a contemporaneous restriction on theB_0 matrix to identify the shocks as shown in equation 8 since this study is interested in short-run and medium term responses (Elbourne, 2009; Cheng 2006).

$$\begin{bmatrix} v_t^{WOP} \\ v_t^{BOP} \\ v_t^{NDC} \\ v_t^{INT} \\ v_t^{MS} \\ v_t^{EXR} \\ v_t^{INF} \\ v_t^{EG} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ B_{21}^0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ B_{31}^0 & 0 & 1 & 0 & 0 & 0 & 0 & B_{38}^0 \\ B_{41}^0 & 0 & B_{43}^0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & B_{53}^0 & B_{54}^0 & 1 & B_{56}^0 & 0 & 0 \\ B_{61}^0 & B_{62}^0 & 0 & 0 & B_{65}^0 & 1 & B_{67}^0 & 0 \\ B_{71}^0 & B_{72}^0 & B_{73}^0 & B_{74}^0 & B_{75}^0 & B_{76}^0 & 1 & 0 \\ 0 & 0 & 0 & 0 & B_{85}^0 & B_{86}^0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{WOP} \\ \mu_t^{BOP} \\ \mu_t^{NDC} \\ \mu_t^{INT} \\ \mu_t^{MS} \\ \mu_t^{EXR} \\ \mu_t^{INF} \\ \mu_t^{EG} \end{bmatrix} \quad (8)$$

There are eight variables in the SVAR model as described in equations 6 and 7 above. The restriction imposition follows that of Cheng (2006),(Elbourne & de Haan, 2009).

3.2. Generalized Impulse Response Function for SVAR

The generalized impulse response function refers to the reaction of any dynamic system in response to some external shocks or changes. In a SVAR framework, the impulse response function traces out the reaction of the endogenous variable to shocks to each of the other individual variables. To assist this study, the impulse response function is used to investigate the relationships among oil price shocks, monetary transmission mechanism and economic growth in Nigeria. The process through which the shocks transmit in the economy is the focus in our context and the cumulative impulse response function to help in the interpretation of the overall effects of shock upon dependent variable in a given period. According to Stock & Watson (2001) the analysis of the impulse response function traces out the effects of a one-unit shock to a variable's error term on the dependent variables that made up the SVAR model. Den Haan, Sumner, & Yamashiro (2011) identify three types of structural shocks as; productivity shock, preference shock and monetary policy shock. According to their definition, "the impulse response function gives the J^{th}-period response when the system is shocked by a one-standard-deviation shock through a sequence of shock and alternative series of shocks". Impulse response function can be analyzed in different ways but this study follows the multivariate extension of factorization technique of the Cholesky Orthogonalisation approach as it is consistent with previous studies of (Cheng, 2006) that are related to this study.

3.3. Variance Decomposition for VAR/VECM

This is another application of multivariate time series analysis that is used in the interpretation of SVAR and is known as Forecast error variance decomposition (FEVD). It explains how each variable contribution to other variables in a regression model by determining the rate at which the forecast error variance of each variables

is explained by the exogenous shocks to other variables and further consider the portion of the observed variation that is attributed to the orthogonalised shock in a variable. According to Stock and Watson (2001) the variance decompositions explain the fraction of the observed variable that can either be ascribed to that variable been affected by shock or that of another endogenous variable. The application of this analysis will assist in analysing the behaviour of the Nigerian economy or that of the Central Bank when used together with the impulse-response function.

3.4. Diagnostic Testing

In this study, further tests are carried out to check for stability test, serial correlation and heteroskedasticity of the model.

3.4.1. Serial Correlation and Heteroskedasticity Test

The bench mark null hypotheses that are tested for the serial correlation and heteroskedasticity test are:

$H_0: \alpha = 1$, no serial correlation and heteroskedasticity in the model.

$H_1: \alpha < 1$, there is serial correlation and heteroskedasticity in the model.

Serial correlation means similarity between observations as a function of the time lag between variables. It is a mathematical tool for finding repeating patterns, such as the presence of a periodic signal obscured by noise, or identifying the missing fundamentals in frequencies. Heteroskedasticity on the other hand refers to the circumstance in which the variability of a variable is unequal across the range of values of a second variable that predicts it.

