

Monetary policy and Commercial Bank performance: Evidence from Nigeria

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Abstract

This study investigates the impact of monetary policy on commercial bank performance in Nigeria from 1990 to 2023, utilizing time series data sourced from the CBN Statistical Bulletin. The dependent variable used in this study is return on equity (ROE), while the independent variables are Money Supply (MS), Interest Rates (INTR), and Exchange Rates (EXR). The data analysis techniques employed include descriptive statistics, unit root tests, bounds cointegration, the Autoregressive Distributed Lag (ARDL) estimation method, and residual diagnostics tests. The Augmented Dickey-Fuller (ADF) unit root tests reveal a mix of I(1) and I(0) series, indicating that the variables differ in their levels of integration. Evidence of cointegration was established, suggesting a long-term equilibrium relationship among the variables. The ARDL long-run results indicate that the impact of money supply on ROE is not statistically significant, with a coefficient of 0.031322 and a probability of 0.6137. This suggests that the long-term effects of money supply fluctuations on bank profitability are minimal. Similarly, neither interest rates nor exchange rates show a significant impact on ROE in the long run, indicating that while these factors affect bank performance in the short run, their long-term effects are negligible. Given these findings, this study concludes that while money supply, interest rates, and exchange rates contribute positively to commercial banks' performance, they do not significantly impact commercial banks' performance in Nigeria in the long run. Thus, it is recommended, among other things, that the Nigerian government should prioritize maintaining a stable monetary policy environment. This stability can foster predictability and confidence, encouraging long-term investment and growth in the banking sector. It is also recommended that the government should work with financial regulators to enhance banks' risk management capabilities, particularly in hedging against short-term exchange rate and interest rate fluctuations. This could include promoting the use of derivatives and other risk management tools.

Key words: Return on Equity, Money Supply, Interest Rates, Exchange Rates, Monetary Policy

INTRODUCTION

In Nigeria, commercial banks and other financial institutions play a crucial role in the economy by channeling idle funds into productive investments. This sector is essential for job creation, economic growth, and the effective allocation of financial resources. The banking sector is instrumental in channeling savings into investments, thus stimulating economic activity and fostering job creation. By providing financial services and credit facilities, banks support businesses and individuals, which in turn promotes overall economic welfare. A well-functioning banking sector can mitigate external economic shocks and contribute to sustainable economic growth (Ojo & Asogwa, 2022). The sector's effectiveness in achieving these outcomes depends on the broader monetary policy framework established by the Central Bank of Nigeria (CBN). The performance of these institutions is closely linked to monetary policy, which governs key factors such as money supply, interest rates, and inflation rates.

Money supply is a fundamental aspect in monetary policy that influences the liquidity available to commercial banks. The CBN uses various tools to manage the money supply, including open market operations, reserve requirements, and the Monetary Policy Rate (MPR). When the CBN adopts contractionary monetary policies to control inflation, such as increasing reserve requirements, it reduces the amount of money available for lending. This reduction in liquidity can impair banks' ability to extend credit, thereby affecting their profitability and ROE (Adeyemi & Onifade, 2023). For example, if the reserve ratio is increased, banks are required to hold a larger portion of their deposits in reserve, limiting their lending capacity and potential income from interest.

Conversely, expansionary monetary policies aimed at increasing money supply can enhance liquidity in the banking system. By lowering reserve requirements or implementing other measures to increase the money supply, the CBN can provide banks with more resources to lend. This increased lending capability can lead to higher income from interest and improved ROE for banks (Nwachukwu & Ezeani, 2023). The ability of banks to capitalize on expansionary policies and manage their lending effectively is crucial for maintaining strong financial performance and supporting economic growth.

Also, interest rates are key tools to monetary policy that directly affects the cost of borrowing and lending rates in the economy. High interest rates, often implemented to combat inflation, can lead to reduced loan demand and increased borrowing costs for businesses and individuals. This can negatively impact banks' earnings from interest, reducing their ROE (Ogundipe & Alabi, 2023). For instance, when the CBN raises interest rates to curb inflation, the cost of credit increases, which can lead to lower loan origination and higher default rates. These factors can diminish banks' profitability and affect their financial stability. On the other hand, lower interest rates can stimulate borrowing and investment by reducing the cost of credit. This can enhance banks' income from interest-bearing assets, leading to higher ROE (Mba & Okeke, 2023). For example, during periods of low interest rates, banks can attract more borrowers, increase their lending volume, and improve their financial performance. The ability to adjust interest rates to support economic growth while managing inflationary pressures is a key aspect of effective monetary policy.

Also, inflation rate affects monetary policy and banking sector performance. This is as a result of its ability to erode the real value of returns on loans and investments, prompting the CBN to

adjust monetary policy to stabilize prices. While such adjustments are necessary to control inflation, they can also impact bank profitability. For instance, in an inflationary environment, the real returns on fixed-rate loans may decrease, leading to reduced income for banks (Ojo & Asogwa, 2022). Hence, effective monetary policy must balance the need for price stability with the goal of supporting favorable conditions for bank profitability. This involves adjusting interest rates and other monetary tools to manage inflation while ensuring that banks can continue to perform well financially. The dynamic interplay between inflation rates, interest rates, and money supply is crucial for maintaining the stability and growth of the banking sector.

