Monetary Policy and Return on Equity of Commercial Banks: A Time Variant Analysis from Nigeria

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Abstract

This study examined the effect of monetary policy on the return on equity of commercial banks in Nigeria. The objective was to examine the effect of monetary policy on the return on equity of Nigeria commercial banks. Time series data were sourced from annual reports of the commercial banks and Central Bank of Nigeria Statistical Bulletin. Ordinary Least Square (OLS), Augmented Dickey Fuller Test, Johansen Co-integration test, normalized co-integrating equations, parsimonious vector error correction model and pair-wise causality tests were used to conduct the investigations and analysis. The results show that return on equity, broad money supply, liquidity ratio and loan to deposit ratio are stationary at level I(0) while cash reserve ratio and monetary policy rate are stationary after first difference implying that they integrated at order one I(I). The results of the Trace Tests indicate the presence of at least one co-integrating vectors. Thus, the null hypothesis of no co-integration amongst the variables is rejected. This infers the existence of a long run relationship between monetary policy rate, liquidity rate, loan to deposit ratio, broad money supply, cash reserve ratio and return on equity. The results of the error correction coefficient are statistically significant and have a negative sign, which confirms a sufficient condition for the variables to be co-integrated. This also implies that the speed at which explanatory variables would adjust from short run disequilibrium to changes in return on equity in order to attain long run equilibrium is 89% within a year. The results granger causality test shows that there exist a unidirectional relationship between liquidity ratio and return on equity. The study concludes that monetary policy rate has the strongest long run impact on return on equity of commercial banks. It recommends that managers of commercial banks should be abreast with the development from Central Bank of Nigeria monetary policy actions to achieve increase profitability and bank managers should have a good understanding of the monetary policy tools and how it works.

Keywords: *Monetary Policy, Return on Equity, Commercial Banks, Time Variant Analysis, Nigeria*

Introduction

The banking sector is the sector of the economy that executes the central function of developing the financial system. This is done by holding the financial assets of customers and investing the assets in a manner where wealth is created. The regulation of the banking activities by the government and governmental agencies is necessary and as such there is no place in the world where the banking sector is not regulated (Bawa, Akinniyi and Njarendy, 2018). The banking sector has to be reformed from time to time to improve its capability of meeting the essential role of financial intermediation (Ekpung, Udude, and Uwalaka 2015). It is expected that the banking sector should perform optimally because of its importance in the economy as it creates employment and facilitates the transfer of funds from surplus to deficit units which boosts economic growth (Kimani, 2013). The commercial banks from the foregoing do not operate on their own. They are regulated and guided

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by the government through the central bank which sets guidelines and policies including monetary policies. These regulations by the central bank are necessary because there could be failures in the market which if not checked will lead to consequences which may be devastating to the economy as a whole. This situation therefore leaves the commercial banks in a state that is likely to have an effect on their profitability and financial performance due to fluctuations in the monetary policy environment which is beyond their control (Waweru, 2013).

Monetary policy is essential to the environment within which banks operations are carried out and it can either enhance the banking activities or constrain the activities of the industry (Udeh, 2015). Despite the encompassing nature of the monetary policy, it has very specific objectives which are achieved through the monetary policy tools and the monetary policy targets. Monetary targets according to Froyen & Guender (2019) are values of specific economic variables that the monetary authority seek to achieve with monetary policy. The economic variables refer to measurements that describe gross domestic product, inflation, interest rate, employment rate etc. The presumption based on economic theory, is that attaining a monetary policy target subsequently results in achieving one or more of the macroeconomic goals. Monetary policy targets affect the operation of commercial banks and the assessment of the banking system can be done through the performance of monetary policy tools (Jegede, 2014). The ultimate goal of monetary policy is basically to control inflation, maintain a healthy balance of payment position in order to safeguard the external value of national currency and promote adequate and sustainable level of economic growth. In order to achieve these goals, the regulatory authorities control money supply in the economy. These Monetary management functions are assigned to the Ministry of Finance through the Central Bank. The Central Bank of Nigeria over the years, has instituted various monetary policies to regulate and develop the financial system in order to achieve major macroeconomic objectives. Although some monetary policy tools like cash reserve ratio and liquidity ratio have been used to buffer the liquidity creation process of commercial banks through deposit and credit products to the public. Monetary policy remains a critical tool in stimulating the growth and stability of financial institution in most developing economics (Sanusi, 2018). The objective of monetary policy includes promoting monetary stability by strengthening the external sector performance and generating a sound financial system that will support increased output and employment. It is a major economic stabilization weapon which involves measures designed to regulate and control the volume, cost, availability and direction of money and credit in an economy in order to achieve some specific macro-economic policy objectives (Ndugbu and Okere, 2015). The commercial banks on their own exist primarily to make profits. They make profits by accepting deposits from the surplus units and granting credits to interested individuals, companies, and other organizations and institutions referred to as the deficit units at an agreed interest rate. The difference in the rates gives the banks a spread which is the profit so desired which is used in running their operations and shared to the owners of the banks. Since the banks do not operate in a vacuum, it implies that their overall lending and operating behavior will generally be influenced by these regulatory policies and other environmental and macroeconomic factors. The regulatory environment controls the banks directing and as such policies and regulations set by them must be adhered to and defaulters are sanctioned. The economic environment on the other hand is perhaps more challenging since the banks have to exercise their discretion in taking decisions as it affects their individual operations and this could impact positively or negatively on their business in the long run (Odior, 2013). This study examined the effect of monetary policy on return on equity of commercial banks.

