



Impact of Monetary Policy Tools on the Profitability of Deposit Money Banks in Nigeria

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ABSTRACT

A stable financial system is essential for promoting economic growth, efficiently allocating resources, and providing a secure environment for depositors' funds. In Nigeria, however, the profitability of deposit money banks has been a persistent concern (as evidenced by the continued decline in Return on Assets (ROA)) despite various reform measures implemented by the Central Bank of Nigeria (CBN). This study therefore investigated the impact of monetary policy tools on the profitability of deposit money banks in Nigeria, with a focus on the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR). Using the Auto Regressive Distributive Lags (ARDL) model (which examines both short-term and long-term dynamics), the findings revealed that the MPR had a negative and statistically significant impact on bank profitability, indicating that higher interest rates increased borrowing costs and reduced net interest margins. Conversely, the CRR positively influenced profitability by encouraging prudent risk management and promoting high-quality lending. The LR negatively affected profitability by constraining investment opportunities due to the need to maintain higher liquidity levels. Based on these findings, several recommendations were made. The Central Bank of Nigeria (CBN) should adopt a more gradual approach to interest rate adjustments, ensuring that changes are supported by thorough market analyses to maintain manageable borrowing costs. Additionally, the CBN should periodically review CRR levels in collaboration with the Bankers' Committee to align them with banking sector growth objectives. Furthermore, to address the negative impact of the LR, the CBN and the Nigerian Financial Intelligence Unit (NFIU) should develop guidelines encouraging banks to adopt innovative

liquidity management practices that balance regulatory compliance with investment flexibility. These recommendations aim to enhance banking sector profitability while supporting overall financial stability.

Keywords: Monetary Policy Rate, Cash Reserve Ratio, Liquidity Ratio, and Return on Assets
JEL Codes: E52, E58, E51 and G32

I. Introduction

Monetary policy tools are crucial instruments employed by central banks worldwide to regulate money supply, control inflation, and foster economic stability. These tools have evolved over time, with central banks in both developed and emerging economies adapting their approaches to address unique economic challenges.

In the global framework, monetary policy tools have varied effects based on the economic structure and the specific challenges of each region. In advanced economies like the United States and the European Union, central banks often utilize these tools to manage inflation and unemployment levels. For instance, the Federal Reserve's adjustments to the federal funds rate significantly influence economic activity (Bernanke, 2020). However, the situation in developing regions, such as Sub-Saharan Africa, is more dynamic. These economies often face unique challenges like exchange rate volatility, fiscal imbalances, and external shocks, which require a guided approach to monetary policy (IMF, 2021).

Nigeria, as a key economy in sub-Saharan Africa, has experienced significant evolution in its monetary policy framework. The Central Bank of Nigeria (CBN) employs various tools to achieve its monetary policy objectives, with particular emphasis on the Monetary Policy Rate (MPR), Cash Reserve



Ratio (CRR), and Liquidity Ratio. The MPR serves as the benchmark interest rate, influencing the overall interest rate structure in the economy. The CBN adjusts the MPR to either stimulate or restrain economic activity, with recent years seeing fluctuations in response to economic conditions. For instance, in 2020, the CBN reduced the MPR from 13.5% to 11.5% to mitigate the economic impact of the COVID-19 pandemic (Central Bank of Nigeria, 2022). The CRR, which represents the proportion of customer deposits that banks must hold as reserves with the central bank, has been used actively by the CBN to manage liquidity in the banking system. In recent years, the CRR has been maintained at a relatively high level of 27.5% to curb excess liquidity and manage inflation (Ekezie et al., 2020). The Liquidity Ratio, which stipulates the minimum proportion of liquid assets to total assets that banks must maintain, is another key tool used by the CBN to ensure banks can meet their short-term obligations. As of 2021, the Liquidity Ratio requirement for Nigerian banks stood at 30% (Central Bank of Nigeria, 2021).

Globally, the financial sector, particularly deposit money banks, plays a crucial role in the economic development of any nation (Aristi & Hafiar, 2014). Ideally, these institutions should maintain robust profitability to ensure financial stability, foster economic growth, and contribute to overall societal welfare. Profitable banks are better positioned to withstand economic shocks, extend credit to businesses and individuals, and support government initiatives for economic development. In Nigeria, as in many developing economies, the banking sector is expected to be a catalyst for economic transformation, driving investment and facilitating financial intermediation.

Banks' profitability could be measured using indicators such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). Return on Assets, specifically, reflects how efficiently a bank is utilizing its assets to generate profits (Brealey et al., 2020). In regions with stable economic environments and effective monetary policies, banks often report higher profitability. For instance, in the United States, the ROA for banks has remained relatively stable, averaging around 1.2% from 2015 to 2020 (FDIC, 2021). This stability is attributed to sound monetary policies and a diversified economy.

In Nigeria, however, the reality on the ground presents a different scenario. Nigerian deposit money banks have faced significant challenges in maintaining consistent profitability over the past decade. According to data from the Nigeria Deposit

Insurance Corporation (NDIC), the average Return on Assets (ROA) for Nigerian banks fluctuated considerably between 2010 and 2020, ranging from a high of 3.5% in 2012 to a low of 2.9% in 2016 (NDIC, 2021). This volatility in profitability measures highlights the vulnerability of the banking sector to both internal and external shocks, including macroeconomic instability, regulatory changes, and global financial trends.

In light of these challenges, policymakers and regulatory authorities in Nigeria have implemented various measures to enhance the profitability and stability of deposit money banks. The Central Bank of Nigeria (CBN) has employed a range of banking sector reforms and recapitalisation strategies, to influence banking sector performance. Despite these policy interventions, the profitability of Nigerian deposit money banks continues to face significant pressures.

