# Financial inclusion and monetary policy in Nigeria: an analysis from 1993 to 2022

## *Inclusão financeira e política monetária na Nigéria: uma análise de 1993 a 2022*

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**Biliqees Ayoola Abdulmumin**[1]
**Oluwatosin Doris Adeoti**[2]

**Abstract:** Financial inclusion has been recognized across the globe as an essential factor for monetary policy to be more successful. Despite the Central Bank of Nigeria's (CBN) efforts to establish an inclusive financial mechanism and effective monetary policy, many Nigerian adults remain financially excluded. This persists despite policies promoting digital financial services, agent networks, and mobile money, highlighting significant challenges to fully realizing the effectiveness of monetary policy in Nigeria. Thus, the research analyzed the financial inclusion and monetary policy in Nigeria from 1993 to 2022. Data were collected from CBN statistical bulletin and analyzed via Autoregressive Distributed Lag (ARDL) Model. The findings showed that financial inclusion variables had significant impact on monetary policy measures at 5% significant level. In light of the findings, the research concluded that financial inclusion had long run impact on monetary policy in Nigeria. The study suggested, amongst other, that commercial banks should increase their lending to small and medium scale enterprises to attract more small business into the financial mechanism and enhance effectiveness of monetary policy in the long run.

**Keywords:** Financial Inclusion; Monetary Policy; Monetary Policy Effectiveness; Nigeria.

**Resumo:** A inclusão financeira tem sido reconhecida em todo o mundo como um fator essencial para que a política monetária seja mais bem-sucedida. Apesar dos esforços do Banco Central da Nigéria para estabelecer um mecanismo financeiro inclusivo e uma política monetária eficaz, muitos adultos nigerianos continuam financeiramente excluídos. Isto persiste apesar das políticas que promovem os serviços financeiros digitais, as redes de agentes e o dinheiro móvel, evidenciando desafios significativos para a plena concretização da eficácia da política monetária no país. Assim, esta investigação analisa a inclusão financeira e a política monetária na Nigéria de 1993 a 2022. Os dados foram recolhidos do boletim estatístico do Banco Central da Nigéria e analisados através do *Autoregressive Distributed Lag* (ARDL) *Model*. Os resultados mostraram que as variáveis de inclusão financeira tiveram um impacto significativo nas medidas de política monetária ao nível de significância de 5%. À luz das conclusões, a investigação concluiu que a inclusão financeira teve um impacto a longo prazo na política monetária na Nigéria. O estudo sugeriu, dentre outras coisas, que os bancos comerciais deveriam aumentar os seus empréstimos às pequenas e médias empresas para atrair menores empresas para o sistema financeiro e aumentar a eficácia da política monetária a longo prazo.

**Palavras-chave:** Inclusão Financeira; Política monetária; Eficácia da Política Monetária; Nigéria.

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[1] PhD. Department of Finance, University of Ilorin, Ilorin, Nigeria.
*E-mail*: abdulmumin.ba@unilorin.edu.ng; ORCID: https://orcid.org/0000-0003-2803-3114
[2] PhD. Department of Finance, University of Ilorin, Ilorin, Nigeria.
*E-mail*: adeotidoris98@gmail.com; ORCID: https://orcid.org/0009-0004-5113-0048

## Introduction

Globally, financial inclusion is seen as a crucial component that enhances the efficient execution of monetary policy (Akanbi *et al*., 2020). In essence, financial inclusion is intended to assist the most vulnerable populations, like the unbanked and low-income segments of society. In recent years, it has become more important to ensure affordable financial services and products are available to individuals and companies (Ozili, 2024). In particular, financial inclusion has an impact on how well monetary policy works by altering how monetary interventions impact spending, saving, and investment behaviors across a more comprehensive economic base (Ediagbonya; Tioluwani, 2023).