However, the banking sector's performance in Nigeria is significantly influenced by monetary policy, particularly through variables such as money supply, interest rates, and inflation rates. The CBN's management of these variables impacts the liquidity available to banks, their lending capacity, and their profitability, as reflected in their equity. The sector's ability to adapt to changes in monetary policy and effectively navigate economic conditions is essential for sustaining its role in economic development.

The management of money supply, interest rates, and inflation rates by the Nigerian government has often yielded mixed results, significantly impacting the country's economic stability and growth. Despite various monetary policies aimed at controlling inflation and stimulating economic activity, persistent issues in managing these variables have led to limited success. For instance, attempts to control inflation through contractionary policies, such as increasing reserve requirements and the monetary policy rate (MPR), have often resulted in reduced liquidity for banks. This reduction in available credit can hinder economic growth by limiting the funds available for investment and consumption, thereby affecting overall economic activity and development.

The high volatility in interest rates has also posed challenges for the Nigerian economy. Frequent changes in the MPR and other policy rates have led to an unpredictable borrowing environment for businesses and consumers. High interest rates, intended to combat inflation, have often led to increased borrowing costs, decreased loan demand, and higher default rates. These factors not only reduce banks' profitability but also dampen private sector investment and consumer spending. Conversely, when interest rates are lowered to stimulate economic growth, it can lead to reduced profit margins for banks and insufficient returns on investment, complicating the economic stability efforts of the government.

Inflation management has been another area where policy efforts have struggled to yield positive results. Persistent inflationary pressures have eroded the real value of returns on loans and investments, impacting banks' profitability and economic stability. While monetary policies aimed at stabilizing prices are crucial, their implementation has sometimes led to unintended consequences, such as reduced consumer purchasing power and increased economic uncertainty. The inability to effectively balance inflation control with economic growth has resulted in a cycle of economic instability, affecting both the financial sector and the broader Nigerian economy. It is against this backdrop, that this study raised the following questions, what is the impact of money supply on return on equity in Nigeria? how does interest rate affect return on equity in Nigeria? what is the effect of exchange rate on return on equity in Nigeria? Therefore, the study examined the impact of monetary policy variables such as

money supply, interest rate and exchange rate on commercial banks performance measured by return on equity in Nigeria.

LITERATURE REVIEW

New endogenous growth theory

This study is anchored on the new endogenous growth theory. Key proponents of the theory are; Paul Romer (1990), Robert Lucas (1988) and Aghion and Howitt (1992). The new endogenous growth theory is a modern development in economic theory that seeks to explain long term economic growth by focusing on factors that are determined within the economic system itself (endogenous factors), rather than external forces (exogenous factors) like technological advancements.

The theory is an economic concept, positing that humans' desires and unlimited wants foster ever-increasing productivity and economic growth. It argues that real gross domestic product (GDP) per person will perpetually increase because of people's pursuit of profits. The new growth theory offered a fresh take on what engineers' economic prosperity. It emphasizes the importance of entrepreneurship, knowledge, innovation, and technology, challenging the view of exogenous growth in neoclassical economics that economic progress is determined by external, uncontrollable forces.

The endogenous growth theory argues that economic growth and prosperity can be influenced by internal processes such as innovation, human capital and investment capital, rather than external forces. As a result, endogenous growth theorists believe that improvement and efficiency in productivity can be attributed to quicker innovation and increased investment in human capital. Consequently, they emphasize the need for government and private sector institutions to encourage innovation and provide incentives for individuals and business to be inventive.

Competition squeezes profit, so people have to constantly seek better ways to do things or invent new products in order to maximize profitability. This concept is one of the central tenets of the new growth theory. The theory argues that innovation and new technologies do not occur simply by random chance. Rather, it depends on the number of people seeking out new innovations or technologies and how hard they are looking for them. People also have control over their knowledge capital—what to study, how hard to study, etc. If the profit incentive is great enough, people will choose to grow human capital and look harder for new innovations.

There is also the central role of the accumulation of knowledge as a determinant of growth i.e., knowledge industries such as telecommunications, electronics, software or biotechnology are becoming increasingly important in developed countries.

Proponents of new endogenous growth theory believe that there are positive externalities to be exploited from the development of a high value- added knowledge economy which is able to develop and maintain a competitive advantage in fast growth within the global economy. They are of the opinion that the rate of technological progress should not be taken as a constant in a growth model, government policies can permanently raise a country's growth rate if they lead to more intense competition in markets and help to stimulate product and process innovation.

They believe that a key source of technological progress is an increase in returns to scale from new capital investment and private sector investment, and that investment in human capital is an essential ingredient of long-term growth. However, one of the weaknesses of the endogenous growth theory is that it is virtually impossible to authenticate with empirical evidence. Also, the endogenous growth theory has been questioned and queried for being based on postulations that cannot be precisely measured.

Regardless of the shortcomings of the new endogenous growth theory, it highlights strong implications for the growth and profitability of commercial banks, as it emphasizes the role of innovation, human capital, and technological progress- all of which are necessary to drive commercial bank growth and profitability.