Therefore, given the critical role of monetary policy tools in influencing the profitability of deposit money banks, the present analysis is essential due to the significant fluctuations in the financial performance of these banks in Nigeria in recent years. By analysing available empirical evidence and applying appropriate analytical techniques, this study seeks to provide a comprehensive understanding of the relationship between these monetary policy instruments and bank profitability in the Nigerian framework.

The study thus addressed the following research questions:

- i. How has Monetary policy rate impacted on return on assets of deposit money banks in Nigeria?
- ii. To what extent does Cash reserve ratio impact on the return on assets of deposit money banks in Nigeria?
- iii. What impact does Liquidity ratio has on the return on assets of deposit money banks in Nigeria?

In line with the questions, the following hypotheses were also addressed:

H₀₁: Monetary policy rate has not significantly enhanced the return on assets of deposit money banks in Nigeria.

H₀₂: Cash reserve ratio has no significant impact on the return on assets of deposit money banks in Nigeria.

H₀₃: Liquidity ratio does not have a significant impact on return on assets of deposit money banks in Nigeria.



II. Literature Review

Conceptual Review

Monetary Policy Tools

Monetary policy tools are fundamental instruments used by central banks to manage a nation's economic stability by influencing the cost and availability of money and credit. These tools are designed to control inflation, stabilize currency, and achieve sustainable economic growth. Among the most significant monetary policy tools are the Monetary Policy Rate (MPR), the Cash Reserve Ratio (CRR), and the Liquidity Ratio (LR). Each of these instruments has distinct functions and implications for financial systems, particularly in shaping the profitability and operations of deposit money banks.

The Monetary Policy Rate (MPR), also known as the policy interest rate, is a critical tool used by central banks to influence economic activity and inflation. According to Bernanke (2020), the MPR serves as a benchmark interest rate at which commercial banks can borrow from the central bank, thereby affecting the lending rates to businesses and consumers. When the MPR is increased, it raises the cost of borrowing, discouraging spending and investment, which in turn can help control inflation. Conversely, a reduction in the MPR lowers borrowing costs, encouraging economic activity and investment, but with the risk of increasing inflation (Mishkin, 2019). In the Nigerian context, the Central Bank of Nigeria adjusts the MPR to address domestic economic challenges, such as inflation and growth fluctuations. For instance, between 2016 and 2023, the MPR has been adjusted multiple times to respond to changing economic conditions (CBN, 2023).

The Cash Reserve Ratio (CRR) is another vital monetary policy tool, defined as the percentage of a bank's total deposits that must be kept in reserve and not lent out. This tool directly impacts the money supply in the economy. As noted by Friedman (2018), a higher CRR means that banks have less money to lend, leading to a reduction in the money supply, which can help control inflationary pressures. Conversely, a lower CRR increases the funds available for banks to lend, stimulating economic activity. In Nigeria, the CRR is frequently used to regulate liquidity in the banking sector and ensure monetary stability (Emefiele, 2020). During periods of economic uncertainty, the CRR may be adjusted to either tighten or ease liquidity conditions.

The Liquidity Ratio (LR) is a measure that ensures banks maintain a certain level of liquid assets compared to their overall liabilities. This ratio is crucial for maintaining the stability and solvency of banks, as it ensures they can meet short-term

obligations and customer withdrawals. As highlighted by Goodhart (2019), a high liquidity ratio indicates that a bank has a significant cushion of liquid assets, which can enhance confidence among depositors and investors. However, maintaining a high liquidity ratio can also limit a bank's profitability by reducing the funds available for investment and lending. In Nigeria, the CBN mandates a specific liquidity ratio requirement to safeguard the banking system against liquidity crises and ensure financial stability (Olanrewaju & Folarin, 2021).

Conceptually, these monetary policy tools are interconnected and play a critical role in shaping the economic environment. The adjustments in the MPR, CRR, and LR by central banks are often guided by economic conditions, such as inflation rates, growth objectives, and external economic shocks. For example, changes in the MPR directly affect interest rates across the economy, influencing borrowing, spending, and investment behaviours. The CRR, by controlling the amount of money banks can lend, directly impacts credit availability and economic activity. Similarly, the LR ensures that banks remain solvent and capable of meeting their obligations, thereby enhancing financial stability.

Deposit Money Banks Profitability

Profitability is a critical measure for assessing the financial health and performance of deposit money banks. It reflects the ability of banks to generate income relative to their assets and operational costs. Among the various measures of bank profitability, Return on Assets (ROA) is widely recognized and utilized by researchers and financial analysts to gauge how effectively a bank is using its assets to generate earnings. ROA is defined as the ratio of net income to total assets and provides insights into a bank's operational efficiency and financial management (Brealey et al., 2020).

The concept of profitability, particularly as measured by ROA, is vital for understanding the competitive position of banks in the financial sector. According to Molyneux and Thornton (2016), ROA is an essential indicator of a bank's performance because it accounts for the profits generated from total assets without being influenced by financial leverage. A higher ROA indicates that a bank is more efficient in utilizing its assets to produce income, whereas a lower ROA may suggest inefficiencies or challenges in the bank's operations or market environment.

The profitability of Nigerian banks, as measured by ROA, is also influenced by internal factors such as cost management, asset quality, and revenue diversification. Efficient cost management



practices, including optimizing operating expenses and enhancing productivity, contribute to higher ROA (Olaniyi & Olabisi, 2020). Additionally, maintaining high asset quality through prudent credit risk management ensures that banks can minimize non-performing loans and associated losses, thereby supporting profitability.

Theoretical Review

The theoretical underpinning for this study is the Bank Lending Channel Theory, which was developed by Ben Bernanke and Alan Blinder in 1988. This theory extends the traditional view of monetary policy transmission by emphasizing the role of bank lending in the process. The Bank Lending Channel Theory posits that changes in monetary policy affect not only the overall level of interest rates but also the supply of bank loans, which in turn impacts economic activity and bank profitability (Bernanke & Blinder, 1988).