According to Central Bank of Nigeria (CBN, 2021), controlling the price and accessibility of credit and money in the economy is one of monetary policy's goals. When a larger proportion of people lack access to formal financial infrastructure, the significance of monetary policy may be compromised. Monetary policy is expected to be more successful when the formal sector is larger, as this enhances the transmission of policy measures. However, monetary policy effectiveness also depends significantly on the financial inclusion of the informal sector, which plays a vital function in implementation of monetary policy. This is because of a substantial number of financial transactions that occurs within the informal sector, making its inclusion essential for achieving the desired outcomes of monetary policy (Jungo; Madaleno; Botelho, 2022).

Furthermore, despite the Central Bank of Nigeria's efforts to establish an inclusive financial system aimed at enhancing effective monetary policy, 28.9 million adults (26% of the population) in Nigeria remain financially excluded (CBN, 2023). This degree of financial exclusion persists despite the implementation of various government policies, such as those that encourage the rapid growth of agent networks, foster an environment that supports the most marginalized, and facilitate the widespread use of mobile money in recent years. This underscores a significant challenge, as the continued financial exclusion of a considerable portion of the population may hinder the full realization of monetary policy's effectiveness in Nigeria, Enhancing Financial Innovation and Access (EFInA, 2023).

To the best of the researchers' knowledge, the majority of studies on how financial inclusion affects monetary policy are conducted abroad, including Dhungana et al., (2023) and Mabuza (2023). There are few studies in Nigeria in this field. The two that do exist are Akanbi and Abdulrahman (2020), who looked at financial inclusion and monetary policy in West Africa, and Ngaikedi *et al*. (2023), who investigated the impact of financial inclusion on fundamental monetary policies in Nigeria. These studies overlooked the role of mobile money, a crucial enabler of financial inclusion which in previous time has been a major driver of financial inclusion especially in nations in Sub-Saharan Africa, Nigeria inclusive with about 55% increase in account ownership with the aid of mobile money (Global Findex, 2021).

Additionally, the 2022 redesign of the CBN's cashless policy regulations greatly enhanced the integrity of the currency, promoted digital alternatives such as the *eNaira*, and improved Nigeria's monetary policy. Notably, it also sought to lessen the flow of money for illegal activities such as vote-buying and kidnapping-for-ransom, underscoring the necessity of a thorough assessment of the ways in which financial inclusion particularly through mobile money influences the dynamics of monetary policy in Nigeria (Monye, 2024). This gap in this study underscores the importance of understanding this evolving relationship. This study assessed the impact of financial inclusion on monetary policy in Nigeria, identifying areas where policy adjustments can improve by ensuring that financial services are available to all citizens.

## 1 Literature review

This segment discusses the literature review of the study precisely; this deals with conceptual review, theoretical review, empirical review and research gap identified in the study.

### 1.1 Conceptual review: monetary policy

Monetary policy aims to regulate the cost and availability of credit and money in the economy. Its effectiveness diminishes when a notable portion of people lacks formal financial systems' accessibility. Expanding the formal sector strengthens the impact of monetary policy (Oyebanji, 2021). According to Martin *et al*., (2022), monetary policy refers to the measures taken by a country's central bank or monetary authority to manage the interest rates, money supply, and credit with the aim of achieving key macroeconomic objectives such as controlling

inflation, stabilizing the currency, ensuring full employment, and fostering economic growth. Martin *et al*., (2022) emphasizes its role in shaping economic conditions by influencing aggregate demand and supply dynamics.

Ngaikedi *et al*. (2023) describe monetary policy as a deliberate intervention by a nation's monetary authorities aimed at influencing the quantity, cost, and accessibility of money and credit supply to achieve economic goals and ensure balance of payments stability. This involves adjusting interest rates or the money supply to control the flow of money in the economy. Similarly, Garbobiya, Oladipo, and Iorember (2024) emphasize that the implementation of monetary policy, a core function of central banks worldwide, is intended to achieve objectives such as price stability, economic stability, employment growth, and a balanced payment system. However, as highlighted by Goshit *et al*. (2022) and Iorember *et al.* (2021), successfully attaining these goals requires a thorough understanding of the transmission mechanisms through which central bank actions influence the economy.