Quantity theory of money

This study is also anchored on the quantity theory of money as developed by Irving Fisher (1911). The quantity theory of money expresses the relationship between the quantity of money and the price in the form of an equation called “an equation of exchange. The quantity theory of money states that the quantity of money is the main determinant of the price level or the value of money. Any change in the quantity of money produces an exactly proportionate change in the price level. Fisher, stated that all things remaining unchanged, as the quantity of money in circulation increases, the price level also increases in direct proportion and the value of money decreases and vice versa. Thus, the quantity theory of money says that the level of prices varies directly with quantity of money (Ahuja, 2011).

The connection that exists between the quantity of money in circulation and general level of prices has been well debated and explored since the turn of the 20th Century. However, in 1920, Professor Irving Fisher reviewed this idea by introducing the concept of circulation. He argued that money circulates from hand to hand. He began his analyses with a simple identity that states that, in every transaction there are both buyers and sellers, hence, for the aggregate economy the value of sales must equal the value of receipt. The classical theory proposed that money has an important and predictable influence on aggregate economic activities and that it is the important factor for consideration in an attempt to control the level of aggregate economic activities and income.

In the classical theory, the main function of money is to act as a medium of exchange. It is to determine the general level of price at which goods and services will be exchanged. The relationship between money and general level of price is explained in terms of quantity theory of money. The theory states that price level is a function of the supply of money. Irving Fisher, who developed this theory, said that price (P) is a function of money supply (M), the volume of transactions (T) and the velocity of circulation (V). This gave Fisher the following equation:

$$P = f(M, V, T) \tag{1}$$

This equation can then be developed into:

$$MV = PT \tag{2}$$

Where M = Quantity of money

V = Number of times it turns over (or its transaction velocity of circulation) P = the price level.

T = the volume of transaction.

This equation popularly regarded as equation of exchange; it provides the basis for explaining the important of money in the economy. According to Fisher the quantity of money M was determined independent of other three variables in the identity, T the volume of transactions and V the velocity of circulation was equally independent. P, the price level was the only variable that depended on the interaction of the other three. Fisher then proposed that the price level was determined solely by and was proportional to the quantity⁶⁶ of money in circulation. Thus, in second equation (2), if the variables V and T are held constant while M varied, then there must be a proportionate change in p.

This effectively means that an increase in money supply leads to a proportionate increase in prices. This increase in price may expand production and increase the supply of goods and services. Thus, initial increases in money supply led to increase in aggregate economic activities. This theory highlights strong implications for the growth and profitability of commercial banks, as it emphasizes the role of money supply and interest rate in influencing price stability, which is necessary to drive commercial bank growth and profitability. In other words,

Empirical literature

Nyeche, E (2024) Assessed the effects of monetary policy on price stability in Nigeria (1981-2021). The objectives were to determine how money supply, lending rate, monetary policy rate and exchange rate affected the consumer price index, proxy for inflation. Time series data were obtained from the central bank of Nigeria statistical bulletin, national bureau of statistics and world bank development indicators and analyzed using econometrics method of unit root, bounds cointegration and ARDL estimation. The study found that money supply had a positive and insignificant effect on consumer price index while lending rate had a negative and insignificant effect on consumer price index. In addition, monetary policy rate had a positive and significant effect on consumer price index while exchange rate had a negative and significant effect on consumer price index in Nigeria. The study recommended among others that government should implement policies that will stabilize exchange rate, through export diversification and the promotion of local production to boost the economy.

Adeneye, O.A, Moses, O.A and Ezeilo, F.I (2023) examined the effect of monetary policy on economic growth in Nigeria (2004 – 2022). The study revealed that arguments against and in favor of the effect monetary policy of Central Bank of Nigeria have on economic growth in Nigeria is inconclusive with mixed outcomes led to the investigation of the effect of monetary policy on the economic growth in Nigeria between 2004 and 2022. The study employed ex-post facto design with time series data covering the period of 19 years. Econometric technique of Autoregressive distributed lag was used to analyze the study data. Findings of the study revealed that the entire explanatory variables in the study namely; Monetary Policy Rate (MPR), Money Supply (MS), and Lending Interest Rate (LNR) at level equation and period of lag one was statistically significant. In terms of the magnitude,

finding of the study revealed that the ARDL coefficients of MPR, MS and LNR are 1861.613, 5.091207 and -3778.871. This suggested that both MPR and MS have positive impact on economic growth while LNR has negative impact on economic growth. More so, one percent increase in MPR and MS led to approximately, 186 and 509 percent increase in economic growth. In the same vein, one percent increase in LNR will effect -3778 percent decrease in economic growth. As manifested from the findings of this study, the following recommendations are suggested: that monetary policy authority should ensure that status quo should be maintained on both MPR and MS while adjustment should be made on lending rate (LNR) by reducing the rate to encourage investors to borrow for the purpose of investment and subsequently, economic growth.

Akomolafe, K.J, Danladi, J.D, Babalola, O, and Abah, A.G (2015) Monetary policy and commercial banks performance in Nigeria. The study was carried out to examine the impact of monetary policy on commercial banks' performance in Nigeria in a micro-panel analysis. Interest rate and money supply were used as proxies for monetary policy,

while profit before tax (PBT) was used to represent commercial banks' performance. Pooled regression, Fixed effect regression, and random effect regression were all carried out in the analysis. However, Hausman test revealed that fixed effect regression is the most appropriate. The results show that there is a positive relationship between banks' profits and monetary policies as proxied by money supply and interest rate. However, interest rate was not statistically significant at 1% and 5% levels. This study therefore recommends that interest rate policy should be looked into by the monetary authority in a way that is friendly to loan advancement in the country.