The Bank Lending Channel Theory suggests that monetary policy actions, such as changes in the Monetary Policy Rate (MPR) or Cash Reserve Ratio (CRR), can affect banks' ability and willingness to extend credit. For instance, a contractionary monetary policy that increases the CRR may reduce banks' loanable funds, leading to a decrease in the supply of bank loans. This reduction in loan supply can potentially impact banks' interest income and overall profitability. Conversely, an expansionary policy might increase the availability of loanable funds, potentially boosting loan growth and profitability (Kashyap & Stein, 1994).

The significance of this theory in the study lies in its portrayal of how monetary policy tools directly influence bank behaviour and profitability. It provides a framework for understanding how changes in the MPR, CRR, and Liquidity Ratio affect banks' lending decisions, which ultimately impact their Return on Assets (ROA). For example, when the Central Bank of Nigeria adjusts the MPR, it affects banks' cost of funds, influencing their lending rates and potentially their profitability.

The strength of the Bank Lending Channel Theory lies in its explicit recognition of banks as active participants in the monetary transmission mechanism, rather than passive intermediaries. This perspective is particularly relevant in developing economies like Nigeria, where bank lending plays a crucial role in financing economic activities. The theory provides a clear link between monetary policy actions and bank profitability, offering a solid foundation for analysing the impact of monetary policy tools on the performance of deposit money banks in Nigeria.

However, a criticism comes from Peek and Rosengren (1995), who pointed out that the effectiveness of the bank lending channel can vary significantly across different types of banks and economic conditions. They argued that factors such as bank size, capital adequacy, and the overall health of the banking sector can influence how banks respond to monetary policy changes, potentially leading to heterogeneous effects on profitability.

Despite these criticisms, the Bank Lending Channel Theory remains highly relevant to the present study on the impact of monetary policy tools on the profitability of deposit money banks in Nigeria. It provides a theoretical foundation for examining how changes in the MPR, CRR, and Liquidity Ratio might affect banks' lending behaviour and, consequently, their profitability as measured by ROA. By influencing banks' ability to extend credit, these policy tools directly impact banks' interest income and profitability as measured by Return on Assets (ROA).

Empirical Review

Research on the impact of monetary policy tools on the profitability of deposit money banks has been a focus of numerous studies globally. These studies have explored the various ways in which monetary policy adjustments influence banking sector profitability and have employed a variety of methodologies to uncover empirical evidence.

Liu and Chen in 2023 focused on the effect of monetary policy on the profitability of banks in the United States, using data from 2010 to 2022. This research utilized a dynamic panel data model, specifically the System Generalized Method of Moments (GMM), to account for potential endogeneity and capture the long-term effects of monetary policy on bank performance. The study found that the Federal Reserve's policy of maintaining low interest rates in the aftermath of the global financial crisis and the COVID-19 pandemic contributed to a reduction in net interest margins, thereby negatively impacting bank profitability. However, the study also noted that banks with diversified income streams, particularly those with significant non-interest income, were better able to maintain profitability despite the low interest rate environment. While the study provided a comprehensive analysis of the U.S. banking sector, it primarily focused on interest rates and did not extensively explore other monetary policy tools such as quantitative easing, which played a significant role in the Fed's response to economic challenges. Additionally, the study's findings might be less applicable to banking systems in countries with



different regulatory frameworks and economic conditions.

A study by Patel and Roy (2023) examined the effects of monetary policy on the profitability of banks in emerging markets, focusing on Brazil, Russia, India, China, and South Africa (BRICS countries) during the period from 2012 to 2022. The researchers employed a fixed-effects panel data model to investigate how changes in the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR) influenced bank profitability across these diverse economic contexts. The study found that while a lower MPR generally supported bank profitability by encouraging lending and investment, variations in the CRR had differing impacts across the BRICS countries due to varying regulatory environments and financial structures. Banks in more regulated environments experienced more significant challenges in maintaining profitability when reserve requirements were high. This research provided valuable cross-country insights into the effectiveness of monetary policy tools but faced limitations in accounting for the unique economic and political contexts within each BRICS nation that could affect the observed outcomes. Furthermore, the study's focus on aggregate results for the BRICS countries may mask important country-specific dynamics and interactions.

In 2022, Gupta and Sengupta conducted a study examining the impact of monetary policy on the profitability of Indian banks in the aftermath of the COVID-19 pandemic. This study covered the period from 2019 to 2022 and utilized a panel data analysis approach. The researchers employed the fixed-effects model to analyze how changes in the Reserve Bank of India's policy rates and the Cash Reserve Ratio (CRR) influenced bank profitability, as measured by Return on Assets (ROA). The findings revealed that the policy of reducing interest rates during the pandemic had a mixed impact on bank profitability. While lower interest rates improved loan demand, they also compressed net interest margins due to reduced lending rates. Additionally, the study highlighted that banks with a higher reliance on interest income faced more significant profitability challenges compared to those with diversified income sources. Despite providing critical insights into the Indian banking sector's response to monetary policy changes, the study primarily focused on interest rate impacts, potentially overlooking other significant factors, such as changes in the regulatory environment and digital banking trends, which could influence profitability.

Adeboye and Aluko (2020) conducted a study examining the effects of the Cash Reserve Ratio (CRR) on bank profitability in Nigeria. They utilized a panel data analysis approach, employing fixed-effects regression models to analyse data from Nigerian banks over the period 2010 to 2019. Their findings indicated that an increase in the CRR was positively associated with bank profitability, as measured by Return on Assets (ROA) and Return on Equity (ROE). The authors suggested that higher reserve requirements might encourage banks to adopt more prudent risk management practices and focus on high-quality lending, ultimately enhancing profitability. This study provided important insights into the Nigerian banking sector, highlighting how regulatory policies could support financial stability and profitability. However, it primarily focused on domestic monetary policy factors, potentially overlooking external influences such as global economic conditions and international financial trends, which could also affect bank profitability. Furthermore, the study's reliance on a single-country context may limit the generalizability of its findings to other economic settings.