Theoretical Framework
Four main schools of thought have presented varied positions on how monetary policy actions explain the cyclical upswings and downswings in macroeconomics. They are the classical theory, the Keynesian theory, the monetarist theory and Neo-Keynesian theory.

The Classical Theory

For the classical schools, money is neutral in its effect on the economy. Thus a change in the money stock does not affect the real variables like output, employment and income (Ezirim 2005). This theory is based on a direct and mechanical relationship between money and prices. If the quantity of money is increased, the price level will also increase in the same proportion and vice versa. Such a relationship is based on the quantity theory equation

$$MV = PT \text{ or } M/P = VT \tag{1}$$

Where M is the total quantity of money, P is the price level of goods traded, V is the velocity of circulation of M, and T is the volume of transactions of goods. The equation shows that the supply of real cash balances (M/P) must equal the demand for real cash balances (VT). As such money plays a causal role in the classical school which means that changes in the money stock cause changes in the absolute price level, and in normal income. To elaborate it, the classicist specified two channels through which monetary changes are transmitted to the real sector of the economy. They are the direct mechanism and the indirect mechanism which are discussed below.

The Direct Mechanism

The mechanism is based on the long run equilibrium of the demand for and supply of money. Assume the money stock is raised, this lead to increase in the supply of actual money balance (M/P) of the public which now exceed the demand for them.

The Indirect Mechanism

This mechanism operates through the money rate of interest and involves the commercial banking system. Assume the Central Bank makes open market purchase of government securities which raise the reserves of commercial banks. With excess reserves, the banks lend more which lowers the money rate of interest. This is illustrated in figure 2.2 where the D and S represent the demand and supply of loanable funds respectively. The equilibrium interest OR is determined at point E where the two curves intersect each other.
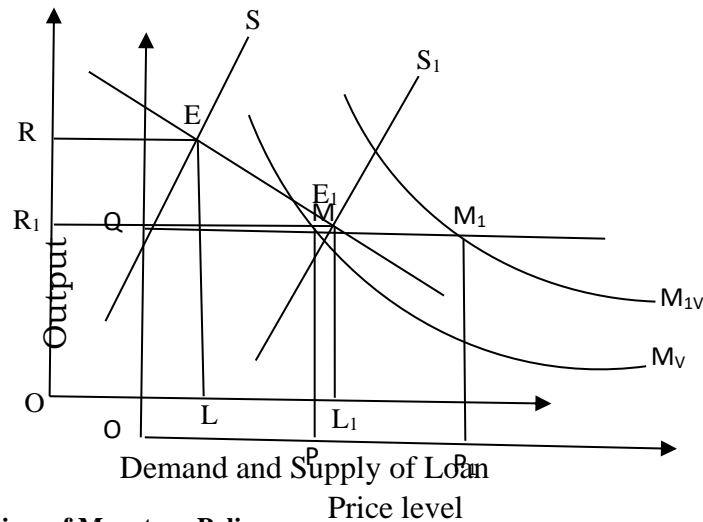

Figure 1 Indirect Mechanism of Monetary Policy

With increase in the reserve of banks, the supply of loanable funds increases which shifts the S curve to the right to S_1. Now the banks lend LL_1 more of funds and the interest rate falls to OR. The reduction in the market rate relative to the real rate creates a disparity between the actual and desired stock of real capital. This encourages businessmen to invest more in new capital assets. This in turn, raises the aggregate demand for money which is financial by new money creation. This expands MV to M_1V as shown in figure 1. Given the full employment level OQ in the economy, the increase in the money supply raises the price level proportionately so that

$$MM_1 = PP_1 \qquad\qquad (2)$$

The Keynesian Theory

The monetary policy action in the Keynesian theory is indirect via the interest rate. In the Keynesian, changes in the money supply affect aggregate expenditure, output, employment and income indirectly through changes in the interest rate (Keynes, 1936 and Ezirim, 2005). Assume the central bank increase the money supply by open market purchase of government bonds; it lowers the interest rate which in turn increases investment and expenditure, thereby raising the national income. The mechanism by which changes in the money supply are transmitted into the income level is called the asset effect. With income level unchanged when the money supply is increased, it causes economic agent to spend their excess holdings of money on bonds. This means an increase in the demand for bonds and a rise in their prices. A rise in the prices of bonds brings down the money interest rate. This, in turn, increases the speculative demand for money. Economic agents prefer to keep money in cash rather than lend it at a low interest rate. This is called the liquidity effect. This is the first stage in the Keynesian transmission mechanism.

Literature Review

The Concept of Concept of Monetary Policy

Dare & Okeya (2017) described monetary policy as the measures designed to regulate and control volume, cost and direction of money and credit in the economy to achieve some specified macroeconomic policy objectives, which can change from time to time depending on the economic position of a particular country. In Nigeria, the Central Bank of Nigeria is responsible for implementing the country's monetary policy by controlling the money supply and setting interest rates based on current economic conditions. The Central Bank of Nigeria acts as bank regulator with the responsibility of implementing rules and regulations on banking activity, supervising compliance with prudential regulation and applicable laws, and otherwise safeguarding the stability of the banking sector. Odior (2013) noted that monetary policy is concerned with the changes in the supply of money and credit. It refers to the policy measures undertaken by the government or the central bank to influence the availability, cost and use of money and credit with the help of monetary techniques to achieve specific objectives. Monetary policy aims at influencing the economic activity in the economy mainly through two major variables, i.e., money or credit supply, and the rate of interest (Hayes, 2013). The techniques of monetary policy are the same as the techniques of credit control at the disposal of the central bank. Various techniques of monetary policy, thus, include bank rate, open market operations, variable cash reserve requirements, selective credit controls. Kent, (1997) defines monetary policy as "the management of the expansion or contraction of the volume of money in circulation for the explicit purpose of attaining a specific objective such as full employment.