Godwin et al., (2019).- monetary policy and commercial banks performance in Nigeria: A Vector Autoregression (VAR) Approach. This paper investigated the effectiveness of monetary policy in enhancing the performance of the Nigerian Commercial Banks in terms of their Profitability, Liquidity and Credit performances for the period 1980 to 2017. The monetary policy variables used were, monetary policy rate, Treasury Bill rates, cash reserve ratio and money supply growth. Applying Vector Autoregression analysis (VAR) on the variables, the study found that overall, monetary policy conduct was effective in enhancing commercial banks performance in Nigeria over the period. Specifically, it was found that monetary policy rate and Treasury Bill rates were positively related to profitability of commercial banks in Nigeria. Also, monetary policy rate, money supply and cash reserve ratio were very effective in improving the credit performance of commercial banks in Nigeria. Furthermore, both monetary policy rate and money supply movements produced positive impact on the liquidity performance of commercial banks at various magnitudes. Hence, the study recommended that a good mix of policy instruments be used to enhance the returns on investment in the Nigerian banking system.

Nguyen, T.N et al., (2017) Impact of monetary policy on commercial bank profit: The Case Of Vietnam. This paper mainly concentrates on examining the impact of monetary policy on commercial banks' profit in Vietnam by using panel data regression. In our study, the data is collected from 20 commercial banks which were doing business in Vietnam's banking market, ranging from 2007 to 2014 in annually frequency. Monetary base (MB), discount rate (DIS) and required reserve ratio (RRR) are used as proxies for monetary policy. Profit before tax (PROFIT) is used to represent commercial banks' performance. The results show that there is

a positive relationship between banks' profits and monetary policies. Among those chosen variables representing SBV's monetary policy, only MB has a significant positive impact on bank's profit at the significance level of 10%. On this premise, the study recommends that MB should be one of the variables in the center of being concerned in the SBV's policies regarding the banking performance and stability.

Osho, A.E and Adelabu, O.E (2020) Monetary policy and financial performance of Quoted Deposit Money Banks in Nigeria. This study examined the effect of monetary policy and financial performance of deposit money banks in Nigeria. Ex-post facto research design was adopted to examine how monetary policy variables affect financial performance measured by return on assets in selected Nigerian deposit money banks over a period of 15 years (2005-2019). The Study is established on Quantity of Money Theory. Multiple regressions were used to estimate the joint and individual effects of monetary policy variables measured by exchange rate, monetary policy rate and maximum bank lending rate on return on assets. The study revealed that the endogenous variables were significantly related with the dependent variable (return on assets). Thus, these independent variables strongly have an impact on the financial performance of deposit, money banks in Nigeria measured by return on assets. It is concluded that monetary policy instruments have been effective for deposit money banks by inducing higher savings, increasing credit supply, stimulating investment which helps these banks to generate higher levels of profitability. Therefore, the Study recommended that the Government should also consistently adopt monetary policies that will help Nigerian banks to improve on their profitability and also there is a need to strengthen monetary policy rate through effective and efficient regulatory and supervisory framework.

Chukwu et al. (2020) Response of Deposit Money Banks to Monetary Policy Dynamics in Nigeria. This study examined how banks react to the monetary policies transmission mechanisms of the central bank of Nigeria. The data employed were collected from Nigerian Deposit Insurance Cooperation and Central Bank of Nigeria and subjected to various econometric techniques. The major findings are that cash reserve ratio negatively and significantly affects the performance of deposit money banks in Nigeria, while other monetary policy variables exert insignificantly to the performance of deposit money banks. It was also found that apart from banks own shock; banks respond negatively to shocks from major monetary policy instruments. It was observed that Monetary Policy Rate causes bank performance in both in the short run and long run. While, Cash Reserve Ratio, Liquidity Ratio and Saving Deposit Rate do not cause bank performance in the short run but in the long run. It was also found that monetary policy instruments jointly cause bank performance in the short and long run as opposed by individual instruments in Nigeria. The researchers therefore suggest among others that central bank of Nigeria reduce the cash reserve ratio to enable deposit money banks extend more loans to their potential customers, thereby enhance performance.

Umar et al., (2022)-The Effect of Monetary Policy on the Performance of Deposit Money Banks in Nigeria. This study broadly seeks to analyze the effect of monetary policy on the performance of deposit money banks in Nigeria. This research was based on secondary source of data extracted out from Central Bank of Nigeria (CBN) statistical bulletin and Index mundi. The Autoregressive Distributed Lag (ARDL) approach to cointegration was applied to achieve the objective. The empirical results revealed that both in the long run and short run, bank lending rate (BLR) has been found to have a significant positive impact on banks loans and

advances (BLA), This means that (BLR) has significant positive impact on the performance of deposit money banks in Nigeria. While liquidity rate (LR) has significant impact in the long run but has no significant impact in the short run likewise interest rate (IR) has no significant impact in the long run but in the short run has significant and positive impact on the performance of deposit money banks. The study concluded that increasing the interest rate can equally lead to improve performance in the short-run as this can motivate customers to save more but this effect will neutralize in the long-run. The study recommends that the central bank of Nigeria should redefine its monetary policy instruments to make them more attractive to the banks. This will make banks to embrace them beyond mere.

