

MONETARY POLICY AND OIL REVENUE IN NIGERIA: PRE AND POST EFFECT ANALYSIS

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ABSTRACT

The study investigates the effect of monetary policy on oil revenue in Nigeria taking into cognizance the particular effect of the switching from minimum rediscount rate (MRR) to monetary policy rate (MPR) which took effect from December 11, 2006. The time series data the study employ to examine the pre-adoption effect spanned from 1996 – 2005, while data for post-adoption effect covered the period from 2008 – 2017. The data are collected on Oil Revenue, Minimum Rediscount rate, Money supply (M2), Treasury bill rate, Exchange rate and Monetary Policy rate. All data are sourced from the Central Bank website and Statistical Bulletin, 2016. The OLS technique is employed in analyzing the data and the result indicates that both MRR and MPR had insignificant negative effect on ORV. Although when the pre-adoption investigation was carried out, MNS had significant positive impact on ORV but in the post-adoption test conducted, the result was significantly negative. It is an indication that MPR is not any better than the MRR. Therefore, the study recommends that more strict measures be taken by the Monetary Authority in the Country to review the baseline interest rate which helps to determine money supply. This will help to curtail the negative effect of money supply on oil revenue.

Keywords: Monetary policy, minimum rediscount rate, monetary policy rate, money supply, Oil Revenue

INTRODUCTION

Monetary policy is a major tool used in every nation's economy to checkmate the flow of currency in order to prevent excess money in circulation. CBN (2006) defined monetary policy as the definite actions by the Central Bank to regulate the value, supply and cost of money in the economy to ensure that the government's macroeconomic objectives are achieved.

In Nigeria, oil revenue contributes so much to the nation's economy. Oil revenue is

derived from the activities of oil and gas industries that operate in Nigeria, through their oil pipeline license fees, royalty on oil extraction, rent on oil wells, gas flaring penalty, sale of petroleum and gas (ATSWA, 2009). Monetary policy affects all facets of the nation's economy in terms of spending responsibilities and revenue sources (which oil revenue forms the major part of it). Invariably, changes in monetary policies pose the problem of having either adverse or favourable effect on the economy at large.

Prior to 2007, Minimum Rediscount Rate (MRR) was a major monetary policy tool the Central Bank of Nigeria used in determining the lending rate to other banks. The introduction and adoption of Monetary Policy Rate (MPR), which served as the replacement for MRR, took effect from December 11, 2006 (CBN, 2006).

CBN made use of MRR to anchor short term interest rate in the financial system in Nigeria. MRR was design to give direction to interest rate and monetary policy, yet it failed to achieve the objectives despite several adjustments made to it between 1999 and 2005 by the Monetary Policy Committee (MPC) to align with the prevailing monetary conditions. The problem could be attributed to the liquidity challenges the banking system encountered over the years which led to the ineffectiveness of MRR in transmitting monetary policy in Nigeria, hence the introduction of MPR on assumption that better monetary policy result could be achieved (CBN, 2016).

Therefore, this study is focused on examining the effect of selected monetary policy tools on oil revenue, both before and after the adoption of Monetary Policy Rate (MPR). The specific objective will be to investigate the effect of monetary policy

measured by Minimum Rediscount Rate (MRR), Money Supply (MNS i.e. M2), Treasury Bill Rate (TBR) and Exchange Rate (EXR) on Oil Revenue (ORV) prior to the adoption of MPR.

The time series data to test the pre effect will be from 1996 to 2005. Secondly, the effect of monetary policy on oil revenue will be investigated using the Monetary Policy Rate, Money Supply, Treasury Bill Rate and Exchange Rate to determine the post effect after the adoption of MPR. The time series data to test the post effect will be from 2008 to 2017. Central Bank has a good number of monetary policy instruments, but the ones selected for this study influence oil revenue in Nigeria directly and are relevant to the study.