Conducting monetary policy in Nigeria is the responsibility of the CBN. In addition to investors, monetary authorities and financial institutions are also drawn to the growing linkage between capital markets and monetary policy because of the impact that monetary policy changes have on market functioning, which is crucial for investors to evaluate risk exposures and optimize returns on their investments (Luu, Zhou; Kou, 2013). According to Peters *et al*. (2020), monetary policy is considered effective when it tends to stabilize the economy, particularly its financial components like investment, bank lending rates, and price levels. The price level is an important part of the economy's financial sector that has a big influence on the state of the nation as a whole. Because inflation is frequently used in the literature to assess the efficacy of monetary policy, price stabilization has thus emerged as a key priority for monetary authorities (Tahir; 2012; Tonuchi, Nwolisa; Obikaonu ; Alase, 2021).

However, due to the numerous shocks that could impact the price level from both monetary and non-monetary sources, its usefulness is restricted in the short term. Although monetary authorities may not be considered responsible for short-term price fluctuations, they are held responsible for long -term, sustained inflation (Chileshe; Olusegun, 2017). Consequently, the long-term inflation rate has been used to gauge how monetary policy works, with inflation targeting as the main instrument (Tonuchi *et al*., 2021).

## 1.2 Conceptual review: financial inclusion

It is generally acknowledged that financial inclusion is multifaceted and includes the ability to access, utilize, and access a variety of financial services. (Ngaikedi *et al*., 2023). According to CBN (2021), financial inclusion refers to a state in which people effortlessly have access to appropriate, desired financial products and services to enable economic and financial well-being.

The full range of financial services and products includes mortgages, stock brokerage, insurance, banking, cooperatives, pensions, and microfinance services. The framework for redistributing resources from surplus to deficit units in the economy is provided by the financial system (CBN, 2021). With a strong financial system and high levels of financial inclusion, poverty will decline significantly. Alternatively, financial exclusion is the reverse of financial inclusion and refers to the scenario where private citizens and corporate entities have little or no access to financial services and products.

Additionally, World Bank Group (2022) highlighted that financial inclusion gives people and businesses access to practical and reasonably priced financial products and services that satisfy their needs, including credit, insurance, payments, savings, and transactions, all of which are provided in an ethical and sustainable manner. Since a transaction account enables people to send and receive payments as well as keep money, having access to one is a first step toward greater financial inclusion. Since a transaction account can be used as a doorway to other financial services, the WBG is still focused on making sure that everyone has access to them (WBG, 2022).

Financial inclusion goes beyond simply providing access to financial services; it ensures that these services are high-quality, affordable, and tailored to meet the needs of all individuals, including those who are often excluded, such as the poor, disabled, and rural populations. It also emphasizes convenience, respect for clients, and the involvement of diverse providers, especially from the private sector, to create a system where financial services truly empower and benefit users in a meaningful and sustainable way (Centre for Financial Inclusion, 2023). It also encompasses the use of a wide range of services such as loans, payments, deposits, pensions, and insurance. Three key dimensions of financial inclusion are availability, usage and penetration (Abdulmumin; Etudaiye-Muhtar; Jimoh; Sakariyahu, 2019).

The first dimension, availability of financial services, emphasizes the existence and accessibility of financial institutions, ensuring users can easily and frequently access banking services (Ediagbonya; Tioluwani, 2023). In an inclusive financial system, availability is critical to bridging gaps in service provision, particularly in underserved areas (Emara; Mohieldin, 2020). While traditional infrastructures such as bank branches remain vital, technological advancements, especially in regions like Sub-Saharan Africa, have highlighted the growing importance of innovative delivery methods, such as mobile banking (Odiambo, 2023). The variability in infrastructure distribution across institutions and countries underscores the need for tailored strategies to enhance financial access universally (Ngaikedi *et al*., 2023). Furthermore, Number of Commercial Banks Branches, Deposits of Rural Branches of Commercial Banks and so on serve as the indicators in the access dimension. This dimension underscores the interplay between physical and technological channels in promoting widespread financial inclusion.