Monetary Policy Instruments

Cash Reserve Ratio

Cash reserve ratio (CRR) is a specified minimum fraction of the total deposits of customers, which commercial banks have to hold as reserves either in cash or as deposits with the central bank. It is set according to the guidelines of the central bank of a country. The amount specified as the CRR is held in cash and cash equivalents with the Central Bank. The aim here is to ensure that banks do not run out of cash to meet the payment demands of their depositors. CRR is a crucial monetary policy tool and is used for controlling money supply in an economy. CRR specifications give greater control to the central bank over money supply.

Commercial banks have to hold only some specified part of the total deposit as reserves. This is called fractional reserve banking (Udeh, 2015). It is the statutory cash reserves that banks are to keep with the Central Bank of Nigeria and this cash ratio was designed to help rescue the liquidity of the banks and hence control the volume of banks credit that can be extended by the commercial banks Otalu, Aladesanmi and Mary, (2014). A good number of researches focused on cash reserve requirements in developing economies and its impact on the profitability of banks.

Liquidity Ratio
According to Olweny and Chiluwe, (2012), liquidity ratio is the proportion of total deposits to be kept in liquid assets so as to safeguard the bank's ability to meet depositor's cash withdrawals. It is set by the central bank to increase or decrease the cash that is available to commercial banks. This ratio was designed to maintain the ability of banks to meet depositor's cash withdrawals so the confidence in the banking system is ensured. The CBN determines what this ratio should be and this therefore makes liquidity ratio a tool of monetary control. The liquid assets that make up the liquidity ratio include, cash balance and other short-term assets, which can easily be realizable into cash without much loss of value.

Monetary Policy Rate (MPR)
The MPR is the interest rate set by the Central Bank of Nigeria to serve as indicative rate for transactions in the interbank market. It was introduced in December 2006 to replace the minimum re-discount rate and is used as the operating target for monetary policy. But this did not correspond with the trend in CRR and loan to deposit ratio, which indicated monetary ease. This explains why MRR could not be effective as indicative rate of monetary policy stance. The change from MRR to MPR improved the link between MPR, CRR and loan to deposit ratio. According to Morgan (2002) it is the minimum lending rate or the interest rate charged by the central bank to the commercial banks for short term loans. It is also referred to as the rate used for discounting bills of exchange. This is accessed through the discount window. When the discount rate is increased, it affects both individuals and businesses. The banks then increase the rates charged their customers to borrow money.

Open Market Operation
This refers to when the central bank purchases and sells securities in order to regulate the supply of money in the economy. This affects the ability of banks to give loans to individuals and businesses. The central bank engages in expansionary open market operations or contractionary open market operations depending on what they want to achieve at a particular point in time. If the target is to increase money supply in the economy, and reduce interest rates, treasury bills will be purchased from the banks which will increase the funds at the disposal of the banks.

Monetary Policy, Post Banking Consolidation from 2007-2019
This period witnessed persistence of excess liquidity. The reforms were meant to minimize macro-economic instability arising from distress in the banking system. The Central Bank of Nigeria motivated intermediation through the deepening of the private sector, financing of growth in the private sector, and encouraging

investment inflows through participation of the industry in the global financial system. Foreign investment actually increased from that period to date. Corporate governance and transparency was stressed and supervision of the banks became more effective.

According to Central Bank of Nigeria, (2009) Current monetary policy strategy involves; restructuring of debt instruments to longer tenors, occasional forex swap, increased deregulation of the forex markets, aggressive liquidity mop up through open market operations and discount window operations amongst others. Monetary targeting has become an anchor of the monetary policy framework since the deregulation era, though it was not firmly established until the post-bank consolidation regime from 2006.

Financial Performance of Commercial Banks
Financial performance of banks relates to the concept of bank profitability. This means that the profitability of the bank explains the financial performance of the bank. The banks generate profit from the role of intermediation. They earn fess from the services rendered to their customers. The financial performance of a bank is determined by factors internal to the operations and from factors that are external (Sattar, 2014). This is in line with the opinions of (Ongore, 2013) and (Al-Tamini *et al.,* 2015).

The internal factors are bank specific determinants of financial performance because they are initiated from the balance sheet and the income and loss statement while the external determinants are the variables which are outside the control of banks' management such as monetary policies. Chen *et al.,* (1986) explained that these macroeconomic factors are significant in explaining bank performance, profitability and return on investment. Gilchris, (2013) agrees that the financial performance is commonly measured by ratios such as return on equity and return on assets. There are many different mathematical measures to evaluate how well a company is using its resources to make profit (Irungu, 2013). Financial performance can be measured using the following techniques; operating income, earnings before interest and taxes, net asset value (Gilchris, 2013).