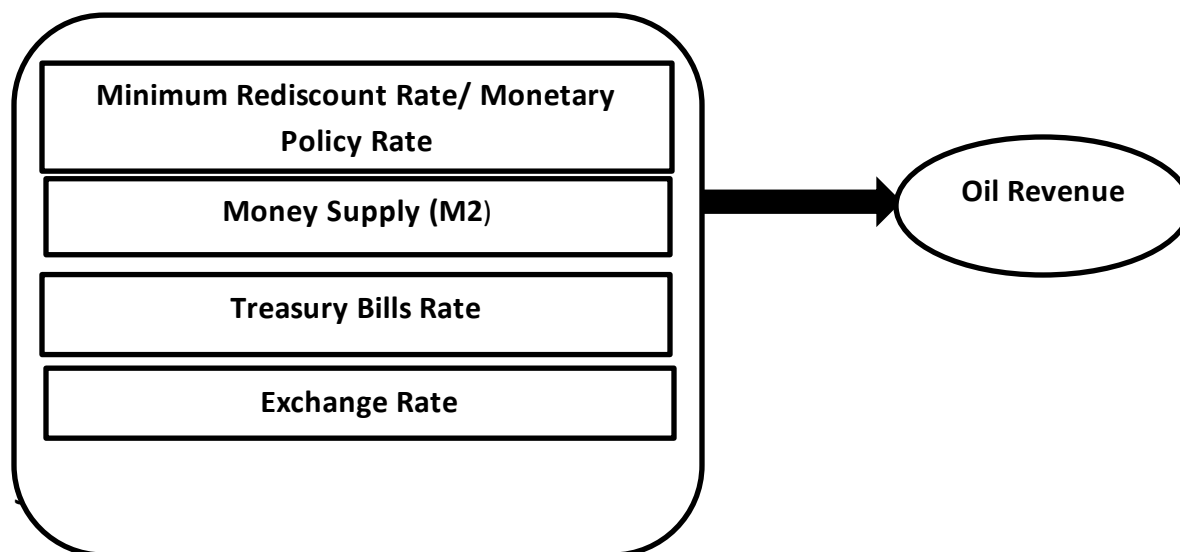
HYPOTHESES

Ho1: Monetary policy measured by MRR, MNS, TBR and EXR do not have significant impact on Oil Revenue in Nigeria (ORV).

Ho2: Monetary policy measured by MPR, MNS, TBR and EXR do not significantly influence ORV in Nigeria.

CONCEPTUAL FRAMEWORK

This figure below depicts how monetary policy affects oil revenue.

FIGURE 1: THE EFFECT OF MONETARY POLICY ON OIL REVENUE**MONETARY POLICY**

Monetary policy denotes any deliberate action or conscious effort made by the Central Banks or Monetary Authorities of a nation to control the quantity, availability or cost of money in an economy with the view of achieving set goals (CBN, 2016). From the above definition, monetary policy can be described as a blend of methods and integrated procedures used by Central Banks to normalize the value and quantity of money in circulation in an economy while making sure the desired level of economic activity is maintained. The effort to regulate money cost and availability by Monetary Authorities of nations is an attempt to curb the problem of inflation. Other macroeconomic objectives monetary policy is designed to achieve include: low unemployment, high output growth rate and stable exchange rate (Musa, Usman & Zoramawa, 2014; Omitogun & Ayinla, 2007). As opined by Chipota & Palesa (2014), monetary policy objective is also to sustain balance of payment equilibrium, ensure price stability and promote economic growth.

MONEY SUPPLY (MSS).

Money is anything of value that is generally acceptable by the public for the purpose of making transactions and settling debts. It is beyond just currency (notes or coins) but includes other things used for transactions (CBN, 2016). Therefore, money supply is the sum of all money or monetary assets that can be easily converted to cash at a specific time period in an economy. According to CBN (2011), it is the amount of money that is available to the economy at any point in time. In Nigeria, it is measured by:

- 1) Monetary base (that is cash reserves Deposit Money Banks (DMBs) have with CBN;
- 2) Narrow money (that is all currencies in circulation and demand deposits) which households and businesses have with DMBs;
- 3) Broad money (M2) which comprises narrow money, time deposits and saving deposits with DBMs (CBN, 2016).

MONETARY POLICY AND OIL REVENUE

The receipts from crude oil sales form a major part of government revenue. The receipts are in USD and it takes the CBN to convert them to Naira before transferring same to the federation account for allocation to the three tiers of the government and others. This monetization of crude oil receipts in USD affects money supply and of course exchange rate plays a major role too. Exchange rate of the naira determines the worth of a particular receipt from crude oil sales in naira. If naira appreciates, it means the receipt from oil revenue shared will fall, while reverse is the case when naira depreciates. The CBN, through its monetary policy, employs all strategies to ensure that the shared revenue does not trigger inflation due to the possibility of having excess money supply. Therefore money supply is put under strict check to avoid excess flow of money in the economy (CBN, 2016).