The second dimension, usage of financial services, evaluates how effectively individuals utilize the offerings of financial institutions (Akanbi *et al*., 2020). While account ownership may be high in some countries, actual engagement with financial services often remains low due to barriers such as limited access points or restrictive conditions (Ediagbonya; Tioluwani, 2023). This highlights that merely having a bank account does not equate to meaningful financial inclusion. According to Basheer (2021), usage reflects the extent to which services like deposits, loans, and credits are actively accessed. Unlike measures focused solely on financial depth, which relates to the size of the financial sector relative to the economy, financial inclusion emphasizes accessibility and relevance to individual needs (Ngaikedi *et al*., 2023). This dimension also considers innovations like mobile money transactions. Indicators of usage of financial services are the commercial banks savings deposit, Commercial Banks Credit to Small and Medium Scale Enterprises, currency in circulation. These indicators are used following (Ngaikedi *et al*., 2023).

Financial institution penetration reflects the extent to which formal financial institutions reach and engage with users in an economy (ElDeeb; Halim; Kamel, 2021). It signifies their ability to attract customers and expand the size of the banked population. This dimension underscores the role of institutions like commercial banks, microfinance entities, and cooperative societies in fostering financial inclusion (Mundia, 2024). These institutions are particularly

impactful in regions like Sub- Saharan Africa, where they provide essential financial and non-financial services to millions, especially underserved populations such as the rural poor. By integrating more people into the formal financial system, penetration is key to lowering financial exclusion since it allows for greater access to vital financial services and wider economic participation (Caplan; Birkenmaier; Bae, 2021). Indicators in the penetration dimension also include the number of people with mobile money accounts per 1,000 adults and the number of accounts with commercial banks, microfinance organizations, regulated credit unions, and cooperative societies for loans and deposits. (Abdulmumin *et al*., 2019).

### 1.3 Theoretical review: finance-growth theory

The finance-growth theory was primarily developed in the mid-20th century, with significant contributions from economists like Schumpeter in 1911 and McKinnon and Shaw in 1973. Schumpeter, (1911) posits that financial development is essential for economic growth because banks with other financial institutions provide capital to innovative entrepreneurs, enabling them to create new products and processes that drive economic development. McKinnon and Shaw, (1973) also asserts that financial liberalization reducing government controls over financial markets leads to better capital allocation and higher savings rates. This improves investment and economic growth, supporting the idea that a well- developed financial system accelerates economic expansion.

However, the finance-growth theory serves as the theoretical underpinning for this investigation since it maintains that financial development creates a dynamic, productive environment for growth through the supply-leading or demand-following effect. Economic development and the financial system's role have been debated since the 19th century, with early contributions from economists like David Hume, Henry Thornton, and Richard Cantillon, who explored money circulation in Britain during the 1830s and 1840s (Ngaikedi *et al*., 2023). Walter Bagehot, a prominent economist in British and follower of Adam Smith, offered the first detailed examination of the relationship between finance and the economy in his 1873 book, Lombard Street: A Description of the Money Market. In it, Bagehot described how historical events influenced capital flow in Britain’s money market, sparking discussions on efficient capital use. Bagehot and Street (1915) further argued that limited access to affordable financial products can

deepen income inequality and cause long-term economic imbalances. Additionally, Sparatt and Stephen (2013) emphasized that financial inclusion and stability play crucial roles in effective monetary policy and sustained economic growth. Ngaikedi *et al*., (2023) also argued that the finance- growth theory underpins financial development's role in spurring economic growth by enhancing access to finance, which reduces income inequality and poverty. This theory posits that financial inclusion boosts welfare, productivity, and economic resilience. However, low financial literacy and limited access to technology hinders Nigeria's financial inclusion and overall growth potential.