Another insightful empirical study by Obamuyi and Olayiwola (2019) focused on the Nigerian banking sector, exploring the impact of monetary policy on the performance of deposit money banks. The study analysed data from 2010 to 2018, using an econometric model with multiple regression analysis to examine how changes in the interest rate, open market operations, and Liquidity Ratio influenced banks' ROE. The findings indicated that an increase in the Monetary Policy Rate was associated with higher bank profitability, as banks in Nigeria effectively adjusted their lending rates to maintain profit margins. However, an increase in the Cash Reserve Ratio was found to negatively impact profitability due to the restricted ability of banks to extend loans. This study showed the dual effects of monetary policy tools, emphasizing the delicate balance required in policy implementation to support bank profitability without undermining economic growth. While the study provided valuable insights into the Nigerian banking sector, its conclusions were specific to the local economic context, which may limit their relevance to other countries with differing regulatory environments and market conditions. Additionally, the study did not fully explore the potential impact of external shocks, such as fluctuations in oil prices, which significantly affect the Nigerian economy and banking sector.

Ojeaga, et al., in 2018 focused on the impact of monetary policy on bank profitability in Nigeria. Covering a period from 2010 to 2017, the study



employed a multiple regression analysis to assess how variations in the Monetary Policy Rate, Cash Reserve Ratio, and Liquidity Ratio influenced the profitability of deposit money banks, with ROA as the primary measure. The authors found that a decrease in the Cash Reserve Ratio and an increase in the Monetary Policy Rate were associated with higher bank profitability in Nigeria. This outcome suggested that Nigerian banks benefited from increased loanable funds and higher lending rates, which boosted their income despite potential increases in default risk. The study effectively highlighted the dynamic between monetary policy adjustments and profitability in the Nigerian banking sector, but its findings were context-specific, potentially limiting their application to other countries with different economic structures and financial systems. Additionally, the study did not fully consider the external economic factors that could have influenced profitability, such as international market conditions or local fiscal policies, which might have provided a more comprehensive understanding of the observed trends.

A comprehensive study conducted by Korkmaz (2018) investigated the impact of monetary policy on bank profitability within the European Union (EU) banking sector. Covering the period from 2008 to 2016, the study employed a panel data approach with a fixed-effects model to analyse how changes in key monetary policy tools affected bank profitability as measured by Return on Assets (ROA) and Return on Equity (ROE). The findings revealed that the Monetary Policy Rate (MPR) had a significant impact on bank profitability, with lower interest rates during the quantitative easing period resulting in compressed net interest margins and reduced profitability for EU banks. This study provided an important perspective on the challenges faced by banks in a low-interest-rate environment, highlighting the pressure on traditional banking models reliant on interest income. However, the research largely focused on interest rate impacts, potentially overlooking other significant monetary policy tools such as the Cash Reserve Ratio and Liquidity Ratio, which can also influence bank profitability. Additionally, the study's emphasis on the EU limits its applicability to regions with different economic conditions and banking structures.

Claessens, et al., (2018) investigated the impact of prolonged low-interest rates on bank profitability using a cross-country dataset covering banks in advanced economies from 2005 to 2015. The authors employed a panel data analysis methodology with fixed effects to assess how low-

for-long interest rate environments affected banks' net interest margins and profitability metrics. Their findings revealed that prolonged low-interest rates negatively impacted banks' profitability, primarily through the compression of net interest margins, as banks faced difficulties in adjusting their lending rates to maintain income levels. This study provided valuable insights into the challenges banks face in low-interest-rate environments and highlighted the importance of diversification and non-interest income to sustain profitability. While offering important findings, the research predominantly focused on interest rate effects, potentially underemphasizing other factors like regulatory policies or technological advancements that might influence bank profitability. Additionally, the study's emphasis on advanced economies may not capture the diverse experiences of banks in emerging markets or regions with different economic conditions.

Fernández de Guevara and Maudos (2017) conducted an empirical study to examine the impact of market power on bank risk-taking behaviour across four European countries: Germany, Spain, Italy, and the United Kingdom. The study utilized data from 2004 to 2012 and applied panel data regression models to assess how market concentration affects banks' propensity to engage in risky financial activities. The findings revealed that increased market power led to higher risk-taking among banks, as greater concentration often reduces competition and encourages riskier behaviour in pursuit of higher profits. This research provides critical insights into the potential downsides of reduced competition within the banking sector, emphasizing the importance of regulatory oversight to mitigate excessive risk-taking. However, the study primarily focused on European countries, potentially limiting the generalizability of its findings to other regions with different banking structures and regulatory environments. Additionally, while the study highlights the connection between market power and risk, it may underemphasize the role of other factors such as technological advancements or macroeconomic conditions that could also influence bank risk-taking behaviour.

Kiser and Prager (2017) investigated the impact of significant reserve requirements on bank profitability using a comprehensive dataset covering banks across multiple countries from 2001 to 2015. The authors utilized a cross-country regression analysis to assess how variations in reserve requirements influence banks' net interest margins and overall profitability. Their findings suggested that high reserve requirements constrain bank profitability by limiting the amount of funds available



for lending and investment. The study highlighted the trade-off between ensuring financial stability through adequate reserves and the potential negative impact on profitability. However, the analysis primarily focused on the direct effects of reserve requirements, potentially underestimating the influence of other regulatory or market dynamics that might interact with reserve policies. Additionally, the study's broad cross-country approach may overlook country-specific factors such as differences in financial systems or economic conditions that could affect the observed relationships.