EXCHANGE RATE (EXR)

Exchange rate is the price of one currency in terms of another currency (The Economic Times (TET), 2018). Exchange rate targeting refers to the fixing of the value of a domestic currency in respect of another low inflation currency. It helps to keep inflation under control (CBN, 2011). Exchange rates can be fixed or floating. Fixed exchange rates are decided by Monetary Authority of a nation while the floating exchange rates are determined by the market forces of demand and supply (TET, 2018).

TREASURY BILLS RATE (TBR)

Treasury bills are short-term money market securities issued by government with maturities of one year or less. They are sold at a discount and mature within 3 to 12 months from the date of issue. The bills serve as the benchmark risk-free instrument

in the money market as they are guaranteed by government. They provide the government with a highly flexible and relatively cheap means of borrowing cash, and are issued through a competitive bid auction (CBN, 2013). Treasury bill rates are market determined following interest rate deregulation in Nigeria.

MINIMUM REDISCOUNT RATE (MRR)

MRR is the official interest rate of the CBN, which anchors all other interest rates in the money market and the economy (CBN, 2006). The decision of CBN on the MRR affects the level of economic activities and prices in the country through a number of channels. Whenever CBN comes up with a decision to change MRR, market interest rate is affected in diverse ways. For instance, financial assets such as stocks and exchange rates will be affected, thereby influencing the expectations of people and economic agents. People are encouraged to save whenever the interest rate increases, foreigners spend more to buy the local currency and foreign goods become cheaper (CBN, 2006).

MONETARY POLICY RATE (MPR)

MPR is the baseline interest rate set by the Central Bank on which every other interest anchors (Duffy, 2017). In Nigeria, MPR was used to replace MRR for a more effective monetary policy result. The MPR controls the amount of money in circulation at any given time. When it increases, money supply shrinks, and expands when it is reduced. The prevailing economic condition of a nation must be carefully studied and considered by the Central Bank before a particular monetary policy measure is applied (Duffy, 2017).

THEORETICAL REVIEW

THE MONETARIST VIEW OF MONETARY POLICY

The monetarist view of monetary policy is modern school of thought in monetary policy developed by Friedman and Schwartz (1963). This school of thought is different from the classical macroeconomics, but a relevant version of the quantity theory of money which focused on the supply of money as the key factor affecting the well-being of a nation's economy. The view encourages effective monetary policy which is capable of stabilizing an economy. Friedman and Schwartz (1963) believes that the sustenance of a steady economic growth rate depends on the growth of money supply at fixed interest rate (e.g. monetary policy rate) which should not be altered by the monetary policy regulatory authority (Central Banks of nations). Friedman equally argued that since money supply might be demanded for reasons other than estimated transactions, it can be held in various forms such as money, bonds, equities, physical goods and human capital. Each form of this wealth has a unique characteristic of its own and a different yield. These effects will ultimately increase aggregate money demand and expand output.

EMPIRICAL REVIEW

Syed, Faisal, and Nasir (2011) examined the comparative effect of fiscal, monetary and trade policy on the economy of Pakistan using co-integration and time error correction model. The study made use of time series data that covered a period from 1981 to 2009. Money supply, government expenditure and trade openness were used to measure monetary, fiscal and trade policy respectively. The study focused on evaluating the conflict concerning the relative relevance and effectiveness of three policies (monetary, fiscal and trade) in

Pakistan. The co-integration result proved that both monetary and fiscal policy had significant and positive effect on economic growth while trade policy effect is insignificant. However, the coefficient of monetary policy was greater than the fiscal policy which suggested that monetary policy had more impact on economic growth than fiscal policy in Pakistan. The implication of the study is that the policy makers should focus more on monetary policy than fiscal to improve economic growth. The role of fiscal policy may be more effective for augmenting economic growth by eradicating graft, revenue leakages and improper use of resources. The study recommended a suitable blend and synchronization of both monetary and fiscal policy. However, this study failed to investigate the effect of other monetary and fiscal policy tools on the economy for a better comparison.