This theory also highlights that limited access to financial resources contributes significantly to ongoing income inequality and slow growth. Therefore, providing safe, affordable financial services is essential for lowering poverty and income disparities, creating equal opportunities, and enabling marginalized groups to participate in the economy, support development, and protect themselves from economic instability (Shah; Ali, 2022). In Nigeria, financial inclusion faces major barriers, including low financial literacy rates, especially in rural areas, which makes it challenging for banks and service providers. Additionally, limited information and telecommunications knowledge restricts financial access. Awareness campaigns are sometimes ineffective due to language differences between the target audience and the educational materials, further reducing financial service utilization (Migap; Okwanya; Ojeka; 2015; Ngaikedi *et al*., 2023). This theory suggests that improving financial inclusion in Nigeria enhances monetary policy effectiveness by lowering inflation, stabilizing prices, boosting productivity, and reducing non-performing loans, thereby strengthening economic stability and financial sector resilience.

### 1.4 Theoretical review: empirical review

Garbobiya, Oladipo and Lorember (2024) analyzed the effect of financial inclusion on monetary policy objectives in the Economic Community of West African States over the period from 2004 to 2020. WDI, the Global Economy database1, the World Bank Global Findex Database, and the Bank of Ghana were the sources of the data. The study used impulse response functions and panel vector autoregression through the GMM framework. The results revealed that throughout the ECOWAS, financial inclusion reduces monetary policy effectiveness. In

particular, financial inclusion raises consumer prices, interest rates, and employment rates while decreasing output growth. Despite this, financial inclusion raises the value of the exchange rate, which causes native currencies to appreciate. The study came to the conclusion that a sub-region must integrate its monetary policy in order for the ECOWAS sub-region as a whole to have a single monetary policy framework.

Esely and Taonezvi1 (2024) examined the linkage between digital financial inclusion, monetary policy transmission, and economic development in 18 Sub-Saharan African countries from 2004 to 2021 obtained from International Monetary Fund (IMF) and World Bank websites. The study used panel data and used real gross domestic product per capita, broad money growth, and a digital financial inclusion index as proxies for economic development, monetary policy transmission, and digital financial inclusion, respectively. According to the study's results, Sub-Saharan African central banks should prioritize legislative changes, regulatory enhancements, and policy reform in order to encourage digital financial inclusion. In order to promote digital financial inclusion, sustainable economic growth, and the reduction of regional differences, the study comes to the conclusion that bolstering rural financial infrastructure is essential.

Ozili (2024) analyzed the determinants of financial inclusions in Nigeria. Focusing on the monetary policy and banking sector factors that affect the degree of financial inclusion in Nigeria, the study expanded the empirical discussion on the drivers of financial inclusion. Data from the World Bank's global financial indicators (GFDI) and WDI were used in the study to estimate the factors influencing financial inclusion in Nigeria from 2007 to 2021 using the two-stage least squares regression method. The findings demonstrated the importance of the CBN's monetary policy rate, savings deposit rate, and bank loan to deposit ratio in influencing financial inclusion in Nigeria. In particular, the degree of financial inclusions is reduced when the central bank interest rate rises, increased when the savings deposit rate rises, and decreased when the loan-to-deposit ratio rises. The quantile regression approach is a reliable alternative estimation method for these determinants. According to the study's findings, which are based on two-stage least squares estimate, the nominal interest rate, inflation rate, and interbank lending rate all influence financial inclusion in Nigeria.

Dhungana, Chapagain, Sharma, and Pokhre (2023) investigated how financial inclusion influenced Nepal's ability to conduct monetary policy effectively. As measures of financial inclusion, the ratios of deposit to GDP, loans and advances to GDP were employed. The three main monetary indicators employed in the study were the money supply, lending rate, and exchange rate. The central bank of Nepal and the Ministry of Finance produced banking and financial statistics and economic surveys between 1975 and 2019, which served as secondary sources of data for the study. The Granger Causality test, VECM, The Johnson Cointegration test, and the Unit Root test were all used in the investigation. The study came to the conclusion that, both in the short and long term, financial inclusion is crucial to the efficient execution of monetary policy.