3.4.2. Stability Test

Based on the Recursive Chow test, the benchmark for the SVAR model is expected to be stable over the sample period. The graphical CUSUM and CUSUM of squares tests are used to determine whether the model is stable or not. At 5% confidence interval, the benchmark hypotheses to be tested are:

$H_0: \alpha = 1$, the model is stable.

$H_1: \alpha \neq 1$, the model is non-stable.

3.5. Sources of data

The data for the variables in the SVAR model are extracted quarterly since studies have shown that VAR estimates are better with high frequency data. Precisely, data on net domestic credit, exchange rate, inflation rate, money supply and economic growth are sourced form the World Bank Tables, (2019 edition). Data on balance of payment are sourced from the Central bank Statistical bulletin, 2019 edition and the data on oil price are sourced from the OPEC database.

4. Results and Discussions

This aspect of the paper presents and interprets the empirical results. Also, these results are discussed and inferences made. The results' analysis begins with the unit root test which is necessary for application of the SVAR as all the variables must be stationary. The result is presented in table 1

Table 1. Augmented Dickey Fuller Unit Root Test

Variable	T Statistics	Order of Integration
GDPGR	-3.902883	I(0)
EXR	-3.593419	I(1)
INF	-4.155450	I(1)
INT	-3.149723	I(1)
LMS	-4.648306	I(1)
LNDC	-4.715514	I(1)
BOP	-3.394719	I(0)
WOP	-3.115960	I(1)

Source: Author's Computation, 2020

Table 1 shows that all the variables are stationary. This is the major requirement for the application of SVAR. While two variables, namely GDPGR and BOP, are stationary at levels that are integration of order zero I(0) the remaining variables are stationary after the first difference that is integration of order one I(1). The implication is that all the variables are stationary between I(1) and I(0).

4.1. SVAR Results

The results of the SVAR are presented and interpreted using the impulse response functions and the variance decomposition table. The results of the impulse response functions are presented as follows.

4.1.1. Impulse Response Functions

The impulse response functions explain the reactions or the responses of variables to one percent standard deviation in another variable which is called the shock variable. The impulse response function of oil price being the only exogenous variable in the VAR model is presented in figure 1.

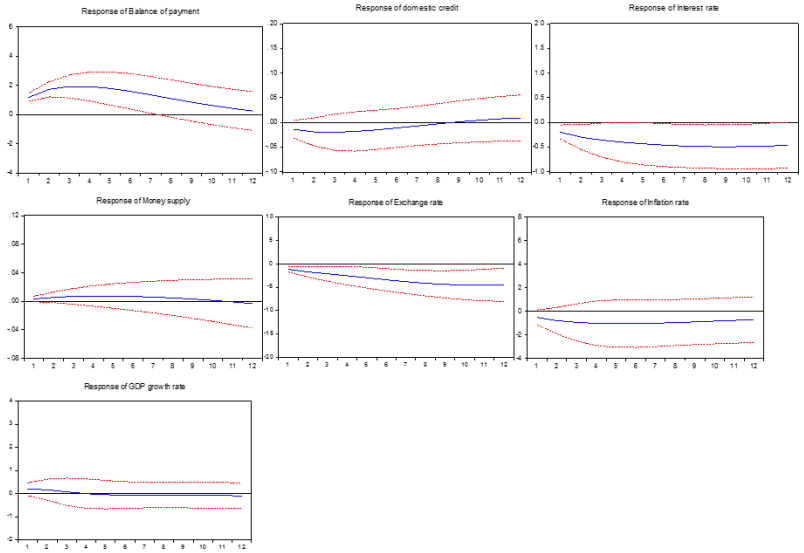


Figure 1. Responses to Oil Price Shocks
Source: Author's Computation

Results in figure 1 show the responses of the variables in the MTM to 1% standard deviation in oil price. It is clear that not all the variables respond significantly to oil price shocks, for instance, balance of payment, interest rate and exchange rate are the most responsive to oil price shock in the MTM while domestic credit, general price level (Inflation) and GDP growth rate fail to respond significantly. The oil price shocks cause the exchange rate to appreciate and BOP to rise while the interest rate falls thus confirming existence of "Dutch Disease" in the country (Roemer, 2015). The implication of this result is that the monetary policy channel (interest rate channel), exchange rate channel and the balance of payment channel are the most responsive to oil price shocks.

