# Effect of Monetary Policy on Financial Intermediation in Nigeria

## Chukwu, Kenechukwu Origin[1*] and Ogbonnaya-Udo, Nneka[1*]

[1]*Department of Banking and Finance, Nnamdi Azikiwe University, 5025, Awka,*
*Anambra State, Nigeria.*

*Authors' contributions*

*This work was carried out in collaboration between both authors. Author CKO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author OUN managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.*

*Original Research Article*

## ABSTRACT

The study examined the effect of monetary policy on financial intermediation in Nigeria. Secondary data were collected from Central Bank of Nigeria statistical bulletin spanning from 1988 to 2018.The research work selected Nigeria as its sample and used the VECM to test the effect of the explanatory variables (Monetary Policy Rate, Cash Reserve Ratio, Loan to Deposit Ratio and Liquidity Ratio) on the dependent variable (Total Domestic Bank Credit).The findings from the study revealed that monetary policy has insignificant effect on intermediation in Nigeria. The granger causality test also shows a unidirectional causality between monetary policy and intermediation in Nigeria. The results suggest that lending interest rate is still high while deposit rate is low and this discourages savings and borrowing in the country. The study recommends among others that monetary policy should be reviewed in order to lower the cost of borrowing (lending rate) so as to encourage investors to borrow more. Commercial banks should try to increase its deposit rates which will help them to mobilize more deposits, as this will enhance their lending services. Financial infrastructure in the country should be improved upon as this will help banks in deposit mobilization especially the unbanked in the country.

_____

*Corresponding author: Email: Ko.mojekwu@unizik.edu.ng, na.ogbonnaya-udo@unizik.edu.ng;*

## 1. INTRODUCTION

Intermediation is taken to mean the process of transferring savings from one section of the economy to the other for a value; this could be either for consumption or investment purposes. Financial intermediation can function effectively when the operators, financial instruments and financial institution function together with the sole objective of fostering economic development in the country [1].

Financial intermediaries are institutions that act as the middlemen between two parties in channelling savings or capital from savers to investors for economic growth. Financial intermediaries such as banks, savings & loan institutions, insurance companies, brokerage firms, credit unions, mutual and pensions' funds provide such services to the consumers. For financial intermediation to take place an efficient and highly developed financial system that will help in the circulation of capital in the economy is needed [2]. Financial intermediaries offer an average consumer; safety, liquidity and economies of scale which presents cost advantages to enterprises such as investment and asset management obtain due to their scale of operation.

The financial intermediation process begins with mobilization and allocation activities in money and capital market by financial institutions by utilizing financial instruments such as savings, securities and loans. In any given economy the efficacy of the financial intermediation is dependent on the extent at which a country's financial system is developed. Invariably, the financial systems that are not developed in some developing countries gives rise to inefficiency of financial intermediation in those economies [3]. Majority of such countries, the financial system is, in general shallow and narrow and unable to intermediate efficiently in the mobilization and allocation of resources for productive investment. In these countries and those in transition, the financial system is dominated by banks, which are normally oligopolistic in structure and tend to concentrate on short-term lending as against investments with long-term gestation period. The alternative source for financing developmental projects is the development and growth of debt or equity markets which at best, is at the elementary stage of development. It is on this note that specialized financial institutions,

including government owned development banks have been established in most of those countries to bridge the gap. In the long-run, the development of capital market institutions remains critical to the promotion of economic development and growth [4].

This process of financial intermediation stimulates investment, oil domestic trade as well as international trade and balance of payments. In playing this significant role of financial intermediation and the need to avoid financial intermediaries from making bad investment or investing in risky projects, operative of monetary policy is needed in the economy. Monetary policy action is the prerogative of the central bank and monetary authorities. It involves the process of controlling the cost, value, and availability of money and credit in other to achieve the desired level of prices, employment, output, and other economic objectives.

Monetary policies played an indispensable role in Nigeria's economy by regulating and stabilizing the volume of money in circulation in order to create an enabling environment for investment, which will foster economic development. Today, the impact of monetary policy has wider implication. Effective monetary policy is needed in the economy. The question therefore is to find out if monetary policy limits or helps in intermediation in Nigeria.

The debate over the effect of monetary policy instruments on financial intermediation in Nigeria remains a contradictory issue and as such the major gap this study tends to fill is by using price-based monetary policy tools to find out how effective these tools are in controlling aggregate total domestic credit in the economy. This work therefore aims at finding out the effect of monetary policy instruments on financial intermediation in Nigeria. The sections of this work are as follows: literature review; theoretical framework and empirical review of related works. Others are methodology and data presentation; discussions, conclusion and recommendations.

## 2. LITERATURE REVIEW

According to the CBN [5], monetary policy directs the Central Bank's supply of money so as to attain the objectives of price stability (or low inflation rate), full employment, and increase in aggregate income. This is essential because

money is a means of exchange and changes in its demand relative to supply, thereby requiring spending modification. Monetary policy has been defined as a policy which deals with the discretionary control of money supply by the monetary authorities in order to achieve stated or desired economic goals; or as an attempt to influence the economy by operating on such variables as the quantity of money and the price of interest [2]. Generally, monetary policy refers to a combination of actions intended to control the value, supply and cost of money in an economy in accordance with the expected level of economic activity [6].

The Central Bank of Nigeria is the organ that is in charge for the conduct of monetary policy in Nigeria. Monetary policy can either be expansionary or contractionary, depending on the general policy drive of the monetary authorities. Monetary policy is expansionary when the policy adopted by the Central Bank increases the supply of money in the system and contractionary, when the activities taken on decreases the quantity of money supply available in the economy or limits the growth or capability of the deposit money banks to grant additional credit [7].

Monetary policy controls the availability and cost of money in the economy. In order to ensure monetary stability, the central bank through the deposit money banks implements policies that assures the orderly growth and development of the economy through proper change in the level of money supply. The reserves of the banks are influenced by the Central Bank through different instruments of monetary policy. These instruments include the cash reserve requirement, liquidity ratio, open market operations and primary auction of treasury bills. Also, the Central Bank employs the discount window operations to control the movement of bank reserves. These activities influence the banks in their credit operations and thus control the price and accessibility of loanable funds. Hence the financial markets provide an important channel for the implementation of monetary policy. An efficient and well organised market will then improve the speed of monetary policy transmission. The instrument of monetary control in Nigeria can be direct and indirect while direct instrument of monetary policy permits Central Bank to direct Deposit Money Banks on the utmost percentage or amount of loans (credit ceilings) to different economic sectors or activities, interest rate limits, liquid asset ratio

and issue credit guarantee to preferred loans. Through this means the available savings is allocated and investment directed in particular directions as wanted by the authorities.