Mabuza (2023) analyzed the influence of financial inclusion on monetary policy effectiveness in Eswatini, utilizing quarterly data from 2013 to 2022. The study employed financial inclusion variables such as deposit and loan balances held by commercial banks, expressed as a percentage of GDP, while inflation served as the measure of monetary policy effectiveness. Money supply and the T-bill rate were included as control variables. The Granger causality tests showed a one-way causality running from monetary policy effectiveness (headline inflation) to financial inclusion (deposits). Further analysis using the Vector Autoregression Model (VAR) indicated that financial inclusions, represented by bank deposit balances, enhances monetary policy effectiveness, whereas bank loan balances appear to diminish it. The study concludes that financial inclusion Granger causes monetary policy effectiveness and plays a significant role in its success in Eswatini.

Ngaikedi, Ezu, Nwanna and Ananwude (2023) examined the effect of commercial bank savings deposits, loans to small and medium enterprises (SMEs), cash reserve ratio, currency in circulation, bank branches, and rural branch deposits on liquidity ratio, open market operations, and loan-to-deposit ratio in Nigeria from 1986 to 2021. The authors employed an ex-post facto research designs and the Autoregressive Distributed Lag (ARDL) Model technique, the study found that commercial bank savings deposits significantly affected liquidity ratio, while other variables had no significant impact on cash reserve ratio, liquidity ratio, open market operations, or loan-to-deposit ratio. The Central Bank of Nigeria (CBN) should encourage innovative savings products to boost deposit mobilization and increase credit to SMEs, enhancing liquidity. It concluded that supporting SME credit could influence CBN’s ability to adjust the cash reserve ratio.

Oanh, Van and Dinh (2023) investigated the link between financial inclusion, financial stability, and monetary policy across 58 countries, consisting of 31 high financial development countries (HFDCs) and 27 low financial development countries (LFDCs), using data from 2004 to 2020. The study applied the PVAR method for their analysis. Secondary data were sourced from the World Bank and IMF dataset. The findings of the impulse-response function indicates that, although financial stability and inclusion had a positive correlation in LFDCs, they have a negative correlation with the rates of inflation and money supply increase. While financial stability is inversely connected with financial inclusion, inflation, and money supply growth rates in HFDCs, financial inclusion is positively connected with these variables.

Maher (2022) examined the relationship between financial inclusion indices and monetary policy in Egypt. The study used a VAR model, which was enhanced by an ARDL model, to investigate the aforementioned link. It also used quarterly data on outstanding deposits and loans from the IMF-FAS for the years 2004 to 2020. The study added to the body of the literature by examining which of the sectors households or SMEs are better suited for the effectiveness of monetary policy in order to formulate more specialized policy recommendations. Inflation and total deposits made by households and SMEs were found to be significantly and negatively correlated by the study. A situation of excessive debt in the sector that may affect the general stability of the financial system is implied by some specifications that suggest a strong positive correlation between inflation and loans granted to SMEs.

Dauda (2022) investigated how financial inclusions impacted the efficiency of the interest rate channels used to transmit monetary policy in West Africa. 15 West African nations' panel datasets from 2005 to 2020 were used in the study. Secondary sources, including the World Bank's WDI database, provided the data. The GMM technique was used for both inferential analysis and descriptive statistics. The GMM's findings demonstrated that the interest rate channels of monetary policy transmission are more effective when financial inclusion is present. The study concluded that interest rates and money growth both have a significant impact on inflation used as a proxy of monetary policy in West Africa, which this implied that interest rate and money growth exact considerable influence on inflation in the region.