The study also investigated the response of the economy through the GDP growth rate to the shocks of the MTM. In other words, the next analysis explored the responses of the GDP growth rate to each of the channels in the MTM.

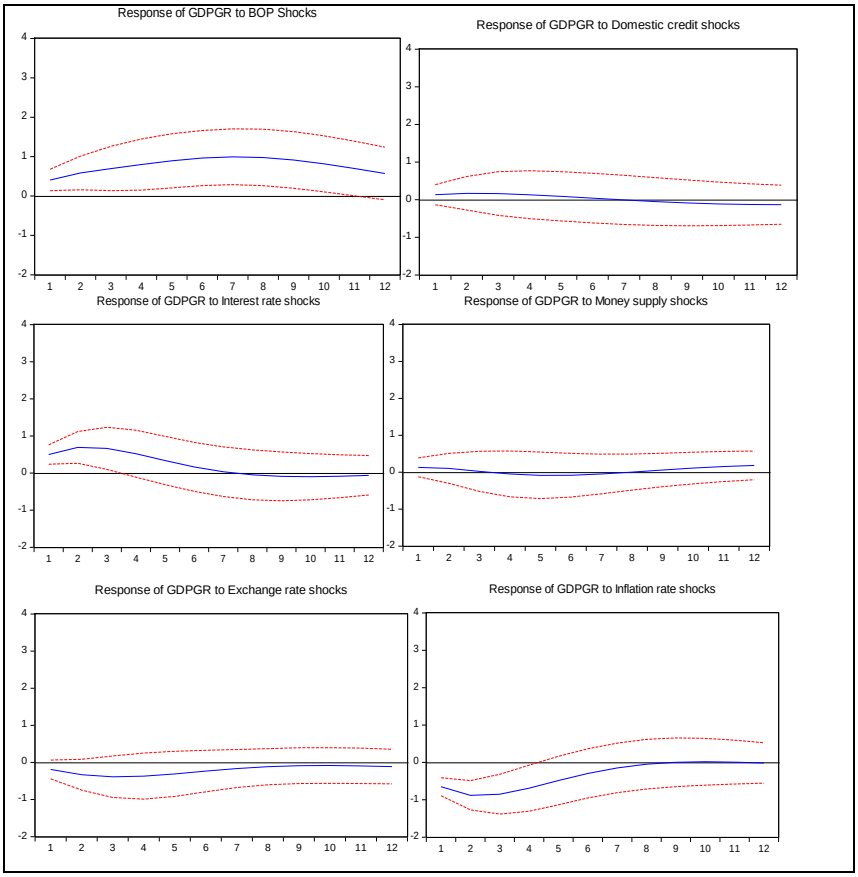


Figure 2. Response of GDP growth rate to the MTM channels shocks
Source: Author's Computation

Figure 2 explains the responses of the economy to each of the channels in the MTN. the GDP growth rate which is the proxy for the economy responds significantly to three channels in the MTM namely; the balance of payment, interest rate and price channels (inflation). It is evident from the figure that the GDO growth rate responds positively and significantly to balance of payment shocks. It should be noted that balance of payment is one of the channels that respond significantly to oil price shocks too. This is an indication that balance of payment (BOP) is an important channel through which oil price shock transmits into the economy. The results shows that whenever there is a 1% standard deviation in the BOP, GDP growth rate responds positively to the shock. This result is in tandem with the findings of Onyeiwu (2012) who concluded that due to high level of import-dependent ratio of Nigeria as a country balance of payment is an important factor that determines the country's economic performance.

Monetary policy channel that is the interest rate channel is one of the MTM channels that is significantly affected by oil price shocks. Similarly in figure 2, results have shown that it is also one of the MTM channels that have significant influence on the economy. The reason for this is because GDP growth rate responds significantly to interest rate shocks. It causes the GDP to rise initially but later falls for the largest part of the period. The implication is that a sudden upsurge in the interest rate can have significant negative influence on economic growth of Nigeria. This is the same conclusion of Mishkin (2007) that monetary policy interventions or shocks are capable of affecting the economic growth of Nigeria significantly.

The price channel is another channel that affects the economy significantly. The response of GDP growth rate to 1% standard deviation in the general price level is significant. It caused the GDP growth rate to fall. This implies that a sudden upsurge in the general price level is capable of causing the GDP growth rate to fall significantly. It should be noted that the price channel failed to respond significantly to oil price shocks but it is an important shock that affects the economy. The reason for this is explained under the variance decomposition.