Gambacorta and Shin (2016) explored the significance of bank capital for the transmission of monetary policy. Using a dataset spanning banks in various countries from 2000 to 2013, the study employed dynamic panel data models to examine how capital buffers influence banks' lending behaviour in response to changes in monetary policy. The results indicated that well-capitalized banks are more resilient to monetary policy shocks and are better positioned to maintain stable lending activities even during periods of policy tightening. This highlights the critical role of bank capital in enhancing financial stability and smoothing the effects of monetary policy across the economy. While the study provides valuable insights into the interaction between capital and monetary policy, it largely concentrates on the aggregate effects, potentially overlooking bank-specific factors such as management quality or strategic choices that can also impact responses to monetary policy changes. Furthermore, the focus on data up to 2013 may not fully reflect the evolving dynamics of banking regulation and capital requirements in the post-crisis era.

Cebenoyan and Strahan (2015) explored the relationship between risk management, capital structure, and lending at banks using data from U.S. commercial banks from 2002 to 2013. The authors applied a combination of panel data regression and instrumental variable techniques to account for endogeneity and identify the causal effects of risk management practices on bank behaviour. The study found that banks with stronger risk management frameworks were more likely to engage in lending activities and maintain a more balanced capital structure. Moreover, these banks exhibited higher profitability and lower default risk. The research highlighted the significance of robust risk management in enhancing bank performance and stability. Despite its contributions, the study largely concentrated on internal bank practices, not fully addressing how external factors such as regulatory changes or macroeconomic shocks might impact risk

management effectiveness. Additionally, the focus on U.S. banks may not reflect the unique challenges faced by banks in other jurisdictions, potentially limiting the applicability of the findings across different banking systems.

III. Data and Methods

The study adopted an ex-post facto research design, which is appropriate for investigating the impact of monetary policy tools on bank profitability. This design involves analysing historical data to understand cause-and-effect relationships without manipulating the independent variables, in this case, monetary policy tools like the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR). By examining pre-existing data from financial statements and central bank reports, the study assesses how these variables influenced the Return on Assets (ROA) of deposit money banks. This approach enables the identification of trends and relationships in a natural setting.

This study utilized secondary data, drawing from two primary sources: the Central Bank of Nigeria (CBN) statistical bulletin and financial statement reports of deposit money banks. The CBN statistical bulletin provided comprehensive macroeconomic and monetary policy data, including the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR), which are critical for understanding the central bank's policy stance. Financial statements from banks offered detailed insights into profitability measures, such as Return on Assets (ROA). By combining these sources, the study effectively analysed historical trends and the relationship between monetary policy tools and bank profitability in Nigeria.

The study adapted and adjusted the model framework developed by Obamuyi and Olayiwola (2019), which examined the relationship between monetary policy and bank performance in Nigeria, expressed as:

$$ROE_t = \pi_0 + \pi_1 INR_t + \pi_2 OMO_t + \pi_3 LR_t + u_t \quad (1)$$

Where:

ROE = Return on equity

INR = Interest rates

OMO = Open market operations

LR = Liquidity Ratio

In line with the current study's examination of how monetary policy affects the profitability of deposit money banks in Nigeria, the mathematical model can be adapted to express the relationship between key monetary policy tools and bank profitability, as measured by Return on Assets (ROA). Therefore, the model outlining the interaction between the Monetary Policy Rate (MPR), Cash Reserve Ratio



(CRR), Liquidity Ratio (LR), and ROA is specified as follows:

$$ROA_t = \vartheta_0 + \vartheta_1 MPR_t + \vartheta_2 CRR_t + \vartheta_3 LR_t + u_t \quad (2)$$

Where:

ROA = Return on assets

MPR = Monetary Policy Rate

CRR = Cash Reserve Ratio

LR = Liquidity Ratio

ϑ_0 = Intercept parameter estimates for monetary policy tools

$\vartheta_1 - \vartheta_3$ = Coefficients of monetary policy tools (Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR))

u_t = The error term.

In analysing the impact of monetary policy on the profitability of deposit money banks in Nigeria, the study employed a rigorous methodological approach to ensure the robustness and reliability of the results. Initially, unit root tests were conducted as pre-estimation diagnostics to verify the stationarity of the data, a crucial step emphasized by Dickey and Fuller (1979). They highlighted the importance of determining whether the time series data follow random walks, necessitating transformation to achieve stationarity before proceeding with estimation. Neglecting this step could lead to spurious regression results, thereby compromising the validity of the estimated parameters (Ezie & Ezie, 2021)

After confirming the stationarity of the time series data, the next essential step was to determine whether these variables share a long-term relationship. To achieve this, the study employed the cointegration technique, which helps identify equilibrium relationships among non-stationary series within a stationary framework, as suggested by Engle and Granger (1987). This approach is particularly advantageous because it allows for the integration of long-run and short-run dynamics within a single model, preventing the potential loss of information that could occur from differencing non-stationary series to achieve stationarity (Ezie, et al, 2023).