Arshad et al., (2021) investigated the linkage between financial inclusion and the efficacy of monetary policy in both developed and developing nations. To investigate the linkage between financial inclusion and how monetary policy works, structural vector autoregressive approaches

were introduced. The study used secondary data from the WDI, FAS, IMF, World Bank, and Global Index to examine 10 developed and 30 impoverished nations from 2004 to 2018. According to the study, the only factor that significantly affects financial inclusion in developing nations is the lag of inflation. This suggests a higher degree of financial inclusion leads to a more successful monetary policy in these nations. Research gotten from industrialized nations indicates that while effective monetary policy promotes financial inclusion, higher financial inclusion facilitates more effective monetary policy. The research concluded that financial inclusion and efficacy of monetary policy do not affect one another simultaneously.

Jungo *et al*., (2021) conducted a comparative study between Latin American and Caribbean (LAC) and Sub-Saharan African (SSA) nations to analyze the influence of financial inclusion on monetary policy and to examine the causal relationship between the two. FAS and World Development Indicators (WDI) databases from 2005 to 2018 were the sources of the data. A feasible generalized least squares (FGLS) model, basic panel data models, and the panel vector autoregressive (PVAR) methodology were all used in the investigation. The findings showed that monetary policy and financial inclusions are positively correlated in both SSA and LAC, with monetary policy promoting financial inclusions in both areas. In SSA, financial inclusion makes monetary policy more effective, whereas in LAC, it makes monetary policy more efficient. The study concluded that financial inclusion has a favorable impact on how monetary policy is conducted.

Bourainy, Salah and Sherif (2021) evaluated the effect of financial inclusion on the rate of inflation in 37 developing nations during a ten-year span, from 2009 to 2018. Three dimensions access, utilization, and quality of financial services were used to create a new multidimensional Financial Inclusion Index (FII) using PCA. After then, the Generalized Method of Moments (GMM), a two-step system, was used to experimentally evaluate the effect of financial inclusion on the inflation rate. However, the authors discovered that greater financial inclusions had an effect on lowering the rate of inflation in developing nations. Additionally, it was discovered that the official reserves and interest rates significantly lower the rate of inflation.

Akanbi et al., (2020) explored the impact of financial inclusion on the effectiveness of monetary policy in West Africa from the period 2005 to 2018. Data which were sourced from the World Bank database (World Development Indicator). Dumitrescu and Hurlin's Granger panel

non-causation test was used in the study to ascertain the direction of causality between financial inclusion measures and inflation, a stand-in for monetary policy. The Generalized Method of Moment (GMM) was utilized to examine how each financial inclusion indicator affected monetary policy, and the autocorrelation approach for panel models proposed by Arellano and Bond (1991) was used to determine whether the series' successive error terms were correlated. According to the findings, monetary policy is significantly influenced by financial inclusion. Based on the findings, financial inclusion should be extended to include a broad spectrum of economic players in rural areas and the informal sector, where a substantial portion of financial transactions take place.

Muchoki (2020) analyzed how financial inclusion affects East Africa nations' monetary policies- Kenya, Tanzania and Uganda. The World Bank Databank and the International Monetary Fund provided secondary data for the study, which covered the years 2004 through 2019. To get total observations across the East African nations that were the subject of the study, a cross-country panel design was employed. The study discovered a negative correlation between the inflation rates and the money supply, GDP per capita growth, and financial inclusion. Nonetheless, there was a favorable correlation between the inflation rates and bank lending rates. The study concluded that bank lending rates, GDP per capita growth, and financial inclusion all had a major impact on monetary policy.

Saraswati et al., (2020) examined how fintech and financial inclusion affect Indonesian monetary policy's efficacy via the interest rate channel, with a particular emphasis on substitution effects and the cost of capital. Data from secondary sources was taken from the Indonesian Financial System Statistic, the Indonesian Financial and Economy Statistics, and the International Financial Statistic (IFS) (Bank Indonesia, 2018). With a 2009–2018 observation period, the study employed the Vector Error Correction Model (VECM). Though the impacts of financial inclusion shocks on inflation are transient, the result showed that financial inclusion affects inflation, a gauge of the efficiency of monetary policy, both in the short and long term. Even if fintech has a short-term impact on inflation, its shocks have long-term effect on inflation volatility due to both cost of capital and substitution effect.