Chipote and Palesa (2014) used Johansen Co-integration and the Error Correction Mechanism to investigate the impact of monetary policy on economic growth in South Africa. The study covered a period from 2000 to 2010. The predictor variables employed were money supply, repo rate, consumer price index and exchange rate while the dependent variable was gross domestic product (GDP). The result of the study showed an evidence of a long run relationship among the variables. However, the findings revealed that money supply, repo rate and exchange rate had insignificant impact on GDP while the influence inflation exerted was significant. The policy implication is that inflation is caused by excess money supply and monetary policy of a nation should be able to put inflation under control to avoid negative effect on the economy.

Musa, Usman, and Zoramawa (2014) analyzed the long and short run relationship between money supply and revenues in Nigeria. The study employed co-integration approach using two different functional forms, one showing the effect of money supply on revenue and the other depicting the effect of revenue on money supply. The study made use of time series data from 1970 to 2010. When money supply was made the dependent variable, the result indicated that government revenue had a positive and significant impact on money supply. On the contrary, when government revenue was made the response variable, the result revealed no evidence of an existence of a long run relationship between money supply and revenues comprising both oil and non-oil. The study concluded that government revenue (both oil and non-oil) drives money supply in Nigeria, which in turn helps to improve the economy.

Ekwe, Amah, and Omodero (2017) examined the impact of monetary policy on the economy of Nigeria using time series data from 1996 to 2016. Monetary policy in Nigeria determines the amount of credit available to the private sector and broad money supply that could be in equilibrium with the level of economic activities in the country. The study made use of broad money supply (M2) and credit to private sector (CPS) to measure monetary policy while the response variable was the gross domestic product (GDP). The findings from the regression analysis revealed that both the money supply and the credit to private sector had no impact on the economy. The result is an indication that, though monetary policy is meant to improve the economy through credit availability at low interest rates to private sectors, but in Nigeria,

businesses are strangled due to high interest rates.

Srithilat and Sun (2017) investigated the impact of monetary policy on economic development of Lao People's Democratic Republic (PDR) using annual time series data from 1989 to 2016. The problem of high fluctuation of inflation and dollarization became a usual phenomenon following the change in policy from centrally planned economy to market oriented economy in 1986. Therefore, monetary policy in Lao PDR faced a lot of constraint which made it incomplete and ineffective. The study made use of Johansen Co-integration and Error Correction Model to analyze the effect of money supply, interest rate, inflation and exchange rate on the real GDP per capita. The findings revealed that exchange rate had a positive effect, while the other predictor variables had negative effect on the real GDP per capita.

GAP IN LITERATURE

Syed et al. (2011) investigated the comparative effect of fiscal, monetary and trade policy on the economy of Pakistan. The study used only money supply to measure the effect of monetary policy, but failed to put into consideration, the effect of interest rates which directly affects money supply (Duffy, 2017). Although, the study of Syed et al. (2011) found evidence that monetary policy in Pakistan has significant positive effect on the economy, on the contrary, the study of Chipota and Palesa (2014) carried out in South Africa found a conflicting evidence that monetary policy insignificantly influence GDP.

Musa et al. (2014) focused on the effect of monetary policy on government revenue and vice versa. The findings revealed that monetary policy did not have positive

relationship with government revenue when used as the predictor variable.

The study of Ekwe et al. (2017) revealed that monetary policy exerted negative influence on GDP. This is supported by the study of Srithilat and Sun (2017) where the findings revealed that all the monetary policy tools (money supply, interest rate and inflation) used had negative effect on GDP except exchange rate which exerted positive effect on GDP.

This research is focused on the effect of monetary policy on oil revenue in Nigeria with particular emphasis on the pre and post effect of the monetary policy changes in Nigeria. The study wishes to examine the effect of MRR and other selected monetary policy instruments on oil revenue before the adoption of MPR, then, thereafter the effect of MPR in conjunction with other tools since after the adoption. This is the existing gap the present study is planned to fill which none of the studies reviewed above considered.

Model Specification

This study wishes to investigate the effect of monetary policy on Oil Revenue in Nigeria before and after the adoption of MPR. The research design for this study is the ex-post facto, since it is based on historical data. The study covers a period from 1996 to 2005 which is prior to the adoption of MPR and the post adoption period from 2008 to 2017. The time series data have been gathered from the CBN website and statistical bulletin.