Indirect monetary instruments includes i, Open market operations ii, reserve requirements iii, money supply iv, Discount windows v, monetary policy rate vi, exchange rate vii, Prudential Guidelines viii, Moral suasion.

**Money supply:** Onoh [8] explained that money supply is the accumulation of money in an economy and entails Narrow and broad monies, $M_1$ and $M_2$ respectively, which can be created either from the liabilities column or assets column of the monetary balance sheet. The $M_1$ signifies the total currency in circulation and demand deposits while the $M_2$ represents $M_1$ plus savings deposit, time deposits and other liabilities such as foreign currency deposits. A reserve requirement is used by the Central Bank to manipulate the level of bank reserves and thus, their capacity to grant loans. Reserve requirements are lowered in order to free reserves for banks to grant loans and thus raise money supply in the economy. On the other hand, they are increased in order to decrease the capacity of banks to provide loans thereby reducing money supply in the economy. The reserve requirements are the Cash Reserve Ratio (CRR) and the Liquidity Ratio (LR). While the former is defined as a percentage of the total demand, savings and time deposits which banks are expected to keep as deposits with the CBN, the latter refers to the proportion of banks' liquid assets to their total deposit liabilities. The CRR and liquidity ratio have been progressively increased or decreased depending on the complementary role the monetary authority tends to achieve.

**Open Market Operation:** Ekezie [2] defined OMO as the buying and selling of government securities in the open market (primary or secondary) so as to expand or contract the quantity of money in the banking system. By acquiring securities, the Central Bank injects money into the banking system and stimulates growth but by selling securities it soak up excess money. Consequently, if there is surplus liquidity in the system, the Central Bank will in a bid to decrease the money supply sell the government securities such as Treasury Bills. In addition, in times of liquidity scarcity, the Central Bank buys government securities so as to raise the money supply. Instruments normally used for this

purpose consist of treasury bills, central bank bills, or prime commercial paper.

**Discount windows:** This instrument is services given by the Central Bank which allows the DMBs to have access to reserves against collaterals in form of government or other acceptable securities. The Central Bank manages this facility in line with its role as lender of last resort and transactions are carry out in the form of short term (usually overnight) loans. The Central Bank lends to financially sound DMBs at the policy rate. This rate stands as the bases for the interest rate regime in the money market (the nominal anchor rate) and thus influences the supply of credit, the supply of savings (which influences the supply of reserves and monetary aggregate) and the supply of investment (which affects employment and GDP).

**Monetary policy rate:** The minimum rediscount rate (MRR) was renamed the Monetary Policy Rate (MPR) in 2006 by the CBN. In this context the word, monetary policy rate (MPR) shall have similar connotation as the minimum rediscount rate (MRR), which has been in use since 1960. MPR is the fee which the Central Bank charges financial operators for rediscounting first class bills of exchange before the maturity date. Matured bills are discounted outright with discount houses.

**Moral Suasion:** Central Bank registers and license DMBs which allows them to regulate the operations of the banking system. Hence, it can persuade banks to pursue certain policies such as credit restraint or expansion, increase savings mobilization and encourage exports through financial support, which they might not do or follow, based on their risk/return assessment. The CBN adopts this approach as a means of establishing two-way communication with the banks, thereby creating a better environment for the efficiency of monetary policy. The main avenue of contact is the Bankers' Committee, which meets two-monthly. This dialogue with banks was further expanded in November 2000 to include other stakeholders comprising key government officials, financial market operators, academics, etc, under the umbrella of the Monetary Policy Forum.

## 2.1 Theoretical Framework

Two theories are considered in this study which includes the Monetarist and the Classical theory on monetary policy, but the theory for the study is centred on Classical View of monetary policy.

### 2.1.1 The monetarist theory

The Monetarist Economist recognize that money is not just a close surrogate for a small class of financial assets but rather a substitute for large spectrum of financial and real asset. Given an symmetry position, a swell in money supply raises the actual proportion of money relative to the desired proportion. Symbolically, the monetarist conception of money transmission mechanism can be summarized below: $\uparrow$OMO$\rightarrow\uparrow$MS$\rightarrow$ Spending$\rightarrow\uparrow$ GNP.

The monetarist argument centres on the aged quantity theory of money. If rate of money in circulation is constant, discrepancy in money supply will directly influence prices and output or income (GNP) [5].

### 2.1.2 The classical view of monetary policy

The classical economists' view of monetary policy is found on the quantity theory of money. The quantity theory of money is usually examined in term of fisherian equation of exchange, which is given by the expression MV = PY. In the expression, M denotes the supply of money over which the Federal Government has some control; V denotes the velocity of circulation which is the average number of times a currency is spent on final goods and services over the course of a year; P denotes the price level GDP. Hence PY represents current nominal GDP.

The equation of exchange is a characteristic which states that the current market value of all final goods and services (nominal GDP) must be equivalent to the supply of money multiplied by the average number of times a currency is used in business deal in a given year.

The classical economist considers that the economy is always at or close to the natural level of real GDP. Thus, they believe that in the short run, the Y in the equation of exchange is fixed. They further argue that the velocity of transmission of money tends to remain constant. So that V can also be considered as Fixed. Given that both Y and V are fixed, it follows that if the Central Bank of Nigeria (CBN) were to employ expansionary (or contractionary) monetary policy, it will lead to an increase (or decrease) in money supply (M), the only effect would be to increase (or decrease) the price level P, in direct proportion for the change in money supply (M). In other words, expansionary monetary policy can only lead to inflation, and

contractionary monetary policy can only lead to deflation of the price level.

## 2.2 Empirical Review

Iwedi et al. [9] explored financial intermediation development and Nigeria economic growth spanning from 1970 to 2015.The research used VAR techniques, Johansen co integration test and granger causality test in analyzing the data. Johansen co integration test shows that there is a long run equilibrium between financial intermediation development indicators and economic growth. When lagged once or twice the VAR result shows that there is a positive and negative sign and this link is insignificant particularly in the case of credit to private sector to GDP. This indicates that credits to private sector are not channelled to productive investment but are diverted to other personal uses. The result of causality shows a unidirectional causality with causation moving from financial intermediation development indicators to real GDP. The study concludes that M2 to GDP has more influence on the Nigeria economy than the credit to private to GDP.