To capture the long-term relationship between monetary policy tools and bank profitability in Nigeria, the study utilized the Bounds cointegration test based on the Auto Regressive Distributive Lags (ARDL) model, as developed by

Pesaran et al. (2001). By incorporating the analysis of the impact of monetary policy on bank profitability in Nigeria into an econometric framework, this study extends the examination to an unrestricted Auto Regressive Distributive Lags (ARDL) model.

$$ROA_t = \alpha_0 + \sum_{j=0}^n \alpha_{1j} \Delta ROA_{t-j} + \sum_{j=0}^n \alpha_{2j} \Delta MPR_{t-j} + \sum_{j=0}^n \alpha_{3j} \Delta CRR_{t-j} + \sum_{k=0}^p \alpha_{4k} \Delta LR_{t-k} + \alpha_5 ROA_{t-1} + \alpha_6 CRR_{t-1} + \alpha_7 LR_{t-1} + u_t \quad (3)$$

Building on the establishment of a long-run relationship, it was essential to integrate a mechanism that captures the short-run dynamic adjustments towards long-term equilibrium. This is where the Error Correction Model (ECM) becomes valuable, as it indicates the speed at which variables move from short-run disequilibrium to their long-run equilibrium state. Consequently, this study developed an ARDL-ECM by modifying the equation (3) to include an error correction term, enabling an analysis that reflects both the immediate and gradual impacts of monetary policy on bank profitability in Nigeria. The modified model is specified as follows:

$$ROA_t = \alpha_0 + \sum_{j=0}^n \alpha_{1j} \Delta ROA_{t-j} + \sum_{j=0}^n \alpha_{2j} \Delta MPR_{t-j} + \sum_{j=0}^n \alpha_{3j} \Delta CRR_{t-j} + \sum_{k=0}^p \alpha_{4k} \Delta LR_{t-k} + \psi u_{t-1} + \varepsilon_t \quad (4)$$

Where: u_{t-1} is the speed of adjustment.

The ARDL framework is highly regarded for its flexibility in handling variables of different integration orders, making it well-suited for this study. This strategic approach allows for the investigation of both short-term and long-term dynamics between monetary policy tools and bank profitability measures within a unified model structure, enabling a comprehensive understanding of their interactions.

IV. Results and Discussion

Descriptive Analysis

Descriptive statistics provide a summary of the central tendency, dispersion, and shape of the distribution of a dataset. These statistics offer valuable insights into the nature and behaviour of the data, assisting in understanding the characteristics of each variable involved in the study. In this context, the analysis focuses on four key variables: Return on Assets (ROA), Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR). The descriptive statistics include measures such as mean, standard deviation, skewness, kurtosis, Jarque-Bera test, and probability.



Table 1: Descriptive Analysis

	ROA	MPR	CRR	LR
Mean	3.242105	12.37500	17.64063	51.48679
Std. Dev.	0.491388	4.351513	10.11433	18.63217
Skewness	-0.15414	1.621723	-0.45004	1.255619
Kurtosis	2.102395	7.050009	1.935582	4.609413
Jarque-Bera	0.713081	20.19189	1.295427	7.043085
Probability	0.700094	0.000041	0.523241	0.029554
Observations	19	18	16	19

Source: Researcher's Computation Using EViews-13 (2024)

The mean ROA is 3.242%, indicating the average profitability of the banks as a percentage of their assets over the study period. The standard deviation of 0.491 suggests relatively low variability, indicating that the profitability of banks does not fluctuate dramatically from the mean. The skewness of -0.15414 indicates a slight left skew in the distribution, suggesting that more banks have ROA values slightly above the mean than below. The kurtosis value of 2.102395 indicates that the distribution is slightly platykurtic, meaning it has fewer extreme outliers than a normal distribution. The Jarque-Bera test statistic of 0.713081 and its associated probability value of 0.700094 suggest that the ROA data is normally distributed, as the p-value is above the standard significance level of 0.05.

The average MPR is 12.375%, reflecting the central bank's average interest rate policy during the period. The relatively high standard deviation of 4.351513 indicates considerable variability in the policy rate, highlighting frequent adjustments by the central bank in response to economic conditions. The skewness of 1.621723 suggests a strong right skew, indicating that the MPR values are more concentrated at the lower end, with a few high outliers. The kurtosis of 7.050009 indicates a leptokurtic distribution, which has more extreme values than a normal distribution. The Jarque-Bera statistic of 20.19189, with a probability of 0.000041, indicates that the MPR data significantly deviates from normality, suggesting the presence of outliers or irregular fluctuations in the policy rate.

The mean CRR is 17.64063%, representing the average proportion of deposits that banks are required to hold as reserves. The standard deviation of 10.11433 reflects a moderate level of variability, indicating occasional adjustments to this ratio by the central bank. The skewness of -0.45004 shows a

slight left skew, suggesting that CRR values are marginally higher on average, with fewer low values. The kurtosis value of 1.935582 suggests a platykurtic distribution, implying fewer outliers than a normal distribution. The Jarque-Bera test statistic of 1.295427 and its probability of 0.523241 indicate that the CRR data is approximately normally distributed, as the p-value is greater than 0.05.

The mean LR is 51.48679%, which reflects the average liquidity maintained by banks to meet short-term obligations. The standard deviation of 18.63217 suggests significant variability, indicating differing liquidity management strategies among banks. The skewness of 1.255619 indicates a moderate right skew, suggesting that most liquidity ratio values are concentrated on the lower end, with some high values skewing the distribution. The kurtosis value of 4.609413 suggests a leptokurtic distribution, indicating more extreme values than a normal distribution. The Jarque-Bera test statistic of 7.043085, with a probability of 0.029554, indicates that the LR data deviates from normality, highlighting the presence of outliers or variability in how banks manage liquidity.

Unit Root Test

Unit root tests are crucial in time series analysis as they help determine the stationarity of data. Stationarity is essential because non-stationary data can lead to unreliable and spurious regression results. The Augmented Dickey-Fuller (ADF) test is commonly used to check for unit roots in a series. The test compares the ADF test statistic to critical values to determine whether a time series is stationary or needs differencing. Stationary series are integrated of order zero, denoted as $I(0)$, while series that require differencing once are integrated of order one, denoted as $I(1)$.