Irungu (2013) described financial performance analysis as the process of identifying the financial strengths and weakness of the firm by properly establishing the relationship between the items of the balance sheet and income and loss statement. It's the process of identifying the relationship between the component parts of financial statements to ascertain an organization position, performance and prospects. Financial performance analysis can be undertaken by management, owners, creditors as well as investors (Chen, 2011). Ongore & Kusa (2013) argued that financial performance analysis helps in short and long term forecasting and growth.

Return on Equity-is a measure of financial performance calculated by dividing net income by shareholders' equity. Because shareholders' equity is equal to a company's assets minus its debt, ROE is considered the return on net assets. It measures how much a company actually brings in aside from shareholder's funds.

Empirical Review
Ogbeifun and Akinola, (2019) examined the impact of monetary policy tools on the performance of deposit money banks in Nigeria. The study sought to evaluate the effect of money supply on the performance of Deposit Money Banks in Nigeria; the significant impact of monetary policy rate on Deposit Money Banks' Performance; to investigate the influence of Cash reserve ratio on Deposit Money Banks' Performance. The study was predicated on the Classical theory, Keynesian theory and Neo-Classical theory. The secondary data were obtained from the Central Bank of Nigeria Statistical Bulletin. The multiple regression analysis i.e. Ordinary least square (OLS) was used to test the impact of monetary policy tools on the performance of deposit money banks in Nigeria. The result showed that the

monetary policy variables had a positive relationship on performance of Nigerian Deposit Money Banks except Money Supply and Liquidity Ratio. The study concluded that monetary policy tools have a significant effect on the financial performance of commercial banks in Nigeria.

Osakwe, Ibenta, and Ezeabasili, (2019) examined the effect of monetary policy on the performance of the banking sector in Nigeria. The explanatory variables were monetary policy rate, Treasury bills rate, Cash reserve requirement and money supply; while the dependent variable is the profit after tax. The study adopted an ex-post facto research design and used secondary data obtained from the Central Bank of Nigeria Statistical Bulletin. The study covered a period of 32 years (1986 to 2017). The data were subjected to Augmented Dicker Fuller stationarity test to determine the best suitable econometric tool of analyses. The Autoregressive Distributive Lag (ARDL) was used for the model estimation. The results indicate that: monetary policy tools have significant effect on the banking sector performance in Nigeria in the short run only. The study thus concluded that monetary policy tools may not be a long run policy instrument for the growth of the banking sector output in Nigeria but rather a short run instrument.

Kenourgios and Ntaikou, (2019) examined the impact of the European Central Bank's unconventional monetary policy (UMP) on bank lending supply and performance in the euro area, through comparing the evolution of bank-specific variables before and after the UMP implementation. By using a dynamic panel data analysis on banks across discrete country groups (euro zone, core, peripheral) and by controlling for bank-specific and country-level variables, the study provided evidence that the bank lending decisions and performance of euro zone banks are not UMP driven, implying the limited ability of the ECB to enhance the effectiveness of banks' lending channel and to affect banks' profitability during the crisis. The study findings also suggested that different criteria determined banks' lending strategy before the UMP period, bank credit strategies vary across the country samples, while the weaker economies' banks seem to underestimate the impact of liquidity risk on their lending activity.

Aginam and Obi-Nwosu, (2019) examined the effect of monetary policy on banks performance in Nigeria. The variables of monetary policy rate, liquidity ratio, broad money supply and interest rate were regressed on return on equity (ROE) for the period of 30 years (1987- 2017). The study adopted an ex-post facto research design because the data for the study are secondary data that already existed. Econometric techniques, including Augmented Dicker Fuller and Philip Perron tests for unit roots and Ordinary Least Square (OLS) were employed for the analysis. The result of the study indicate that monetary policy rate, liquidity ratio and broad money supply have positive and significant effect on return on equity (ROE) while interest rate has negative and insignificant effect on return on equity (ROE) within the period under review. The study thus concludes that monetary policy can be used to influence the performance of deposit money banks in Nigeria.

Adediran, George, Alege, and Obasaju, (2019) assessed the influence of monetary policy tools on bank credit performance in Nigeria, using annual data covering 36 years for the period 1980–2015. The study adopted the Cobb–Douglas production function and estimated a specified model using autoregressive distributed lag co-integration approach. The study found out that cash reserve requirement, which is credit policy easing, is significant in growing the Nigerian economy, as compared to monetary policy rate. The implication of this is that, if credit policy easing is properly implemented, it could be efficient in offsetting adverse external credit shocks.

Hayo, Henseler and Rapp, (2019) investigated monetary policy interest-rate-to-performance sensitivity of the European banking sector over the 07/2012–06/2017 period when interest rates were (close to) zero. The study applied the Word scores approach to introductory statements of ECB's Governing Council press

conferences to estimate a 'shadow prime rate'. Based on short-run intraday event windows, the study found that shadow prime rate changes positively affect changes in the EURO-STOXX-Banks Future. The study findings add to the recent evidence documenting that banks benefit from increasing interest rate levels in a low-interest-rate environment. Farajnezhad, Suresh, and Ramakrishnan, (2019) examined the significance of the monetary policy transmission mechanism particularly credit channel in Malaysian. The study analyzed the commercial banking in Malaysia, using static panel data method to evaluate the monetary policy. Yearly data were employed using over the period 2008 to 2017. The sources of cross-sectional are liquidity, capital and bank size in various between banks. The study discovered the fundamental relations between the bank loan and monetary policy variable using two major tests OLS, random effect model and fixes effect model. The results of the study show that there is a credit channel in the case of Malaysia. Adesina, Nwidobie, and Amadi, (2018) ascertained the monetary policy instruments of the Central Bank of Nigeria during and after the bank consolidation exercise (2000 to 2016) and determined the effects of these policies on the financial performance of deposit money banks (DMBs) in Nigeria. An Autoregressive Lag Model (ADL) analysis of secondary data obtained from the CBN Statistical Bulletin, 2016 shows that monetary policies of the CBN had a significant effect on the performance of DMBs in the short-run but an insignificant effect in the long-run.