Okoro et al. [10] did a study on financial intermediation and monetary policy effectiveness in Nigeria. The data used for the study was obtained from CBN statistical bulletin from 1995 to 2014 and analyzed using ordinary least square method. The variables used in the study were bank loans and advances, demand deposit, interest rate and cash resave ratio. The result of the analysis shows that interest rate has significant but negative effect on bank loan and advances, while cash reserve ratio has significant but positive effect on demand deposit.

Ziaul Haque [11] investigated monetary shock and bank intermediation in a dynamic stochastic general equilibrium model. Empirical studies have shown that in economies with relatively low inflation rates, output growth and money growth are correlated. The purpose of this study is to illustrate how the basic Real Business Cycle (RBC) model can be modified to incorporate money in an attempt to construct monetary business cycle model such that the dynamics of the model also give positive correlation between money shocks and output. It is observed in this model that a positive monetary shock reduces interest rates and stimulates economic activity, which is called the liquidity effect. Furthermore, the statistics generated by the model shows that monetary shocks have significant real impact

when money enters through the financial system. Taken together, this implies that how money enters into the model significantly matters for the effect of monetary shocks and such shocks entering through financial intermediaries may be important in determining the cyclical fluctuations of the U.S. economy.

Udeh [12] investigated the effect of monetary policy instruments on profitability of commercial banks in Nigeria: Study of Zenith bank experience. Published financial statements of Zenith bank Plc as well as statistical bulletin of Central Bank of Nigeria from 2005 to 2012 were used to obtain data for the analysis. Research questions and hypotheses numbering four were used for the study. Pearson Product moment correlation technique was used to analyze the data collected while t-test statistic was employed in testing the hypotheses. The result of the research indicates that cash reserve ratio, interest rate and liquidity ratio have insignificant impact on the profit before tax of Zenith Bank Plc. However, minimum rediscount rate was discovered to have significant effect on the profit before tax of the bank. The paper concluded that a good quantity of monetary policy instruments do not impact significantly on profitability of commercial banks in Nigeria.

Nwoko et al. [13] investigated the impact of Central Bank monetary policies on Nigerian economic growth for the period between 1990-2011.The impact of the independent variables which are money supply, average price, interest rate and labour force were tested on the dependent variable which is Gross Domestic Product. Statistical tool used to analyse the data was the multiple regression of ordinary least square. The result of the research shows that average price and labour force have significant impact on gross domestic product; interest rate had negative and significant impact while money supply was insignificant.

Sulaiman and Migiro [14] examined the connection between monetary policy and economic growth in Nigeria: a causality test from 1981 to 2012. The study measures economic growth using gross domestic product while monetary policy indices includes cash reserve ratio, monetary policy rate, exchange rate, money supply, and interest rate. The co-integration test result indicates that there are long run relationships between the variables used in the study. The causality test shows that there are causal relationship between monetary

policy and growth of the economy while there is no causal relationship between economic growth and monetary policy. This implied that the monetary policy transmission mechanisms contribute positively to the productivity of the Nigerian economy – thus promoting economic growth.

Baghebo and Stephen [15] investigated the effect of monetary policy on Nigeria economic growth from 1980-2011. Central Bank of Nigeria Statistical Bulletin was used to obtain data for the analysis. The independent variables were liquidity ratio, money supply and cash ratio while dependent variable is gross domestic product. The methodology used to analyze the data was the Error correction mechanism and the result indicates that monetary policy had insignificant but positive impact on Nigeria economy.

Adigwe et al. [16] explored the impact of monetary policy on economic growth of Nigeria from 1980 to 2010. Two models of multiple regressions were used in the study. In model one, the Liquidity ratios, Money Supply, Cash ratio were the explanatory variables while Gross Domestic Product (GDP) was the response variable. In model two, the Liquidity ratio, Money Supply, Cash ratio, Interest Rate and Exchange rate were the explanatory variables while Inflation rate was the response variable. The result of the analysis shows that monetary policy represented by money supply has a positive impact on GDP growth but negative impact on the rate of inflation.

Miftahu [17] studied the relationship between monetary policy and economic growth; assessing the policy nexus in Nigeria. The study uses annual time series data of 38 years (1980 – 2017) collected from statistical bulletin of Central Bank, while Johansen co-integration test and the ordinary least square regression were used in analyzing the data. The findings revealed the existence of long run relationship between monetary policy and economic growth. The short run relationship indicates that money supply has positive effect while exchange rate and interest rate have negative effect on the real GDP. As such, monetary authorities in Nigeria should adequately manage and monitor the growth level of money supply in order to achieve the needed growth level.

Osakwe et al. [18] did a study on the effect of monetary policy instruments on banking sector credits in Nigeria. Three price-based monetary policy tools was used as independent variable which includes monetary policy rate, cash reserve ratio, Treasury bill rate while liquidity ratio was also introduced as a control variable. Bank credit was used as the dependent variable. Augmented Dicker-Fuller (ADF) unit roots test, Johansson co-integration test, Vector Error Correction model and Impulse Response Function (IRF) were used to analyse the data. The finding from cointegration text revealed that there is a long run relationship between monetary policy tools and bank credit such that MPR and LIQ has significant and positive long run effects while TBR and CRR had significant but negative long run effects on bank credit in Nigeria. The Vector Error Correction Mechanism (ECM) showed that monetary policy in Nigeria is a reliable short term mechanism for controlling the banks in Nigeria vis-à-vis financial intermediation functions. The impulse response function has shown that all the monetary policy variables (MPR, CRR, TBR and LIQ) have negative effects on bank propensity to grant credit in Nigeria.

Omankhanlen [19] analyzed the effect of monetary policy on Nigerian deposit money bank System. Monetary policy rate, liquidity ratio, cash reserve ratio and average exchange rate was used as the regressors while total loans and advances was used as dependent variable. OLS regression technique test result revealed that monetary policy has statistical significant effect on commercial banks loans and advances during the period under study.