4.1.2. Variance Decomposition

The variance decomposition explains the contributions of each structural shocks to the behavior of a particular variable. The share of each shock among the total shocks affecting the behavior of a particular variable is explained by the variance decomposition table.

Table 2. Variance Decomposition of GDP Growth Rate

PERIODS	WOP	BOP	LNDC	INT	LMS	EXR	INF	GDPGR
3	0.544373	7.485836	0.551487	8.837652	0.216930	2.237878	14.52657	65.59928
6	0.384189	16.54002	0.494033	7.808713	0.220503	2.875338	13.42551	58.25170
9	0.372060	26.38813	0.472715	6.859710	0.217995	2.716593	11.80965	51.16315
12	0.424399	30.55705	0.626480	6.484628	0.488324	2.648422	11.02197	47.74873

Source: Author's Computation, 2020

Table 2 shows the distributions of shocks as they affect the economy during the period under review. The results show that apart from the own shock balance of payment, inflation and monetary policy shocks are the largest contributors to the behaviors of GDP growth rate. The implication of this is that the economy's behavior is affected by these three shocks mostly among the structural shocks in the SVAR model. In that sequence exchange rate is the next contributor of shocks to the GDP

growth rate. It is again seen that oil price directly does not directly contribute much shocks to the behavior of GDP growth rate but through the MTM channels such as interest rate, price, balance of payment and exchange rate channels.

As earlier shown in the impulse response functions that inflation does not respond significantly to oil price shocks, the economy responds significantly to inflation shocks. The reason behind this is explained in the next variance decomposition table.

Table 3. Variance Decomposition of Inflation Rate

PERIODS	WOP	BOP	LNDC	INT	LMS	EXR	INF	GDPGR
3	1.885230	0.053875	0.969692	0.348012	2.063700	6.182733	88.24359	0.253164
6	2.485977	0.125284	0.658003	0.283057	3.705723	12.52993	79.73200	0.480035
9	3.202780	0.193550	0.552121	1.601048	4.080429	17.44405	72.50145	0.424569
12	3.716791	0.294186	0.521537	3.807351	4.048167	18.60451	68.56009	0.447374

Source: Author's Computation, 2020

Table 3 shows the behavior of inflation rate and the shocks that are responsible for its behavior. From all the structural shocks, exchange rate and money supply shocks are the most influential shocks in the analysis of the shocks that affect inflation rate in Nigeria. This is a pointer to the fact that inflation rate behavior in Nigeria is highly connected to the changes in exchange rate. Thus, findings again are similar to the conclusions from Omolade, Ngalawa and Kutu, (2019) where they identified the nature of inflation in Nigeria to be more of imported type due to the fact that Nigeria is highly dependent on importation and hence any shocks to exchange rate affects the domestic prices of goods and services in Nigeria significantly. The transmission channels of shocks from exchange rate to the economy appear to be clearer from the variance decomposition. Exchange rate channel is one of the MTM channels that respond to oil price shocks. While inflation rate behavior is significantly affected by exchange rate shocks the economy in turn responds significantly to inflation rate shocks.

4.2. Diagnostics

Some tests are carried out to analyze the validity of the estimated SVAR results and to further examine reliability of the results. These tests are discussed as follows

Table 4. Breusch-Pagan-Godfrey Test for Heteroscedasticity

F-statistic	0.367258	Prob. F(16,15)	0.9724
Obs*R-squared	9.007232	Prob. Chi-Square(16)	0.9131
Scaled explained SS	1.647357	Prob. Chi-Square(16)	1.0000

Source: Author's Computation, 2020

The null hypothesis is that there is no heteroscedasticity. Using the F statistics, it is discovered that the probability of F shows that the null hypothesis is accepted. Therefore, it is concluded that the model is homoskedatisctic which further supports the validity of the estimated results

Table 5. Breusch-Godfrey Serial Correlation Test

Null Hypothesis : No Serial-Correlation			
F-statistic	1.336783	Prob. F(2,13)	0.2965
Obs*R-squared	5.458497	Prob. Chi-Square(2)	0.0653

Source: Author's Computation, 2020

The null hypothesis of no serial correlation is accepted form table 5. This is because F-statistics probability is greater than 5%. Consequently, the estimates from our SVAR model are valid