C. S. Okaro (2016)-Monetary Policy, the Control of Money Supply and its Effects on the Profitability of Deposit Money Banks in Nigeria (1999-2013). This paper investigated the effects of Monetary Policy and control of money supply on the profitability of Deposit Money Banks (DMBs) in Nigeria from 1999 to 2013. The specific objectives of the study were to: determine the relationship between money supply, the level of credit in the economy, macroeconomic variables (inflationary rate, exchange rate movement, and Real Gross domestic Product and the profitability of DMBs in Nigeria. Three research questions and three hypotheses were raised. Ordinary Least Linear Regression Analysis method was adopted for the study which employed SPSS statistical tool to run the correlation and regression analysis. Data gathered included Quasi Money (QM), Real Gross Domestic Product (RGDP), Exchange Rate (ER), Inflation (INF), Lending Interest Rate (LIR) Real Interest Rate (RIR) Domestic Credit to Private sectors (DCP), Currency in Circulation (CC) and Return on Assets (ROA). The findings revealed among others that; quasi money has insignificant positive relationship with profitability of DMBs, while currency in circulation has insignificant positive relationship with profitability of DMBs in Nigeria. The level of credit in the economy has significant negative relationship with profitability of DMBs. More so, inflation, exchange rate, and real GDP have insignificant relationship with the profitability of the banks. Hence, monetary policy influences the DMBs directly, as well as indirectly through feed-back effects from the economy It is recommended among others that, monetary policy must work in random to create the right macroeconomic framework, create a favourable investment climate by facilitating the emergence of market based interest rate and exchange rate regimes that would attract both domestic and foreign investments, create jobs, promote non-oil export and revive industries that are currently operating far below installed capacity. The government should also endeavor to make the financial sector less volatile and more viable as it is in developed market economies. Finally, given the limitations of monetary policy in Nigeria, it should be used along with government fiscal policy.

Okonkwo et al., (2023)-The Impact of Quantitative Tools of Monetary Policy on the Performance of Deposit Money Banks in Nigeria (1986-2019).The goal of this study is to provide empirical evidence about the impact of commercial bank Treasury bill subscription, monetary policy rate, liquidity ratio, and cash reserve ratio on the profitability of Nigerian deposit money banks. The ex post facto research design was adopted for this investigation. Ordinary Least Square was utilized for a regression analysis of the data. According to the results, there is a strong correlation between treasury bills subscription and private sector lending. The research found that the cash reserve ratio correlates highly with private sector lending. The research suggests that the Nigerian government implement measures that would assist deposit money institutions in the country to enhance their lending facilities, particularly

for the private sector. To make bank borrowing appealing and inexpensive for investors, the monetary authority must also appropriately handle the quantitative instruments of monetary policy.

Gap in Literature/Value addition

An extensive review of related empirical studies revealed that the studies (Okoro, 2016, Osho et al 2020, Nguyen et al 2017, Akomolafe et al 2015) attempted to look at monetary policy influence on commercial banks performance using different mix of independent variables and different dependent variables. However, this study argues that profit before or after tax and return on asset are not the only measures of commercial banks performance and as such, they are limited in the sense of leaving out a key index that shows the true performance of commercial banks in Nigeria. Unlike the other studies that investigated monetary policy and commercial banks performance, this present study seeks to examine the performance of the commercial banks using return on equity in Nigeria over the sampled period of 1990 to 2023.

METHODOLOGY

Research Design

This study employed the *ex-post facto* research design. Time series data which spanned from 1985 to 2023 were obtained from the Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of Statistics (NBS).

Model Specification

Functional forms:

$$ROE = f(MS, INTR, EXR) \quad 3.1$$

Stated in linear form gives:

$$ROE_t = \beta_0 + \beta_1 MS + \beta_2 INTR_t + \beta_3 EXR_t + \mu_t \quad 3.2$$

Where; ROE = return on equity, MS. = money supply, INTR. = interest rate, EXR = exchange rate

A priori Expectation: it is anticipated that the coefficients β_1 to β_3 will be positive ($\beta_1 > \beta_3$)

Formulating the Autoregressive Distributed Lag (ARDL) short and long-run model gives:

$$\Delta ROE_t = \alpha_0 + \sum_{i=1}^q \alpha_1 \Delta ROE_{t-1} + \sum_{i=1}^q \alpha_2 \Delta MS_{t-1} + \sum_{i=1}^q \alpha_3 \Delta INTR_{t-1} + \sum_{i=1}^q \alpha_4 \Delta EXR_{t-1} + \lambda_1 ROE_{t-1} + \lambda_2 MS_{t-1} + \lambda_3 INTR_{t-1} + \lambda_4 EXR_{t-1} + \varepsilon_{1t} \quad 3.4$$

Where: α_0 = constant parameter to be estimated, $\alpha_1 - \alpha_4$ = short run parameters, $\lambda_1 - \lambda_4$ = long-run multipliers, p = optimal lag for each of the dependent variables, q = optimal lag of the independent variables, Δ = first difference operator, ε_{1t} = error terms

Data Analysis Technique

Following the outcome of the unit root test and the establishment of long run relationship from the bounds cointegration results, time series data in this study was estimated using the Autoregressive Distributed Lag (ARDL) approach, developed by Pesaran et al. (2001). This

method was employed to explore the long-run relationship between the variables under investigation. The initiation of the ARDL method or bounds test can be credited to Pesaran and Shin (1999), with further development by Pesaran et al. (2001). A key advantage of the ARDL method is its capability to handle varying lags in different variables, making it highly versatile and attractive. This characteristic ensures a more accurate representation of the data-generating process mechanism. Consequently, the ARDL method can be utilized regardless of whether the time series is stationary at levels (I(0)), stationary at first differences (I(1)), or fractionally integrated (Pesaran et al., 2001). It is crucial to note that within the ARDL framework, the series should not be integrated to order I(2) as this would compromise the F-statistics and critical values established by Pesaran.

4. ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

Unit Root Test

The results of Augmented Dickey-Fuller (ADF) unit root tests are presented in Table 1:

Table 1: ADF unit root test results

Variable	ADF statistics at levels	ADF statistic at 1 st difference	5% critical value	Order of integration
EXR	0.997	-5.545	-2.95	I(1)
INTR	-2.238	-7.204	-2.95	I(1)
MS	-4.764	NA	-2.95	I(0)
ROE	-7.041	NA	-2.95	I(0)

Source: Author's computation from Eviews 12 software

The results of ADF unit root test in the table 1 above shows that money supply (MS) and return on equity (ROE) were stationary in their level form given that their ADF statistic at levels is greater than its corresponding critical values at the 5% level. Consequently, the null hypotheses of unit root for these variables are rejected at the 5% level. The implication of this result is that money supply (MS) and return on equity (ROE) are integrated of order I(0). On the other hand, after first differences, the results show that other variables became stationary as their ADF statistics became greater than the associated critical value at the 5% significance level. This indicates that they are integrated of order one, I(1). Overall, the results show that the variables are mixed integrated, thus, necessitating the application of the bounds cointegration test method.

Bounds Cointegration Test

The bounds cointegration test results are presented in Table 2

Table 2: Summary of bounds cointegration test results

Series: ROA, MS, EXR, INTR		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	6.303158	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.37	3.2

5%	2.79	3.67
2.5%	3.15	3.08
1%	3.65	4.66

Source: Author's computation from E-views 12 software

Note: K denotes the number of regressors

The results of the bounds cointegration in the table 2 above shows that the computed F-statistic (6.303158) is greater than the lower bound value of (2.79) and the upper bound critical value of (3.67) at the 5% significance level. This finding necessitates the rejection of the null hypothesis that no long-run relationships exist among the variables at the 5% significance level. Therefore, it follows from the results that ROE has a long-run relationship with the independent variables used. Based on this finding, this study adopted the ARDL method of analysis.

Model Estimation

The ARDL model was estimated following the evidence of mixed integrated and cointegrated series. The results are presented in Table 3.

Table 3: ARDL short and long run analysis

Short-run results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROA(-1))	1.845072	0.445234	4.144047	0.0020
D(ROA(-2))	1.138394	0.329832	3.451432	0.0062
D(ROA(-3))	0.333309	0.181625	1.835152	0.0964
D(EXR)	-0.004832	0.001829	-2.640971	0.0247
D(EXR(-1))	-0.007709	0.002239	-3.443424	0.0063
D(EXR(-2))	-0.005740	0.002084	-2.754106	0.0203
D(EXR(-3))	-0.010633	0.001999	-5.318772	0.0003
D(INTR)	-0.248973	0.066768	-3.728904	0.0039
D(INTR(-1))	-0.325468	0.065975	-4.933233	0.0006
D(INTR(-2))	-0.147534	0.055575	-2.654652	0.0241
D(INTR(-3))	-0.140393	0.048421	-2.899409	0.0158
D(MS)	-3.382413	1.065859	-3.173414	0.0099
D(MS(-1))	-0.101099	1.315937	-0.076827	0.9403
D(MS(-2))	0.695549	1.249214	0.556789	0.5899
D(MS(-3))	-2.916855	1.209597	-2.411427	0.0366
CointEq(-1)*	-3.574904	0.538191	-6.642447	0.0001

Long-run results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	0.000934	0.000709	1.317243	0.2171
INTR	0.033682	0.046043	0.731537	0.4812
MS	0.031322	0.060122	0.520982	0.6137
C	0.912389	1.391267	0.655797	0.5268

$R^2 = 0.931218$; Adj. R-squared = 0.857523

The results of the ARDL model estimates the impact of monetary policy variables such as money supply (MS), interest rates (INTR), and exchange rates (EXR) on the performance of commercial banks in Nigeria, using return on equity (ROE) as the dependent variable. The results offer insights into both short- and long-run relationships, revealing notable differences in how monetary factors influence bank profitability.

In the short run, the ARDL results shows that return on equity (ROA) indicates that previous performance strongly affects current profitability. The first, second, and third lags of ROA are all positive, with coefficients of 1.845072 ($p = 0.0020$), 1.138394 ($p = 0.0062$), and 0.333309 ($p = 0.0964$), respectively. This indicates a substantial persistence in bank performance, where past profitability significantly impacts present outcomes.