Omankhanlen et al. [20] studied the effects monetary policy has on loan risk exposure in Nigeria Deposit money banks. The ordinary least square multivariate regression of vector error correction model (VECM) framework was used for the analyses. The level of loan risk exposure of banks was the dependent variable, while liquidity ratio, cash reserve ratio, monetary policy rate, and average exchange rate were independent variables. The results showed that monetary policy has long run significant effect on bank loan risk exposure in Nigeria. Further results revealed that liquidity ratio and exchange rate has significant effects while cash reserve rate and monetary policy rate do not have significant effect on loan risk exposure of banks.

## 3. METHODOLOGY

The study employed secondary data collected from Central Bank of Nigeria Statistical Bulletin

for the period covering 1988 to 2018. The study intends to develop a model that is capable of examining how monetary policy tool affects intermediation process in Nigeria over a certain period of time.

Three price-based monetary policy tools was used as independent variable which includes monetary policy rate, cash reserve ratio, Treasury bill rate while liquidity ratio was also introduced as a control variable.

However, in order to achieve the objective of the study, the research work employed descriptive statistics to describe the variables, unit root test to determine the stationarity of the variables, Johansen Cointegration test to determine the long run relationship, Vector Error Correction Model of ordinary least squares method was used to determine the short run effect and causality test.

The study adopted and modified the model of Okoro et al. [10] who investigated the effect of financial intermediation and monetary policy effectiveness in Nigeria 1995-2014.

The original model is stated as:

$$INT= f(LOAN) \tag{1}$$

$$CRR= f(DDEP) \tag{2}$$

The model was adopted and modified below

To incorporate the specific objectives, the following models stated in functional form will be estimated:

$$TDC= f(MPR, LDR, CRR, LQR) \tag{3}$$

The mathematical form of the model and to normalise the models to avoid the possible effect of any outlier, the models were transformed in a log-linear econometric format as follows:

$$TDC = a_0 + a_1 MPRs_{it} + a_2 CRRs_{it} + a_3 LDRs_{it} + a_4 LQRs_{it} \tag{4}$$

$$TDC= a_0 + a_1 logMPRs_{it} + a_2 logCRRs_{it} + a_3 logLDRs_{it} + a_4 logLQRs_{it} + e_{it} \tag{5}$$

Where: TDC= Total Domestic Bank Credit
MPR=Monetary Policy Rate
CRR =Cash Reserve Ratio
LDR=Loan to Deposit Ratio
LQR= Liquidity Ratio

$a_0$ = Intercept of the model
$a_1 - a_6$ = Parameters of the regression coefficients
$e_{it}$ = Stochastic error term

# 4. DATA PRESENTATION AND ANALYSIS

Descriptive statistics in Table 1 explains the characteristics of the variables used in the study. Summary of descriptive statistics used in the analysis are shown in the table. The mean value was shown to be 4486.180 for TDC, 13.92742 for MPR, 8.958065 for CRR, 65.21347 for LDR and 46.28065 for LQR. The medium value was shown to be 1210.030 for TDC, 13.50000 for MPR, 8.000000 for CRR, 66.50000 for LDR and 46.00000 for LQR. The maximum and minimum of the series are 16117.20 and 19.56000 for TDC, 26.00000 and 6.000000 for MPR, 22.50000 and 1.000000 for CRR, 85.66000 and 37.97000 for LDR, 64.10000 and 29.10000 for LQR. The series standard deviations are 5534.403 for TDC, 3.956110 for MPR, 6.522973 for CRR, 12.20019 for LDR, 9.168885 for LQR. All the variables are positively skewed towards normality as shown by the positive sign of the skewness except for LDR.

The result in Table 2 indicates that no variable are stationary at level hence the need to difference the variable's to see their outcome.

The result of ADF test shown in Table 3 revealed that all the variables are stationary at first difference. This is because their respective ADF test statistics value is greater than Mackinnon critical value at 5%. In other to verify the stationnarity of the variables the research also adopted Phillips-Perron (PP) unit root test at intercept.

The result of Phillips-Perron (PP) unit root test proves that the variables are stationary at order one 1(1) which necessitated the use of Vector Error Correction Estimate (VECM) as method of data analysis.

## 4.1 Co-integration Test

The co-integration test is used in the determination of the long-run relationship that exists between variables. Table 6 shows that long-run relationship (co-integration) exists among the variables. There is three cointegrating equation which is TDC, MPR and CRR in the model. This is reflected in the trace statistic of Table 6 which shows a value greater than that of the 5% critical value respectively. With the

**Table 1. Descriptive statistics**

|  | Mean | Median | Maximum | Minimum | Std.Dev | Skewness | Kurtosis | Jarque-Bera | P-value | Obs |
|---|---|---|---|---|---|---|---|---|---|---|
| TDC | 4486.180 | 1210.030 | 16117.20 | 19.56000 | 5534.403 | 0.941512 | 2.431614 | 4.997255 | 0.082198 | 31 |
| MPR | 13.92742 | 13.50000 | 26.00000 | 6.000000 | 3.956110 | 0.629373 | 4.632288 | 5.48804 | 0.064311 | 31 |
| CRR | 8.958065 | 8.000000 | 22.50000 | 1.000000 | 6.522973 | 0.902839 | 2.846823 | 4.241755 | 0.119926 | 31 |
| LDR | 65.21347 | 66.50000 | 85.66000 | 37.97000 | 12.20019 | -0.587732 | 2.672208 | 1.923500 | 0.382223 | 31 |
| LQR | 46.28065 | 46.00000 | 64.10000 | 29.10000 | 9.168885 | 0.075959 | 2.629827 | 0.206805 | 0.901764 | 31 |

*Source: Output Data from E-views 9.0*

**Table 2. ADF result at level**

| Variables | ADF Test Statistic | 1% | 5% | 10% | Order of Integration |
|---|---|---|---|---|---|
| TDC | 1.208612 | -3.670170 | -2.969972 | -2.621007 | Non-stationary |
| MPR | -2.964371 | -3.670170 | -2.969972 | -2.621007 | Non-stationary |
| CRR | -0.352325 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| LDR | -2.863202 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| LQR | -2.904721 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |

*Source: Researcher's E-view result*

**Table 3. ADF result at 1<sup>st</sup> difference**

| Variables | ADF Test Statistic | 1% | 5% | 10% | Order of Integration |
|---|---|---|---|---|---|
| TDC | -3.742983 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| MPR | -7.919288 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| CRR | -5.232032 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| LDR | -4.525313 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| LQR | -5.880341 | -3.679322 | -2.967767 | -2.622989 | Stationary |