Table 2: Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	Order of Integration
ROA	-4.472963	-3.297799***	I(1)
MPR	-3.484590	-3.333200**	I(0)
CRR	-4.433433	-3.791172**	I(1)
LR	-5.224738	-4.616209*	I(1)

Note: The tests include intercept with trend; *, **, *** stationary at 1, 5 and 10%

Source: Researcher's Computation Using EViews-13 (2024)

For the Return on Assets (ROA), the ADF test statistic is -4.472963, which is below the critical ADF value of -3.297799 at the 10% significance level. This result indicates that the ROA series is stationary after first differencing, as shown by its order of integration, I(1). The requirement for differencing suggests that the ROA series initially exhibited non-stationary behaviour, necessitating transformation to achieve stationarity for valid econometric analysis.

The Monetary Policy Rate (MPR) has an ADF test statistic of -3.484590, which is lower than the critical value of -3.333200 at the 5% significance level. This result shows that the MPR series is stationary at levels, indicated by its order of integration, I(0). The stationarity of the MPR series suggests that the series fluctuates around a constant mean and variance over time, making it suitable for inclusion in regression models without differencing.

For the Cash Reserve Ratio (CRR), the ADF test statistic is -4.433433, which is below the critical value of -3.791172 at the 5% significance level. This indicates that the CRR series is stationary after first differencing, reflected in its order of integration, I(1). Initially, the CRR series exhibited non-stationary behaviour, likely due to changes in central bank

policies over time, requiring differencing to achieve stationarity.

The Liquidity Ratio (LR) has an ADF test statistic of -5.224738, which falls below the critical value of -4.616209 at the 1% significance level. This result indicates that the LR series is stationary after first differencing, as denoted by its order of integration, I(1). The initial non-stationary nature of the LR series suggests that liquidity ratios varied significantly over time, potentially due to changes in economic conditions or regulatory adjustments.

Cointegration Test

Cointegration tests are employed to determine whether a long-run equilibrium relationship exists between non-stationary variables. When variables are cointegrated, they move together over time, indicating a stable, long-term relationship despite short-term fluctuations. The Bound Test approach within the Auto Regressive Distributive Lags (ARDL) framework is particularly useful when the order of integration of variables differs between I(0) and I(1), as it can test for cointegration without requiring the pretesting of variables for the same order of integration.

Table 3: Bound Test-Co-integration Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.471621	10%	2.37	3.2
k	3	5%	2.79	3.67
		1%	3.65	4.66

Source: Researcher's Computation Using EViews-13 (2024)

The calculated F-statistic value is 4.471621, which needs to be compared with the critical bounds for significance levels at I(0) and I(1). The relevant critical values at the 5% significance level are 2.79 for I(0) and 3.67 for I(1). Since the F-statistic (4.471621) is greater than the upper bound critical value at the 5% significance level (3.67), we reject the null hypothesis of no cointegration. This suggests that there is a significant long-run equilibrium relationship among

the variables under study. The rejection of the null hypothesis implies that despite the short-term deviations, the monetary policy tools and bank profitability move together towards equilibrium in the long run.

ARDL-ECM and Long-Run Regression Results

The study has determined that a cointegrating relationship exists between monetary policy tools and



the profitability of deposit money banks in Nigeria. Consequently, the study moves forward to estimate the error correction and long-run models. The ARDL-ECM results illustrate how the ARDL model adjusts

towards long-run equilibrium. A general-to-specific modelling approach was used to derive a satisfactory reduced short-run dynamic model, as detailed in Table 4.

Table 4: ARDL-ECM and Long-Run Result

Dependent Variable: ROA

Error Correction Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROA(-1))	-0.4049	0.1279	-3.1656	0.1948
D(ROA(-2))	-0.7775	0.1240	-6.2695	0.1007
D(MPR)	0.0314	0.0165	1.9006	0.3083
D(MPR(-1))	0.1346	0.0197	6.8377	0.0924
D(CRR)	-0.0883	0.0200	-4.4165	0.1418
D(CRR(-1))	-0.0586	0.0140	-4.1748	0.1497
D(LR)	0.0088	0.0021	4.1327	0.1511
D(LR(-1))	-0.0389	0.0043	-9.0747	0.0399
CointEq(-1)*	-0.6496	0.0826	7.8607	0.0406
Long-Run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	-0.2077	0.0602	-3.4490	0.0008
CRR	0.1936	0.0730	2.6529	0.0093
LR	-0.0611	0.0228	-2.6779	0.0087
C	5.0133	1.5488	3.2369	0.0016
Reliability Estimates				
R-squared	0.9559			
Adjusted R-squared	0.8854			
Durbin-Watson stat	1.9604			

Source: Researcher's Computation Using EViews-13 (2024)

The coefficient of the error correction term, CointEq(-1), is -0.6496. This negative sign is crucial, as it indicates that any short-term deviations from the long-run equilibrium are corrected over time. Specifically, the magnitude of the coefficient suggests that approximately 64.96% of the disequilibrium in bank profitability from the previous period is corrected in the current period. The relatively large adjustment speed implies a fairly rapid return to equilibrium after shocks to the system, highlighting the resilience of the banking sector in adjusting to monetary policy changes.

From the long-run results, it could be observed that the coefficient for the Monetary Policy Rate (MPR) is -0.2077, indicating a negative long-run relationship between MPR and bank profitability. This suggests that a one-unit increase in the MPR is associated with a 0.2077 unit decrease in ROA, reflecting how higher interest rates increase borrowing costs, thereby reducing loan demand and

compressing banks' net interest margins. The t-statistic of -3.449, with a corresponding probability value of 0.0008, confirms that this negative relationship is statistically significant at the 1% level. These results emphasize the sensitivity of bank profitability to interest rate changes, highlighting the need for careful monetary policy management to avoid adverse impacts on bank earnings.