Gap in Literature
The gap in literature, which has informed this research, is to identify the relationship between monetary policies and bank profitability and their joint contribution to financial performance of commercial banks. The dwindling profit of commercial banks in Nigeria and the fact that regulators come up with monetary policies from time to time due to economic factors without really checking how these policies may negatively affect the financial performance of banks calls for this study especially since a healthy financial system is necessary for the economy of any nation. Other studies have also been performed investigating monetary policy and profitability in Nigeria including, Enyioko, (2012) who examined the performances of banks in Nigeria based on the interest rate policies. The study found that interest rate policies have not improved the overall performances of banks significantly. Aburime, (2008) found that real interest rate, inflation, monetary policy and foreign exchange regime are positively associated with banks' return on assets of the banks in Nigeria. Mbai, (2006) found out that proper interest rate management reduced bank exposure to risk and provides an opportunity to stabilize and improve their net income. Given the volatile macroeconomic environment in Nigeria, there is need for up to date research on the complex relationship between monetary policy and financial performance.

Methodology
Research Design
The study adopted the ex-post facto research design. This is because the researcher has no control over the variables in the study as he cannot manipulate but only reports what has happened or is happening (Cooper & Schindler, 2002). Secondly, it is designed to synchronize with the hypothetic deductive research method which also includes co relational and classical econometric investigation procedure, involving a five stage sequence.

Population of the Study
The population for this study is therefore 22 commercial banks quoted on the floor of the Nigerian stock exchange.

Sample Size and Sampling Procedure
For the purpose of this study, the sample size corresponds with the period defined for this study which ranges from 1970 through 2019, a duration of fifty (50years) years. Consequently, the sample size was not obtained by application of a deterministic model; neither did the respective years constituting the sample size selected by a sampling technique. Therefore, all the years defined by the period of the study are adopted as the sample.

Data Collection Method

The data for this study was time series data, which is information on variables of a study over various time periods. This time-based data adopted is secondary data since they are obtained from already existing publications, journals which constitutes secondary sources of information. The source of this research data however was gotten from Central Bank of Nigeria publication, namely Central Bank of Nigeria Economic Reports, Annual Reports and Statement of Accounts and Statistical Bulletin for various issues and years. The data on return on asset, return on equity, and interest margin to gross income, monetary policy rate, liquidity ratio, cash reserve ratio, growth rate of broad money stock, and loan to deposit ratio were collected for the periods of fifty years.

Data Analysis Techniques

Two categories of techniques were employed in the study: descriptive analytical techniques and econometric analytical techniques.

Descriptive Analytical Techniques

The skewness, for instance, is a measure of asymmetry of the distribution of the series around its mean. It is calculated as

(3)
Where

S = Skewness,

$$ S = \frac{1}{N} \sum_{i=1}^{N} \left(\frac{yi - \bar{y}}{\sigma} \right)^3 $$

N = Numbers of years/observations,

yi = Mean,

$\bar{y}$ = Median

σ = Standard Deviation

The kurtosis measures the peakedness or flatness of the distribution of the series. It is calculated using the formular below:

$$ K = \frac{1}{N} \sum_{i=1}^{N} \left(\frac{yi - \bar{y}}{\sigma} \right)^4 $$

4

Where
K = kurtosis
N = Numbers of years/observations,

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yi = Mean,

$\bar{y}$ = Median

σ = Standard Deviation

The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. It is calculated as

Jarque-Bera =   5)

Where

N= Number of years or observation

S^2 = Skewness

K = Kurtosis

$$\frac{N}{6}\left(S^2 + \frac{(K-3)^2}{4}\right)$$

Under the null hypothesis of a normal distribution the Jarque-Bera statistic is distributed as with 2 degrees of freedom. The reported probability is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. A small probability

Unit Root Test

The Augmented Dickey Fuller (1981) technique was adapted to test the time series of data employed for the study. The ADF test regression equations are specified as shown below;

$$\Delta V_{t =} \eta \, V_{t-1} + \eta \sum_{i=1}^{N} \Delta V_{t-j} + \varepsilon_i$$

6

$$\Delta V_{t =} \propto_0 + \lambda V_{t-1} + \eta \sum_{i=1}^{N} \Delta V_{t-j} + \varepsilon_i$$

$$\Delta V_{t =} \propto_0 + \lambda_{1i} \eta \, V_{t-1} + \eta \sum_{i=1}^{N} \Delta V_{t-j} +$$

7

ε_i

Where in equation (4), (5) and (6) above, V represents the variables used for the unit root test. In most case, unit root test is conducted on individual variables using either intercept without trend or intercept with trend. Thus, equation (4) represents the model without intercept and no trend, equation (5) represents the model with intercept but any trend while equation (6) represents the model with intercept and trend. The hypotheses to be tested are as follows: H0: Xt is non – stationary, H1: Xt is stationary.