*Source: Researcher's E-view result*

**Table 4. PP result at level**

| Variables | ADF Test Statistic | 1% | 5% | 10% | Order of Integration |
|---|---|---|---|---|---|
| TDC | 1.594686 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| MPR | -2.946371 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| CRR | -0.352325 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| LDR | -2.863202 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |
| LQR | -2.904721 | -3.670170 | -2.963972 | -2.621007 | Non-stationary |

*Source: Researcher's E-view result*

**Table 5. PP result at 1$^{st}$ difference**

| Variables | ADF Test Statistic | 1% | 5% | 10% | Order of Integration |
|---|---|---|---|---|---|
| TDC | -3.575049 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| MPR | -7.919288 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| CRR | -5.232032 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| LDR | -4.525313 | -3.679322 | -2.967767 | -2.622989 | Stationary |
| LQR | -5.880341 | -3.679322 | -2.967767 | -2.622989 | Stationary |

*Source: Researcher's E-view result*

**Table 6. Presentation of Johansen co-integration result**

| Eigen Value | Trace Statistic | 5% Critical Value | Prob. ** | Hypothesized no. of CE(s) |
|---|---|---|---|---|
| 0.692374 | 90.86609 | 69.81889 | 0.0004 | None* |
| 0.610698 | 57.85771 | 47.85613 | 0.00044 | At most 1* |
| 0.503026 | 31.44249 | 29.79707 | 0.0320 | At most 2* |
| 0.338262 | 11.86440 | 15.49471 | 0.1636 | At most 3 |
| 0.010784 | 0.303596 | 3.841466 | 0.5816 | At most 4 |

*Source: Output Data from E-views 9.0*
*\*(**) denotes rejection of hypothesis @ 5% and (1%) Significant level*
*L.R. test indicates 3co-integrating equation @ 5% significant level*

**Table 7. Normalized long-run coefficient based on Johansen test**

| Dependent Variable TDC | | | | |
|---|---|---|---|---|
| C | CRR | LDR | LQR | MPR |
| -516.6801 | -1210.366 | -90.45380 | 531.8493 | 814.9432 |
| | (161.792) | (96.3984) | (112.507) | (253.616) |
| | [-7.48100] | [0.93833] | [4.72725] | [3.21329] |

*Source: Output Data from E-views 9.0*

existence of long run relationship, there is need to analyze normalized long run coefficients based on Johansen test. The result of the normalized coefficients shown in Table 7 shows a long-run effect between monetary policy and intermediation in Nigeria.

**Note:** Standard errors in ( ) and t- statistic in [ ].** implies significant at 1% level of significant.

In long run cash reserve ratio and loan to deposit ratio have positive effect on total domestic credit while liquidity ratio and monetary policy rate have negative effect on total domestic credit.

The coefficients of CRR, LQR and MPR are statistically significant at the 1% level.

**Conclusion:** The null hypothesis of no cointegration is rejected against the alternative of cointegrating relationship in the model.

The non-stationary of data series and the cointegration of the vector variable in the equations lead to the execution of the second phase of the Engle-Granger technique which is Vector Error Correction Estimate (VECM). The equation represents the short run behaviour and the adjustment to the long-run model. The

residual from the co-integrating regression lagged one period was used as error correction mechanism in the dynamic equation.

## 4.2 Long-run Relationship

The result in Table 8 shows that all the explanatory variables except cash reserve ratio have positive effect on total domestic bank credit (TDC) in the long-run. Also, all the variables are statistically significant at 5% level. It is evident from the result that MPR (monetary policy rate), LDR (loan to deposit ratio) and LQR (liquidity ratio) have positive and statistically significant effect on intermediation in Nigeria. A one percent increase in these measures of monetary policy leads to a positive change in the long-run intermediation by 1677.22 percent, 505.221 percent and 654.47 percent respectively. On the other hand, the result reveals a negative relationship between CRR (cash reserve ratio) and TDC (total domestic bank credit) in Nigeria. A one percent increase in CRR (cash reserve ratio) leads to a reduction in the long-run TDC (total domestic bank credit) by 1264.86 percent. This entails that the closer the gap between Loan to Deposit Ratio, the better for long-run intermediation in Nigeria.

## 4.3 Short-run Relationship

The result from Table 9 shows that MPR (monetary policy rate) and LDR (loan to deposit ratio) are positive and statistically insignificant related to short-run TDC (total domestic bank credit) in Nigeria while LQR (liquidity ratio) is positive and statistically significant to TDC (total domestic bank credit) in Nigeria. Also CRR (cash reserve ratio) has negative and significant effect on TDC (total domestic bank credit). A one per cent increase in MPR (monetary policy rate), LDR (loan to deposit ratio) and LQR (liquidity ratio) lead to positive change in total domestic bank credit by 73.10667 percent, 9.072209

percent and 54.54529 percent respectively. On the other hand, one percent increase in CRR (cash reserve ratio) leads to negative effect on short-run total domestic bank credit by 222.7017 percent.

The magnitude of the error-correction term reveals the change in intermediation per period that is attributable to the disequilibrium between the actual and equilibrium levels. The reported speed of adjustment is negative and statistically significant with a coefficient of -0.087577 indicating that about 8.76% of adjustment to the equilibrium level of total domestic bank credit occurs annually in Nigeria. In other words, the speed of adjustment implies that, about 8.76% of the disequilibrium in total domestic bank credit will be corrected annually for the long-run relationship to be established.

## 4.4 Diagnostic and Stability Tests

Before drawing conclusions/policy inference from the estimated regression, it is important to perform residual diagnostic and stability tests to ascertain the validity of the underlying assumptions. The diagnostic tests of VEC Residual Serial Correlation LM Tests, VEC Residual Normality Tests and VEC Residual Heteroskedasticity Tests were conducted while the stability test of inverse roots of AR characteristic polynomial was estimated.

### 4.4.1 VEC residual serial correlation LM tests

To test for serial correlation among the residuals, the LM test was conducted and the results are shown in Table 10.

The result showed that there is absence of serial/autocorrelation among the residuals since the null hypothesis of no serial or autocorrelation is accepted at 0.05 level of significance for both lags 1 and 2.