To achieve the objective of this study, the econometric model adopted is as follows:

$$ORV = f(MRR, MNS, TBR, \& EXR) \dots\dots\dots (1)$$

The categorical form of equation (1) above is symbolized as follows:

$$ORV = \alpha + \beta_1MRR + \beta_2MNS + \beta_3TBR + \beta_4EXR + \mu$$

Where:

- ORV = Oil Revenue
- MRR = Minimum Rediscount Rate
- MNS = Money Supply (M2)
- TBR = Treasury Bill Rate
- EXR = Exchange Rate
- β (1-4) = Coefficient of independent variables
- μ = The Error Term

$$ORV = f(MRR, MNS, TBR, \& EXR) \dots\dots\dots (2)$$

The explicit form of equation (2) above is denoted as follows:

$$ORV = \alpha + \beta_1MPR + \beta_2MNS + \beta_3TBR + \beta_4EXR + \mu$$

Where:

- ORV = Oil Revenue
- MPR = Monetary Policy Rate
- MNS = Money Supply
- TBR = Treasury Bill Rate
- EXR = Exchange Rate
- β (1-4) = Coefficient of independent variables
- μ = The Error Term

RESULTS AND INTERPRETATIONS

The result of the study is presented in six (6) different tables. Tables 1-3 depict the effect of selected monetary policy tools on oil revenue prior to the introduction of monetary policy rate. In the same manner, the post effect is shown on tables 4-6, which is when the monetary policy rate became operational as the baseline interest rate by the Central Bank of Nigeria.

TABLE 1: MODEL SUMMARY – PRE EFFECT.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.993	.987	.976	.06198372	2.355

a. Predictors: (Constant), EXR, TBR, MNS, MRR

b. Dependent Variable: ORV

Source: Authors' Computation, 2018.

Table 1 presents a result summary of regression model generated from the relationship between ORV and the predictor variables (MRR, MNS, TBR, & EXR) in Nigeria. The R value which is 99.3% represents a strong positive relationship between the dependent (ORV) and the independent

(MRR, MNS, TBR, & EXR) variables. The R^2 value of 98.7% connotes that only 1.3% of the changes in ORV cannot be explained by the input variables captured in the model. The Durbin-Watson of 2.355 is within the acceptable limit, showing existence of no auto-correlation.

TABLE 2: ANOVA – PRE EFFECT.

Model		Sum of Squares	Df	Mean Square	F-test	Significance level.
1	Regression	1.432	4	.358	93.189	.000
	Residual	.019	5	.004		
	Total	1.451	9			

a. Dependent Variable: ORV

b. Predictors: (Constant), EXR, TBR, MNS, MRR

The joint result reflected by F-test value of 93.189 (p -value = $0.000 < 0.05$) indicates that the explanatory variables jointly influence the oil revenue (ORV) in Nigeria. The result

also signifies that the model is a good fit and statistically significant at 95% level of confidence.

TABLE 3: COEFFICIENTS – PRE EFFECT.

Model		Unstandardized Coefficients		Standardized Coefficients Beta	T-test	Significance level.
		B	Std. Error			
1	(Constant)	4.140	.890		4.653	.006
	MRR	-1.654	.794	-.230	-2.082	.092
	MNS	.851	.114	.674	7.492	.001
	TBR	-.307	.382	-.088	-.803	.458
	EXR	-.660	.146	-.400	-4.538	.006

a. Dependent Variable: ORV

Source: Authors' Computation, 2018.

The table 3 above, shows the result of the individual performance of the predictor variables as they affect the oil revenue. The result reveals that MRR (p-value = 0.09 > 0.05; t-test = -2.082) and TBR (p-value = 0.46 > 0.05; t-test = -0.803) have insignificant negative effect on ORV. The result also shows that EXR has a significant negative influence (p-value = 0.00 < 0.05; t-test = -4.538) on ORV. On the contrast, MNS exerts significant and positive influence (p-value = 0.00 < 0.05; t-test = 7.492) on ORV.

Considering the results that emerged under the pre-effect condition, the Ho1 is accepted in the case of MRR, TBR, and EXR but is rejected in the case of MNS. These findings agreed with Syed et al. (2011) who found that money supply had positive influence on economic growth in Pakistan. On the contrary, the findings of Musa et al., (2014); Ekwe et al., (2017) disagreed with this result because using money supply as a predictor variable, the result was negative both in relationship and impact.