Co-integration Test

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To test for the presence of long-run equilibrium relationship, the Johansen's and Juselius (1990) and Johansen (1991) multivariate co-integration technique is employed. The co-integration test is based on the following equation.

$$\Delta y_t = \alpha + \eta_1 \Delta y_{t-1} + \eta_2 \Delta y_{t-2} + \eta_3 \Delta y_{t-3} + \eta_4 \Delta y_{t-4} - - \eta_{k-1} \Delta y_{t-k+1} + \eta \, y_{t-k} + \mu_t \qquad (8)$$

Where n and n are 4x4 matrices and k is the lag length. The tests used here involved co-integration with linear deterministic trend in the error correction model (ECM). The test for the presence of long-run equilibrium relationship is carried out based on the Johansen's (1991) multivariate co integration technique. Usually, applying this technique, two statistics are involved; Trace statistic and Maximum Eigen statistic. When the sample size is smaller than forty (i.e n<40), the Maximum Eigen statistic provides the more sophisticated results. The hypotheses to be tested under these statistics are as follows:

For the Trace Statistic

Null hypothesis	Alternate hypothesis
Ho: r = o	H1: r ≥ 1
Ho: r = 1	H1: r ≥ 2
Ho: r = n	H1: r = n

For the Maximum Eigen Statistic

Null hypothesis	Alternate hypothesis
Ho: r = o	H1: r = 1
Ho: r = 1	H1: r = 2
Ho: r = n	H1: r = n

Maximum Eigen statistic can only check co-integration one by one.

Note: The Null hypothesis is rejected on the ground that the values of either the Trace or Maximum statistics are greater than the Mackinnon critical value of 5% or 1% for studies in Management and Social sciences. Co-integration analysis does not provide information about possible patterns or direction of the relationship among the variables. Hence we will employ the causality test.

Granger-Causality Test

The test for linear causality or feedback effect between the specified variables was done using granger causality techniques. The test is based on the following equation below.

$$Y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 Y_{t-1} + \sum_{i=1}^{n} \beta_1 X_{t-1} + \mu_{1t} \qquad (9)$$

and

$$X_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \beta_{t-1} + \sum_{i=1}^{n} \beta_1 Y_{t-1} + \mu_{2t} \qquad (10)$$

Where X_t and Y_t are the variables to be tested while $\mu 1_t$ and $\mu 2_t$ are white noise disturbance terms and n is maximum number of lags. The null hypothesis $\alpha_1 = \beta_1 = 0$ for all 1's is tested against the alternative hypothesis α_1, 0 and β 0, if the coefficient of α_1 are statistically significant, that of β_1 are not, then X causes Y, if the reversal is true than Y causes X. However, where both coefficient of α_1 and β_1 are significant then causality is bi-directional.

Model Specification

From the objectives of this study, the models specified below captures the five (5) variables of monetary policy and return on equity as measure of financial performance of commercial banks in Nigeria.

$$ROE_t = f(MPR_t, LDR_t CRR_t, LTR_t, BMS_t) \qquad (11)$$

Equation 15 presents the estimable version of equation (14)

$$ROE_t = \alpha_0 + \beta_1 MPR_t + \beta_2 LDR_t + \beta_3 CRR_t + \beta_4 LTR_t + \beta_5 BMS_t + \mu \qquad (12)$$

$$= \alpha_0 + \sum_{i=0}^{n} \beta_{1,} + E_{it;} \beta_i \geq 0 \qquad (13)$$

Where
ROE   =   Return on Equity
MPR   =   Monetary Policy Rate
LDR   =   Liquidity Ratio
CRR   =   Cash Reserve Ratio
LTR   =   Loan to Deposit Ratio
BMS   =   Growth in Broad Money Supply
α_0 =   Constant / Intercept
$\beta_1 - \beta_5$ =   Coefficients of independent variables

μ_{it} =   Error Term

Operational Measures of Variables

Return on Equity (ROE): This ratio is a measure of the profitability of a business in relation to the equity. It tells the profit which the company or its shareholders can earn from money, the higher the ratio, the higher the profitability.

ROE=Net Income/Shareholder's Equity

Money supply (MS): the federal government uses its tools to reach a certain level of money in the economy. The equilibrium interest rate falls when the federal government through the central bank expands its money supply target. Money supply is therefore the total value of money available in an economy at a point in time. It includes printed notes, money in deposit accounts and other liquid assets. An increase in the money supply aimed at increasing aggregate output is called an

expansionary monetary policy. It is important for a valuation and analysis of the money supply to be done as this aids policy makers make policies and alter existing policies for the economy.