**Table 8. Long-run parameters of VECM normalized on TDC**

| Parameters | Coefficient | Standard Error | t-statistic |
|---|---|---|---|
| TDC(-1) | 1 | - | - |
| MPR(-1) | 1677.217 | 222.366 | 7.54294 |
| CRR(-1) | -1264.863 | 137.249 | -9.21583 |
| LDR(-1) | 505.2096 | 76.0577 | 6.64245 |
| LQR(-1) | 654.6991 | 110.806 | 5.90850 |
| C | -82177.47 | 9069.67 | -9.06069 |

*Source: Output Data from E-views 9.0*
*TDC = -82177.47 + 1677.22MPR − 1264.86CRR + 505.21LDR +654.47LQR*

**Table 9. Short-run dynamic estimates of VECM normalised on TDC**

| Parameters | Coefficient | Standard Error | t-Statistic |
|---|---|---|---|
| $\Delta$TDC(-1) | 0.603359 | 0.17284 | 3.49082 |
| $\Delta$MPR(-1) | 73.10667 | 60.5980 | 1.20642 |
| $\Delta$CRR(-1) | -222.7017 | 95.6626 | -2.32799 |
| $\Delta$LDR(-1) | 9.072209 | 23.3324 | 0.38882 |
| $\Delta$LQR(-1) | 54.54529 | 25.0383 | 2.17847 |
| ECM(-1) | -0.087577 | 0.03177 | -2.75633 |

*Source: Output Data from E-views 9.0*
*Adjusted R-squared = 0.267760; F-Statistic = 3.047762*

**Table 10. VEC residual serial correlation LM tests**

| Lags | LM-Stat | Prob |
|---|---|---|
| 1 | 11.44745 | 0.9905 |
| 2 | 15.70861 | 0.9232 |
| Probs from chi-square with 25 df. | | |

*Source: Output Data from E-views 9.0*

**Table 11. VEC residual Heteroskedasticity tests**

| Joint test | | |
|---|---|---|
| Chi-sq | df | Prob. |
| 187.0035 | 180 | 0.3448 |

*Source: Output Data from E-views 9.0*

**Table 12. VEC residual normality tests**

| Component | Jarque-Bera | df | Prob. |
|---|---|---|---|
| 1 | 5.057404 | 2 | 0.0798 |
| 2 | 1.284124 | 2 | 0.5262 |
| 3 | 3.225682 | 2 | 0.1993 |
| 4 | 1.622428 | 2 | 0.4443 |
| 5 | 0.104833 | 2 | 0.9489 |
| Joint | 11.29447 | 10 | 0.3350 |

*Source: Output Data from E-views 9.0*

**4.4.2 VEC residual heteroskedasticity tests**

To test for heteroskedasticity among the residuals, the Levels and Squares joint test was conducted and the results is presented in Table 11.

The joint test of the VEC residual heteroscedasticity test show that there are equal variances among the residuals in the VAR model given that the probability value of the test statistic (Chi.sq) is greater than 0.05 which implied the acceptance of the null hypothesis of absence of heteroskedasticity.

**4.4.3 VEC residual normality tests**

The normality test was done using the Jarque-Bera Normality test, which requires that for a series to be normally distributed; the Jarque-Bera statistics would not be significant. This implies

that the p-value of the normality test table should be greater than the chosen level of significance to accept the Null hypothesis, that the series is normally distributed.

The result of the normality test shown in Table 12 shows that the probability value of the individual variables are 0.0798, 0.5262, 0.1993, 0.4443 and 0.9489 for TDC, MPR, CRR, LDR and LQR respectively is greater than 0.05%. The joint probability for all the variables was shown to be 0.3350 and is greater than 0.05%. Based on that however we accept $H_0$ and reject $H_1$. We then conclude that the residuals are normally distributed and random.

**4.4.4 Stability test**

The stability of the VAR model was investigated using the inverse roots of AR characteristic polynomial presented in Fig. 1.
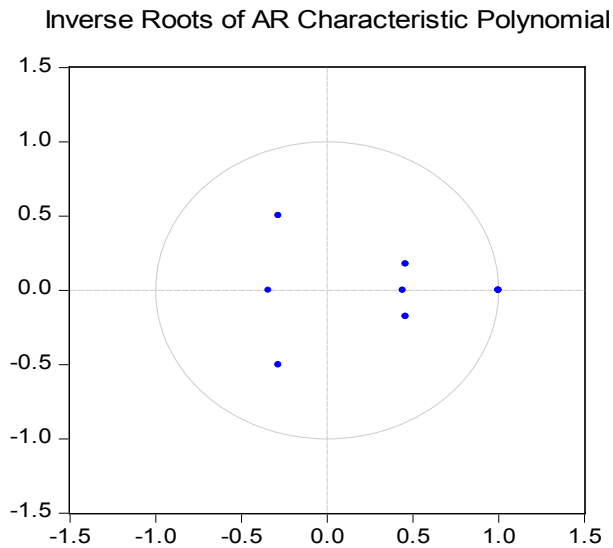
Inverse Roots of AR Characteristic Polynomial



**Fig. 1. Inverse root of AR characteristics polynomial**
*Source: Graphs Using E-view Statistical Package, Version 9*

**Table 13. Pairwise granger causality test on input variables (CRR) and (TDC)**

| Hypothesis | | | F-statistics | Probability |
|---|---|---|---|---|
| A | $H_0$: - | CRR does not Granger Cause TDC | 0.59331 | 0.5604 |
| | $H_1$: - | CRR does Granger Cause TDC | | |
| B | $H_0$: - | TDC does not Granger Cause CRR | 3.51755 | 0.0457 |
| | $H_1$: - | TDC does Granger Cause CRR | | |

*Source: Granger Causality test result*

**Table 14. Variance decomposition of ASI model 1**

| Period | S.E. | TDC | MPR | CRR | LDR | LQR |
|---|---|---|---|---|---|---|
| 1 | 914.4492 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 1591.101 | 92.33433 | 1.327430 | 3.689097 | 2.645260 | 0.003882 |
| 3 | 2063.698 | 90.82614 | 1.944086 | 2.194348 | 4.517401 | 0.518021 |
| 4 | 2453.411 | 87.99146 | 2.150080 | 2.017296 | 6.663132 | 1.178027 |
| 5 | 2780.207 | 85.32974 | 2.069095 | 2.500468 | 8.330419 | 1.770278 |
| 6 | 3062.795 | 83.33714 | 1.961363 | 2.986479 | 9.499734 | 2.215284 |
| 7 | 3314.809 | 82.06295 | 1.862621 | 3.293414 | 10.28251 | 2.498505 |
| 8 | 3545.396 | 81.30245 | 1.784632 | 3.430482 | 10.80842 | 2.674011 |
| 9 | 3761.161 | 80.82015 | 1.730211 | 3.483723 | 11.17426 | 2.791653 |
| 10 | 3965.764 | 80.47886 | 1.691488 | 3.503654 | 11.44942 | 2.876577 |

*Source: Extracted from e-views 9 output data on variables of study*

The result shows that the VAR is relatively stable since all dots are within the circle except one of it that is exactly on the circumference of the circle. The reverse would be the case if the dots lie outside of the circled region.