TABLE 4: MODEL SUMMARY – POST EFFECT.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.956	.914	.845	.12062285	2.460

a. Predictors: (Constant), EXR, MPR, MNS, TBR

b. Dependent Variable: ORV

Source: Authors' Computation, 2018.

The result on table 4 shows that R is 95.6% which indicates the existence of a very

strong and positive relationship between the ORV and the input variables (MPR, MNS,

TBR, and EXR). The coefficient of determination (denoted by R^2) is equal to 91.4%, implying that the proportion of the variance in the response variable (ORV) is predictable from the predictor variables (MPR, MNS, TBR, and EXR). The result

revealed that only 8.6% variations of ORV in Nigeria are not explained by the model used in this study. The Durbin-Watson of 2.460 indicates there is no auto correlation to show concern for.

TABLE 5: ANOVA – POST EFFECT

Model		Sum of Squares	Df	Mean Square	F-test	Significance level.
1	Regression	.769	4	.192	13.222	.007
	Residual	.073	5	.015		
	Total	.842	9			

a. Dependent Variable: ORV

b. Predictors: (Constant), EXR, MPR, MNS, TBR

Source: Authors' Computation, 2018.

The pool result represented by F-test is 13.222 ($p\text{-value} = 0.007 < 0.05$). This shows that MPR, MNS, TBR and EXR jointly and significantly influence ORV. It also indicates

that the regression analysis model applied for the study predicts the changes in the ORV significantly well at 5% level of significance.

TABLE 6: COEFFICIENTS – POST EFFECT

Model		Unstandardized Coefficients		Standardized Coefficients	T-test	Significance level.
		B	Std. Error			
1	(Constant)	5.003	2.124		2.355	.065
	MPR	-1.453	.957	-.635	-1.518	.190
	MNS	-2.371	.372	-1.277	-6.373	.001
	TBR	1.818	.683	1.071	2.659	.045
	EXR	4.058	1.187	.634	3.418	.019

a. Dependent Variable: ORV

Source: Authors' Computation, 2018.

From table 6 above, MPR has an insignificant negative influence on ORV ($p\text{-value} = 0.19 >$

0.05 ; $t\text{-test} = -1.518$). The MNS equally has a significant negative effect on ORV ($p\text{-value} =$

0.00 < 0.05; t-test = -6.373). On the contrast, both TBR and EXR significantly and positively impact on ORV (p -value = 0.045 < 0.05; t-test = 2.659 and 0.019 < 0.05; t-test = 3.418 respectively). From the result on table 4.6, the H_02 is accepted in MPR and MNS while it is rejected in TBR and EXR. These results are in agreement with the findings of Srithilat and Sun (2017) who examined the impact of monetary policy on economic development of Lao PDR and found evidence that money supply, interest rate and inflation had negative influence on GDP except exchange rate that showed positive effect on GDP.

DISCUSSION ON FINDINGS

The common characteristics among the results of this study is that both the Minimum Rediscount Rate (MRR) and its replacement which is the Monetary Policy Rate (MPR) do not have positive influence on Oil Revenue (ORV). The results indicated that both of them had insignificant negative impact on oil revenue, which represents over 70% of the government revenue in Nigeria. According to Duffy (2017), increase/decrease in interest rates, affects money supply directly. The monetarist view of monetary policy by Friedman and Schwartz (1963) believed that the sustenance of a stable economic growth rate hinges on the growth of money supply at a fixed interest rate (e.g. monetary policy rate) which should not be varied by the Central Banks of nations. The expectation of the CBN is to see a better monetary policy result emanating from the change from MRR to MPR (CBN, 2016). From the regression result of this present study, the original aim is not achievable unless there could be some other measures in the future to realize the objectives.

RECOMMENDATION AND CONCLUSION

The findings of this study is something that deserves a critical attention. Perhaps the Monetary Authority in the country will consider it wise to review the MPR and come up with improvement to drive the economy better. Stability of exchange and interest

rates is very crucial and important since the oil revenue that goes to the Federation account for sharing (CBN, 2016) drives money supply in the country (Musa et al., 2017). From the view of Friedman (1963), the Central Bank of Nigeria should design monetary policies that could sustain growth of money supply at a more favourable fixed interest rate which will help the country have a stable economic growth.

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