Results, Analysis and Discussion of Findings
Table 1 Descriptive Statistics results of Monetary Policy Variables and Return on Equity

	ROE	MPR	LTR	LDR	CRR	BMS
Mean	20.69040	11.05280	66.56120	50.23800	9.536000	18.05380
Median	15.36000	12.10000	67.81500	48.65000	8.000000	17.50000
Maximum	265.2000	26.00000	87.30000	94.50000	32.00000	46.10000
Minimum	0.060000	3.500000	37.97000	29.10000	1.000000	8.600000
Std. Dev.	36.48768	4.933968	11.99397	12.54232	7.241455	6.576364
Skewness	6.187541	0.360160	0.491528	0.900387	1.193390	2.187726
Kurtosis	42.01515	3.111130	2.626810	4.503857	3.870062	9.538619
Jarque-Bera	3490.259	1.106690	2.303479	11.46744	13.44526	128.9544
Probability	0.000000	0.575023	0.316087	0.003235	0.001203	0.000000
Sum	1034.520	552.6400	3328.060	2511.900	476.8000	902.6900
Sum Sq. Dev.	65236.18	1192.858	7048.916	7708.178	2569.495	2119.180
Observations	50	50	50	50	50	50

The results in Table 1 show the mean values of 20.690%, 11.05%, 66.56%, 50.23%, 9.53% and 18.05% for ROE MPR LTR LDR CRR and BMS while it has median values of 15.36% for ROE, 12.1% for MPR, 67.8% for LTR, 48.65% for LDR, 8% for CRR and 17.5% for BMS for the periods under study. The maximum values of each of the series are 265.2% for ROE, 26.0% for MPR, 87.3% for LDR, 94.5% for LTR, 32% for CRR and 46.1% for BMS. On the other hand, the minimum values of the series for the period under study are 0.06% for ROE, 3.50% for MPR, 37.97% for LDR, 29.1% for LTR, 1.0% for CRR and 8.60 for BMS respectively. The gap between the maximum and minimum values is widest in term of liquidity ratio (LDR). In addition, the provision under LDR offer wider absolute variations with a standard deviation of 12.54%, followed by 11.9% for LTR, 7.2% for CRR, 6.57% for BMS and 4.9% for MPR. With a mean average of 20.6% it is observed that return on equity (ROE) witnessed the widest swing with a standard deviation of 36.48%. The skewness which is a measure of asymmetry of the distribution of the series around its mean is seen to be positive for all series under investigation which is an indication that the distributions have a long right tails. The kurtosis measures the peakedness or flatness of the distribution, the results reported a kurtosis of 42.01 for ROE, 3.11 for MPR, 2.63 for LTR, 4.50 for LDR, 3.87 for CRR and 9.54 for BMS. As a decision rule, the kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peak (leptokurtic) relative to the normal while if the kurtosis is less than 3, the distribution is flat (Platykurtic) relative to the normal. The series ROE, MPR, LDR, CRR and BMS records a kurtosis of more than 3, hence their distribution is leptokurtic (peak) in nature while the LTR posted a kurtosis of less than 3 and their distributions can be described as flat (Platykurtic). This evidence is further confirmed by the Jarque-Bera for each of the series and her associated probabilities. Under the null hypothesis of a normal distribution, the reported probability indicates that we can accept the hypothesis of normal distribution at 5% level of significance.

Table 2 ROE vs Monetary Policy variables

Variables	Level	1st Difference	2nd Difference	Conclusion

ROE	5.712982***	14.87372***	7.720808***	I(0)
BMS	4.014586***	9.638208***	6.565942***	I(0)
CRR	2.105053	5.351923***	8.847664***	I(I)
LDR	4.702195***	7.619580***	6.642526***	I(0)
LTR	4.381435***	6.417334***	9.914318***	I(0)
MPR	2.365492	7.385233***	8.494382***	I(I)

Note that ***, **, * indicates significance at 1%, 5% and 10% respectively
Author's Computation: Extract from Eviews

The table 2 presents the summary results of the ADF unit root test. The results show that return on equity, broad money supply, liquidity ratio and loan to deposit ratio are stationary at level I(0) while cash reserve ratio and monetary policy rate are stationary after first difference implying that they integrated at order one I(I).

Table 3 Johansen Cointegration Test

Null Hypothesis	Alternative Hypothesis	Test Statistics	Critical-value
	Trace Statistics		
None*	R=<1	111.8209	95.75366
At most 1	R=<2	60.34401	69.81889
At most 2	R=<3	39.16455	47.85613
At most 3	R=<4	20.60710	29.79707
At most 4	R=<5	9.275854	15.49471
At most 5	R=<6	2.676695	3.841466
	Maximum Eigenvalue Test		
None*	R = 1	51.47685	40.07757
At most 1	R = 2	21.17947	33.87687
At most 2	R = 3	18.55745	27.58434
At most 3	R = 4	11.33124	21.13162
At most 4	R = 5	6.599159	14.26460
At most 5	R = 6	2.676695	3.841466

Author's Computation: Extract from E-views

Trace Test indicates one co-integrating equation at the 0.05 level. Trace Max Eigenvalue test indicates one co-integrating equation at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. The results of the Trace Tests indicate the presence of at least one co-integrating vectors. Thus, the null hypothesis of no co-integration amongst the variables is rejected. This infers the existence of a long run relationship between monetary policy rate, liquidity rate, loan to deposit ratio, broad money supply, cash reserve ratio and return on equity. Moreover, the result of the Maximum Eigenvalue Test also confirms the result at the 0.05 level.

Consequently, we resort to the application of the Vector Error Correction Model (VECM). The application of the VECM will identify the long run relationship amongst these variables of interest and tie it to deviations that may occur in the short run.