The exchange rate shows a negative effect and statistically significant impact on return on equity in the current period, indicating that a unit increase in exchange rate decreases return on equity in Nigeria by -0.004832. Similarly, the same follows across its lags. The first lag (-0.007709, $p = 0.0063$), second lag (-0.005740, $p = 0.0203$), and third lag (-0.010633, $p = 0.0003$) show that a unit increase in exchange rate significantly reduce return on equity in the short run in Nigeria, indicating vulnerability to currency depreciation in the short run. On the other hand, In the long run, the exchange rate has a positive but not statistically significant impact on return on equity in Nigeria, indicating that a unit increase in exchange rate increases return on equity by 0.000934 units in the long run.

Furthermore, the results show that interest rates exhibit a pronounced negative short-run effect on commercial banks' return on equity in Nigeria. The immediate impact is highly significant (-0.248973, $p = 0.0039$), and the negative influence persists through the first lag (-0.325468, $p = 0.0006$), second lag (-0.147534, $p = 0.0241$), and third lag (-0.140393, $p = 0.0158$). Indicating that a unit increase of interest rates are associated with return on equity in the current period, lag 1-3 in Nigeria in the short run. On the other hand, the long-run results for interest rates are positive (0.033682) but not statistically significant ($p = 0.4812$), suggesting that over time, a unit increase in interest rate variations increases return on equity in Nigeria by 0.033682 units.

In addition, the effect of money supply on ROA is more complex. While the current period effect is significantly negative (-3.382413, $p = 0.0099$), the lagged effects are mixed. The second lag shows an insignificant positive relationship, but the third lag indicates a return to negative significance (-2.916855, $p = 0.0366$), implying that in the short-term, a unit increases in money supply decreases return on equity in Nigeria by -3.382413, -0.101099, and -2.916855 units in the current period, lags 1 and 3 in the short run. On the other hand, the results show that money supply exhibits a positive and not statistically significant positive relationship (0.031322, $p = 0.6137$) in the long run. This suggests that a unit increase in the money supply increases return on equity in Nigeria by 0.031322 units.

The error correction term (CointEq(-1)) is both negative and highly significant (-3.574904, $p = 0.0001$), suggesting a strong correction mechanism in response to deviations from the long-run equilibrium. This implies that any short-term shocks to ROA are quickly corrected, with approximately 357% of the disequilibrium adjusted in each period.

The goodness of fit for the model is strong, with an R-squared value of 0.931218, indicating that approximately 93% of the variation in commercial bank performance (ROA) is explained

by the monetary policy variables. The adjusted R-squared is 0.857523, reflecting the model's high explanatory power even after accounting for the number of predictors.

Residual Diagnostics Tests

The residual diagnostics tests for the study, "Relationship Between Environmental Sustainability and Economic Performance in Nigeria," provide crucial insights into the reliability of the model results.

Serial Correlation LM Test

The Breusch-Godfrey Serial Correlation LM Test is used to detect the presence of autocorrelation in the residuals of a model

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.402818	Prob. F(2,8)	0.3004
Obs*R-squared	7.789367	Prob. Chi-Square(2)	0.0203

Source: Author's computation using Eviews12 software

In this case, the F-statistic is 1.402818, with a corresponding probability (Prob. F) of 0.3004. Since the p-value is greater than the conventional threshold of 0.05, we fail to reject the null hypothesis of no serial correlation. Similarly, the Obs*R-squared value is 7.789367, with a p-value of 0.0203, which further confirms that there is evidence of serial correlation in the residuals.

Heteroskedasticity Test

The Breusch-Pagan-Godfrey Heteroskedasticity Test checks whether the residuals have constant variance, an assumption critical to the validity of Ordinary Least Squares (OLS) estimates.

Table 5: Breusch-Pagan-Godfrey

F-statistic	0.650302	Prob. F(19,10)	0.7987
Obs*R-squared	16.58062	Prob. Chi-Square(19)	0.6183
Scaled explained SS	2.712084	Prob. Chi-Square(19)	1.0000

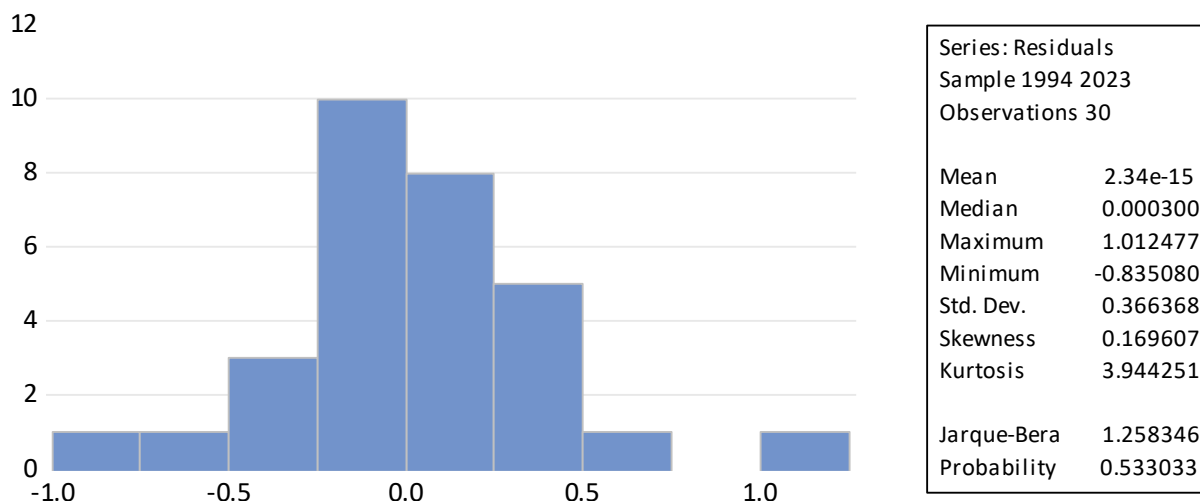
Source: Author's computation using Eviews12 software