## 4.5 Variance Decomposition

In this study variance decomposition was used to show which of the variables of monetary policy most influences intermediation in Nigeria within the period of the study. The results of the variance decomposition estimates of TDC in Table 12 indicates that loan to deposit ratio shock explain about 11% of the variation in TDC in the $10^{th}$ period. This is followed by cash reserve ratio, liquidity ratio and monetary policy rate which explains about 3.5%, 2.8% and 2.1% changes in TDC in the $10^{th}$ period and $4^{th}$ period respectively, while about 92% of future changes in TDC are explained by present TDC.
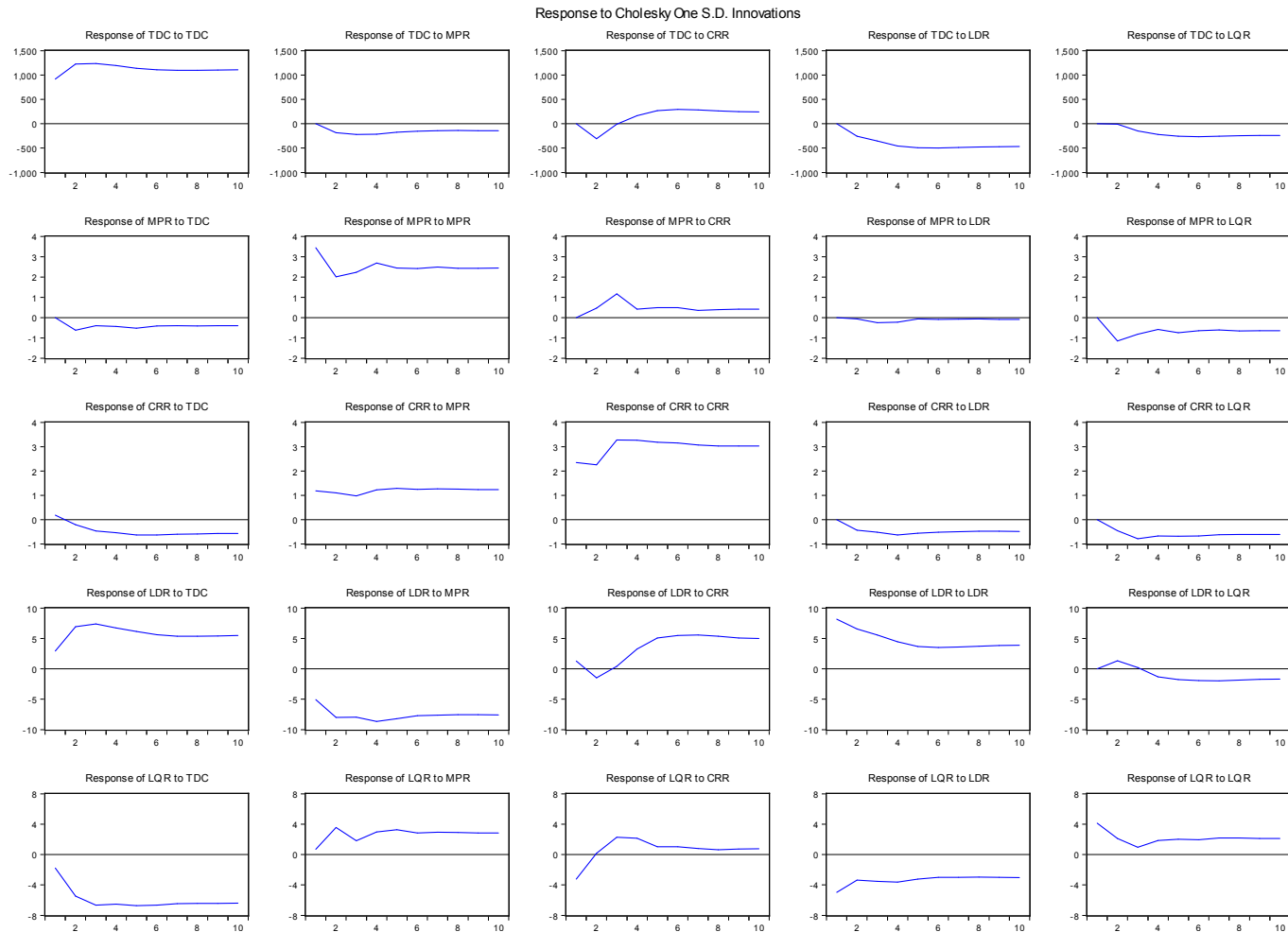
**Fig. 2. Impulse response function of TDC to shocks in MPR, CRR, LDR and LQR**

## 4.6 Impulse Response Function

Impulse response functions trace the effect of a shock emanating from an endogenous variable to the other variables in the VECM. It traces the responses of the system variables to one standard deviation shocks and to the system innovations spanning over the thirty one (31) years. The impulse response function for the model is analyzed in Fig. 2.

Fig. 2 shows that loan to deposit ratio and cash reserve ratio have the highest shock impact on TDC among the variables. The effect of loan to deposit ratio impulses is negative on TDC from $2^{nd}$ to $10^{th}$ period while making its full impact on the $5^{th}$ and $6^{th}$ period. Accumulated impulse response functions shows that loan to deposit ratio and liquidity ratio impact the highest shock on TDC among other variables making its full impact from third period to the tenth period. LDR has a negative effect on TDC from the $2^{nd}$ period to the $10^{th}$ period. LQR and MPR have a negative effect on TDC from $2^{nd}$ to $10^{th}$ period while CRR has a negative effect from $2^{nd}$ period to $4^{th}$ but positive effect from $5^{th}$ to $10^{th}$ period.