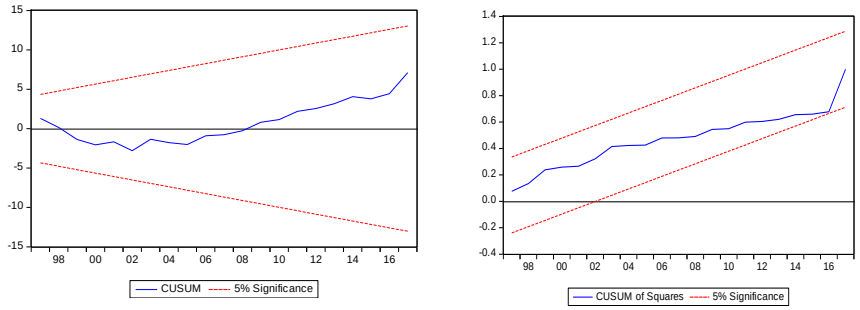


Figure 3. Stability Test.
Source: Author's Computation

The stability test indicates that the model is reliable (that is, the model does fall within the red lines) and does not suffer from any structural break. This is an indication that the estimated SVAR model exhibits the stability required for a model that will be useful for empirical inference.

5. Conclusions and Recommendations

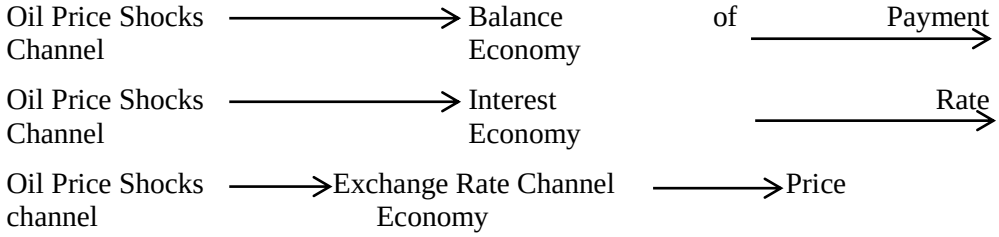
Based on the findings from the SVAR analysis, some germane conclusions are made about the relationships between oil price shocks, MTM and the Nigerian economic growth.

Firstly, it was revealed in the analysis that oil price shocks affect the channels in the MTM differently. While some channels in the MTM are significantly responsive to oil price shocks, some are not. For instance, balance of payment channels. Monetary policy channel (interest rate) and exchange rate channels are the most responsive to the oil price shocks in Nigeria. This implies that whenever there is oil price sudden surge or fall, these channels in the MTM react more significantly to the shocks.

Secondly, it is concluded from the study as well that the economy responds differently to shocks from the MTM. For instance, it is evident from the results that balance of payment, interest rate and general price level shocks have the greatest influence of the economic activity in Nigeria more than other shocks in the MTM. This implies that GDP growth rate of Nigeria which is the proxy for the economy is highly influenced by these channels in the MTM.

Thirdly, this study has also shown that the effect of oil price shocks on domestic price level in the economy is not direct. The exchange rate shocks have the highest influence on the domestic price level in Nigeria despite the fact that inflation rate does not respond significantly to oil price shocks but it does to exchange rate shocks and the economy responds significantly to inflation shocks. This sequence of reactions is inflation that both exchange rate and price channels are important in transmitting the shocks form oil price to the domestic economy.

Finally. The chains of transmission of oil price shocks to the Nigerian economic growth are explained in the following diagram.



The diagram above explains the transmission of oil price shocks to the domestic economy in Nigeria. It is clear from the conclusion that oil price shocks effect on the domestic economy in Nigeria is not automatic but goes through some chains of reactions to affect the growth of the economy.

The policy implication and recommendation of these conclusions are that the negative effect of oil price shocks for instance on the economy can be mitigated by

the monetary authority via any of the policy that affects the identified channels which are most responsive to the oil price shocks. For instance, if the oil price falls which will have negative implications on the Nigerian economy as an oil dependent country, effort of the monetary authority can be targeted towards the interest rate by following expansionary monetary policy to stimulate investment in the real sector of the economy in order to boost domestic output. It should be noted that all these channels can be accommodated within one policy framework to mitigate the negative effect of the oil price shocks and not treating one channel at a time in isolation of others.

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