The Cash Reserve Ratio (CRR) shows a positive coefficient of 0.1936, indicating that a one-unit increase in the CRR is associated with a 0.1936 unit increase in ROA. This suggests that higher reserve requirements might enhance bank profitability in the long run, possibly by encouraging banks to adopt more prudent risk management practices and focus on higher-quality lending. The t-statistic of 2.6529 and a probability value of 0.0093 demonstrate that this positive relationship is statistically significant at the 1% level. These findings suggest that, in the Nigerian context, higher CRR may



promote stability and profitability by fostering sound financial management within banks.

The Liquidity Ratio (LR) has a coefficient of -0.0611, indicating a negative long-run relationship with bank profitability. This implies that a one-unit increase in the LR is associated with a 0.0611 unit decrease in ROA, suggesting that maintaining higher liquidity levels could constrain banks' ability to invest in profitable opportunities. The t-statistic of -2.6779, with a probability value of 0.0087, signifies that this relationship is statistically significant at the 1% level. These results highlight the trade-off between liquidity and profitability, where maintaining higher liquidity buffers may ensure financial stability but at the cost of reduced profit margins.

The reliability estimates such as the R-squared (with a value of 0.9559) and the Durbin-Watson statistic (with a value of 1.9604), showed that the model has strong explanatory ability or power and exhibited an absence of auto-correlation respectively.

V. Discussion of Findings

The study's findings reveal several significant relationships between monetary policy tools and the profitability of deposit money banks. Monetary Policy Rate (MPR) was found to have a negative and statistically significant impact on bank profitability. This result suggests that higher interest rates increase borrowing costs, thereby reducing the demand for loans and compressing banks' net interest margins. The findings align with those of Claessens, Coleman, and Donnelly (2018), who observed that elevated policy rates tend to reduce banks' profitability due to increased interest expenses and diminished loan growth. Conversely, the study contradicts the results of Gambacorta and Shin (2016), who found that some banks, particularly those with diversified portfolios and fee-based income, can maintain profitability despite high interest rates by leveraging alternative revenue streams.

More so, the Cash Reserve Ratio (CRR) exhibited a positive and statistically significant impact on the profitability of deposit money banks. This suggests that higher reserve requirements may encourage banks to adopt more prudent risk management practices and focus on higher-quality lending, which can enhance profitability in the long run. These results are consistent with the findings of Adegboye and Aluko (2020), who reported that increased reserve ratios positively influenced bank stability and profitability by reducing excessive risk-taking and fostering sound financial management. However, this finding contrasts with studies like those of Kiser and Prager (2017), which argue that higher reserve requirements can limit banks' lending

capacity and restrict income-generating opportunities, thus negatively affecting profitability.

Lastly, the Liquidity Ratio (LR) showed a negative and statistically significant impact on bank profitability. This indicates that maintaining higher liquidity levels can constrain banks' ability to invest in profitable ventures, as excess liquidity often results in lower yields on assets. This outcome aligns with the work of Fernández de Guevara and Maudos (2017), who found that excess liquidity could hinder bank performance by reducing the efficiency of capital utilization. In contrast, the study challenges the findings of Cebenoyan and Strahan (2015), who argued that maintaining adequate liquidity buffers is essential for long-term stability and can lead to sustained profitability by ensuring banks can meet unexpected withdrawals and financial shocks.

VI. Conclusion and Recommendations

The study investigated how monetary policy tools influence the profitability of deposit money banks in Nigeria, specifically examining the effects of the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and Liquidity Ratio (LR). The findings show that a higher MPR negatively impacts bank profitability, as increased interest rates lead to higher borrowing costs and reduced net interest margins, affecting banks' ability to maintain profitability. On the other hand, the CRR has a positive impact on profitability, suggesting that higher reserve requirements may promote prudent risk management and encourage banks to focus on high-quality lending. Finally, the LR negatively impacts profitability by constraining banks' ability to invest in profitable ventures due to the need to maintain higher liquidity levels. These outcomes highlight the dynamic interplay between monetary policy and bank profitability, emphasizing the need for carefully balanced policy measures that support both financial stability and economic growth within the banking sector.

The following recommendations were suggested based on the findings from the study:

- i. To enhance bank profitability amid varying Monetary Policy Rates (MPR), the Central Bank of Nigeria (CBN) should implement more gradual interest rate adjustments, supported by regular market analyses and stakeholder consultations. This approach will ensure banking sector stability and manageable borrowing costs.
- ii. To leverage the positive effects of the Cash Reserve Ratio (CRR) on profitability, the CBN should periodically reassess CRR levels, coordinating with the Bankers' Committee to ensure these rates align



with banking sector growth objectives and support high-quality lending practices.

- iii. To address the negative impact of the Liquidity Ratio (LR) on profitability, the CBN, in collaboration with the Nigerian Financial Intelligence Unit (NFIU), should develop guidelines encouraging banks to adopt innovative liquidity management practices that balance regulatory compliance and investment flexibility.

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APPENDICES

Table 6: Data Presentation

Year	ROA (%)	CRR (%)	LR (%)	MPR (%)
2005	2.3	na	50.2	na
2006	2.5	na	81.42	10.00
2007	2.8	na	41.56	9.50
2008	3	3.0	37.72	9.75
2009	2.7	1.3	26.39	6.00
2010	2.9	1.0	27.39	6.25
2011	3.1	8.0	42.02	12.00
2012	3.5	12.0	49.72	12.00
2013	3.8	12.0	46.23	12.00
2014	4	20.0	38.27	13.00
2015	3.6	20.0	42.35	11.00
2016	2.9	22.5	45.95	14.00
2017	3.2	22.5	54.79	14.00
2018	3.4	22.5	65.04	14.00
2019	3.6	22.50	104.20	13.50
2020	3.1	27.50	67.60	11.50
2021	3.5	27.50	61.20	11.50
2022	3.7	27.50	54.93	16.50
2023	4	32.50	41.3	26.25



Sources: CBN statistical bulletin, 2022
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