## 4.7 Granger Causality Test

The work tested the causality of the variables studied on the dependent variable TDC using granger causality test. The output data shown in Table 13 revealed that there exist a unilateral causality between Total Domestic Bank Credit (TDC) and Cash Reserve Ratio (CRR) with causality moving from TDC to CRR. Since the probability value in the Table is less than 5% and the F-statistic is greater than the F-tabulated, therefore, we reject the Null Hypothesis ($H_0$) and accept the Alternate Hypothesis ($H_1$).

## 5. SUMMARY, CONCLUSION AND POLICY IMPLICATION

### 5.1 Summary and Conclusion

Central bank through the use of monetary policy controls movement of bank reserves which affects banks in their credit operation and thus influence the cost and availability of loanable funds in the economy. This influences financial intermediation in the country as such there has been a question in the country whether the monetary policy of Central bank encourages or discourages intermediation in the country. Empirical exploration on this topic in Nigeria remains a contradictory issue and is based on that, the study tends to find out the effect of price base monetary policy on intermediation in Nigeria from 1988 to 2018.Characteristics of the data series was explained using descriptive statistics, after that unit root was establish in order to determine the stationarity of the variables. The unit root shows that the variables where integrated at order one (1) and the co-integration test shows the existence of cointegrating equation as such VECM vector error correction mechanism (VECM) was used in analysing the data. The structural analysis was carried out and the result shows that loan to deposit ratio impacts more on intermediation in Nigeria. But the impact is negative which shows that bank's deposits are shrinking or not increasing meaning that there is lower interest income resulting in lower earnings.

The finding of this study is consistent with the study of Iwedi et al. [9], Udeh [12] and Baghebo and Stephen [15] who found insignificant effect between monetary policy and intermediation in Nigeria. This shows that the monetary policy in Nigeria has not help in financial intermediation in Nigeria. Lending interest rate is still high while deposit rate is low and this discourages savings and borrowing in the country. People who already have loans will have less disposable income because they spend more on interest payments. Consequently other areas of consumption will fall. On the other hand interest rate on deposit in Nigeria is low and discourages people to save.

### 5.2 Policy Implication

Financial intermediation has been argued to help investment and economic growth of the country through the mobilization of savings from surplus to deficit sector of the economy at a reduced cost. But in Nigeria the rate of financial intermediation in Nigeria has not been impressive as such the study makes the following recommendations. Monetary policy in Nigeria as of today is high and there is need for it to be reviewed in order to lower the cost of borrowing (lending rate) so as to encourage investors to borrow more. Commercial banks should try to increase its deposit rates which will help them to mobilize more deposits, as this will enhance their lending services. Financial infrastructure in the country should be improved upon as this will help banks in deposit mobilization especially the unbanked in the country. Government should deepen the money and capital market which will help provide versatility for hedging instruments and offer long term instruments to the public. Government

should reform the legal and judicial environment for creditor rights, as well as secured (collateral) rights. Central Bank of Nigeria efforts on credit information sharing particularly as regards the coverage and quality of the information assembled by the credit bureaus should be improved and strengthened.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Gurley J, Shaw E. Financial aspects of economic development. American Economic Review. 1955;4(2):30-55.
2. Ekezie ES. The Elements of Banking, Onitsha: Africana-Fep Publishers Limited; 1997.
3. Nwankwo GO. Money and capital markets in Nigeria today. University of Lagos Press, Nigeria; 1991.
4. Aderibigbe JO, Uremadu SO. An overview of the Nigeria financial system. CBN Bullion. 2004;28(1):15-36.
5. Jhingan ML. Macro-economic theory. 11th Revised Edition Delhi: Vrinda Publications (p) Limited; 2004.
6. Nnanna OJ. Monetary policy framework in Africa: The Nigerian experience, in proceedings: Conference on monetary policy frameworks in Africa. Reserve Bank of South Africa, Pretoria; 2001.
7. Central Bank of Nigeria. Annual report and statement of accounts. CBN; 2011.
8. Onoh JK. Dimensions of Nigeria's monetary and fiscal policies: Domestic and external. Aba: Astra Meridian Publishers; 2007.
9. Iwedi M, Okey-Nwala PO, Kenn-Ndubuisi JI, Adamgbo SC. Financial intermediation development and economic growth: Empirical evidence from Nigeria. Business Research Review. 2016;2(2):33-59.
10. Okoro EU, Manasseh CO, Abada FC, Nzidee WA, Ambrose C, Okeke AC, Onwumere JU. Financial intermediation and monetary policy effectiveness in Nigeria. International Review of Management and Marketing. 2018;8(6):53-61.
11. Ziaul Haque QG. Monetary shocks and bank intermediation in a dynamic stochastic general equilibrium model. Journal of Economics and Sustainable Development. 2015;6(12):231-226.
12. Udeh SN. Impact of monetary policy instruments on profitability of commercial banks in Nigeria: Zenith bank experience. Research Journal of Finance and Accounting. 2015;6(10):190-205.
13. Nwoko NM, Ihemeje JC, Anumadu E. The impact of monetary policy on the economic growth of Nigeria. African Research Review. 2016;10(3):192-206.
14. Sulaiman LA, Migiro SO. The nexus between monetary policy and economic growth in Nigeria: A causality test. Public and Municipal Finance. 2014;3(2):35-40.
15. Baghebo M, Stephen ET. Monetary policy and economic growth in Nigeria. Asian Economic and Financial Review. 2014;4(1):20-32.
16. Adigwe PK, Echekoba FN, Onyeagba JB. Monetary policy and economic growth in Nigeria: A critical evaluation. Journal of Business and Management. 2015;17(2):110-119.
17. Miftahu I. Monetary policy and economic growth in developing countries: Evaluating the policy nexus in Nigeria. International Journal of Business and Economics Research. 2019;8(5):303-313.
18. Osakwe AC, Agbo EI, Okonkwo EJ. Effect of monetary policy instruments on banking sector credits in Nigeria. Advance Journal of Management, Accounting and Finance. 2019;4(04):32-45.
19. Omankhanlen AE. The effect of monetary policy on the Nigerian deposit money bank system. International Journal of Sustainable Economies Management. 2014;3(1):39-52.
20. Omankhanlen AE, Okorie UC, Taiwo JE. A dynamic analysis of the relationship between monetary policies and loan risk exposures in Nigerian deposit money banks. Mediterranean Journal of Social Sciences. 2015;6(6):247–255.

*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*http://www.sdiarticle4.com/review-history/60365*