Table 4. Error Correction Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM	-0.893790	0.037646	-23.74219	0.0000
D(ROE(-1))	0.002884	0.030381	0.094924	0.9245
D(ROE(-2))	-0.026034	0.024727	-1.052885	0.2937
D(MPR(-1))	0.018414	0.341504	0.053922	0.9571
D(MPR(-2))	-0.017652	0.366626	-0.048146	0.9616
D(LTR(-1))	0.311660	0.115294	2.703175	0.0075
D(LTR(-2))	-0.017409	0.121765	-0.142968	0.8865
D(LDR(-1))	0.269301	0.138275	1.947570	0.0529
D(LDR(-2))	-0.009051	0.129978	-0.069632	0.9446
D(CRR(-1))	0.106873	0.230650	0.463358	0.6436
D(CRR(-2))	-0.673852	0.229188	-2.940177	0.0037
D(BMS(-1))	0.019422	0.146452	0.132616	0.8946
D(BMS(-2))	0.120017	0.152169	0.788710	0.4312
C	-4.904455	0.904682	-5.421192	0.0000
R^2	0.978980			
Adj. R^2	0.970700			
Sum sq. resids	1208.276			
S.E. equation	6.050985			
F-statistic	118.2276			
Log likelihood	-142.9900			
Akaike AIC	6.680424			
Schwarz SC	7.231532			
Mean dependent	-5.158936			
S.D. dependent	35.35015			

Author's Computation: Extract from Eviews

From the results table 4 the error correction coefficient is statistically significant and has a negative sign, which confirms a sufficient condition for the variables to be co-integrated. This also implies that the speed at which explanatory variables would adjust from short run disequilibrium to changes in return on equity in order to attain long run equilibrium is 89% within a year.

Table 5 Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
MPR does not Granger Cause ROE	48	0.57758	0.5655	Accept H_o
ROE does not Granger Cause MPR		0.38353	0.6838	Accept H_o
LTR does not Granger Cause ROE	48	1.99997	0.1477	Accept H_o
ROE does not Granger Cause LTR		0.17587	0.8393	Accept H_o
LDR does not Granger Cause ROE	48	7.29569	0.0019	Reject H_o
ROE does not Granger Cause LDR		1.59735	0.2142	Accept H_o
CRR does not Granger Cause ROE	48	0.01855	0.9816	Accept H_o
ROE does not Granger Cause CRR		1.36663	0.2658	Accept H_o
BMS does not Granger Cause ROE	48	0.04565	0.9554	Accept H_o
ROE does not Granger Cause BMS		0.53437	0.5899	Accept H_o

Author's Computation: Extract from E-views

To determine to direction of causality between the explained and explanatory variables, the Engel Granger (1987) causality test was performed on the variables as indicated in the table above. The results in table 5 show that there exist a unidirectional relationship between liquidity ratio and return on equity. In order words liquidity ratio granger cause return on equity. We accept the null hypothesis no causality between all the explanatory variables and the explained variable except for liquidity ratio.

Table 6 OLS Multiple Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	-1.334311	1.238312	-1.077524	0.2871
LTR	0.357208	0.501086	0.712867	0.4797
LDR	0.468830	0.491531	0.953815	0.3454
CRR	-0.251595	0.773540	-0.325251	0.7465

BMS	-0.409757	0.860602	-0.476128	0.6363
C	-2.094107	60.72255	-0.034486	0.9726
R^2	0.079140			
Adjusted R^2	-0.025503			
F-statistic	0.756285			
Prob(F-statistic)	0.586101			
Durbin-Watson stat	1.828089			

Author's Computation: Extract from E-views

From the result table 6 the relative statistics show that of the five explanatory variables under investigation, none of the explanatory variables passed the test of hypothesis as they exhibited insignificant p-values accordingly. From the global statistics the R^2 reported a poor coefficient of 0.079140 which implies that only 7.9% of variation in the explained variable is captured by the explanatory variables however, Durbin Watson statistics shows a coefficient of 1.82089 which is within the acceptable range and thus implies the absence of autocorrelation.

Discussion of Findings
The results of the second model indicate that there exist insignificant positive relationship between liquidity ratio, loan to deposit ratio and money supply to return on equity. While monetary policy rate and cash reserve ratio show a negative relation. The co-integration test shows the existence of long run relationship between the variables. The findings also show that there is unidirectional relationship between liquidity ratio and return on equity while other monetary policy variables have no causality. This is the line with the study carried out by Ogbeifun & Akinola (2019) which examines the impact of monetary policy tools on the performance of deposit money banks in Nigeria.

Conclusion
From the foregoing, the following conclusion was made to justify that the specific objectives of this study are achieved. The relationship between bank performance and monetary policy exists in the long-run, and when there is temporal disequilibrium, return on equity quickly adjust within a short period to the equilibrium position. Since there is evidence that long run influence runs from monetary policy to return on equity. There is need to know which of the variables has the strongest multiplier effects on bank performance. This study concludes that monetary policy rate has the strongest long run impact on financial performance of commercial banks followed by money supply. Monetary policy rate is more sensitive to return on equity, the most sensitive factor to return on equity is liquidity ratio followed by money supply. Thus, the study concludes that a good understanding of the monetary policy actions can be very critical in influencing commercial return on equity.

Recommendations
Based on this, some very pertinent recommendations were offered from the empirical findings of this study as follows:

i.   Managers of commercial banks should be abreast with the development from Central Bank of Nigeria monetary policy actions to achieve increase profitability.
ii.   To maximize shareholder wealth, bank managers should have a good understanding of the monetary policy tools and how it works.
iii.   The monetary policy instruments should be applied properly and timely to achieve high bank returns.

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