The F-statistic here is 0.650302, and the Prob. F is 0.7987, well above the 0.05 threshold. The Obs*R-squared value is 16.58062 with a p-value of 0.6183, and the Scaled explained SS has a p-value of 1.0000. Since all p-values exceed 0.05, we fail to reject the null hypothesis of homoskedasticity, suggesting that the residuals have constant variance. This indicates that the model does not suffer from heteroskedasticity, making the parameter estimates efficient and unbiased.

Normality Test

The Jarque-Bera test assesses whether the residuals follow a normal distribution, which is another key assumption of OLS.

Figure 4.1: Jarque Bera



Source: Author's computation using Eviews12 software

The test reports a Jarque-Bera statistic of 1.258346 with a probability value of 0.533033. Since the p-value is greater than 0.05, we fail to reject the null hypothesis that the residuals are normally distributed. The skewness (0.169607) and kurtosis (3.944251) values are also within acceptable ranges, supporting the conclusion of normality.

Discussion of Findings

The ARDL short and long-run results provide valuable insights into the dynamics of commercial bank performance in Nigeria, as measured by return on equity (ROE). The analysis reveals that previous performance strongly influences current profitability. Specifically, the first, second, and third lags of ROE are all positive, with coefficients of 1.845072 ($p = 0.0020$), 1.138394 ($p = 0.0062$), and 0.333309 ($p = 0.0964$), respectively. This indicates a substantial persistence in bank performance, where past profitability significantly impacts present outcomes (Athanasoglou, Brissimis, and Delis, 2008).

The exchange rate shows a negative and statistically significant impact on ROE in the current period, with a coefficient of -0.004832. This suggests that a unit increase in the exchange rate decreases ROE in Nigeria. Similarly, the first lag (-0.007709, $p = 0.0063$), second lag (-0.005740, $p = 0.0203$), and third lag (-0.010633, $p = 0.0003$) of the exchange rate also exhibit significant negative effects. These findings indicate that currency depreciation significantly reduces ROE in the short run, highlighting the vulnerability of Nigerian banks to exchange rate fluctuations (Klein and Shambaugh, 2010). In contrast, the long-run impact of the exchange rate on ROE is positive but not statistically significant (0.000934, $p > 0.05$), suggesting that the adverse effects of exchange rate changes may dissipate over time.

Interest rates exhibit a pronounced negative short-run effect on commercial banks' ROE in Nigeria. The immediate impact is highly significant (-0.248973, $p = 0.0039$), and the negative influence persists through the first lag (-0.325468, $p = 0.0006$), second lag (-0.147534, $p = 0.0241$), and third lag (-0.140393, $p = 0.0158$). This indicates that increases in interest rates are associated with decreases in ROE in the current period and subsequent periods (Bernanke and Blinder, 1992). However, the long-run results for interest rates are positive (0.033682) but not statistically significant ($p = 0.4812$), suggesting that the negative short-run effects may not persist in the long run.

The effect of money supply on ROE is more complex. While the current period effect is significantly negative (-3.382413, $p = 0.0099$), the lagged effects are mixed. The second lag shows an insignificant positive relationship, but the third lag indicates a return to negative significance (-2.916855, $p = 0.0366$). This implies that increases in money supply decrease ROE in the short term, with varying effects over different lags (Friedman and Schwartz, 1963). In the long run, money supply exhibits a positive but not statistically significant relationship with ROE (0.031322, $p = 0.6137$), suggesting that the short-term negative effects may not be sustained over the long term.

CONCLUSION AND RECOMMENDATIONS

This study explores the empirical impact between monetary policy and commercial bank performance in Nigeria from 1990 to 2023. Monetary policy was measured using money supply (MS), interest rates (INTR) and exchange rates (EXR) while commercial bank performance was measured using Return on equity (ROE). Time series data for the variables were sourced from CBN Statistical Bulletin 2023. Analytical methods employed encompass descriptive statistics, unit root tests, bounds cointegration, ARDL estimation, and residual diagnostic tests. Based on the findings, the study concludes that money supply, interest rates, and exchange rates contribute positively on commercial banks performance but it does not significantly impact commercial banks performance in the country.

Recommendations

Based on the findings, the study makes the following recommendations:

1. The Nigerian government should prioritize maintaining a stable monetary policy environment. This stability can foster predictability and confidence, encouraging long-term investment and growth in the banking sector.
2. Government should work with financial regulators to enhance banks' risk management capabilities, particularly in hedging against short-term exchange rate and interest rate fluctuations. This could include promoting the use of derivatives and other risk management tools.
3. Nigerian government should reinforce bank supervision and ensure adequate capital requirements. Robust capital buffers can help banks withstand short-term shocks, protecting their profitability and maintaining financial stability. Additionally, regular stress tests should be conducted to assess banks' resilience to adverse market conditions.

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