Nwidobie (2019) analyzed financial inclusion index in Nigeria employing data from 2012 to 2017 and employed Principal Component Analysis (PCA). Secondary data from the CBN Bulletin, 2018 was used in the study to examine factors such deposits, loans, and transaction

volumes through ATMs, POS systems, mobile banking, and Webpay, as well as the quantity of bank branches and deposits in rural regions. The results identified these variables as significant indicators of financial inclusion, despite their negative correlation with it. According to the findings, monetary authorities should concentrate on raising these metrics in order to enhance financial inclusion in Nigeria.

### 1.5 Research gap

To the best of the researcher's knowledge, there is limited literature investigating the impact of financial inclusion on monetary policy in Nigeria. Available evidences are Ngaikedi et al., (2023) who investigated the effect of financial inclusion on monetary policy fundamentals in Nigeria, using commercial banks savings deposit (CBSD), Commercial Banks Credit to Small and Medium Scale Enterprises (CBCSME), currency in circulation (CIC), Number of Commercial Banks Branches (NCBB), and deposits of rural branches of commercial banks (CBDRA) as their variables. Additionally, Akanbi and Abdulrahman (2020) also examined financial inclusion and monetary policy in West Africa while using access and usage indicators, inflation as the proxy for monetary policy. However, these studies failed to consider mobile money which has become an important enabler of financial inclusion in Sub-Saharan Africa , Nigeria inclusive with about 33 percent of adults who had mobile money account which is the largest share of any region in the world and is also more than three times larger than the 10 percent global average of mobile money account ownership (Global Findex, 2021).

Previous studies such as Ngaikedi et al., (2023) covered up to 2021, thereafter, the CBN introduced a revised cashless policy in 2022 which significantly boosted the adoption of digital payments. As a result, money supply experienced a sharp decline of 70.24%, falling to 982 billion naira in February 2023, down from around 3.3 trillion naira in October 2022, when the policy was initially announced (Global Findex 2022; Monye, 2024). To the best of researcher's knowledge, no study has addressed the time gap by analyzing the impact of Nigeria's 2022 revised cashless policy and its effects on financial inclusion and monetary policy from 2022 to 2023. This shift highlights the deepening role of financial inclusion in monetary policy, capturing how digital transactions reshape liquidity, spending patterns, and overall economic dynamics, essential for a robust, updated analysis. Hence, this study aims to bridge the time gap by offering a comprehensive understanding of the long-term trends and evolving impacts of financial inclusion on Nigeria's monetary policy.

## 2 Methodology

This section outlines the research methodology adopted in the study to investigate the impact of financial inclusion on monetary policy in Nigeria.

### 2.1 Research design

This study adopts an ex-post facto research design. Through statistical methods, this approach assesses the relationship between financial inclusion and monetary policy, offering a data-driven perspective that supports the reliability and validity of findings within the Nigerian context. By utilizing secondary data to provide empirical insights, the research design enables the use of statistical techniques to assess the impact of independent variables on monetary policy.

### 2.2 Data source and model specification

The study used Nigerian data collected from Statistical Bulletin of the Central Bank of Nigeria (CBN). The collected data spans from 1993 to 2022 which is a 30-year period.

This study adapted and modified the model of Ngaikedi et al., (2023) whose study focused on the effect of Financial Inclusion on Monetary Policy Fundamentals in Nigeria. Ngaikedi et al. (2023) however, utilized variables such as open market operation (OMO), cash reserve ratio (CRR), and loan-to-deposit ratio (LDR) of rural bank branches to measure monetary policy fundamentals.

These variables were instrumental in capturing the central bank's regulatory tools and their interaction with financial inclusion dynamics, providing insights into how financial inclusion influence key aspects of monetary policy in Nigeria. The original model of Ngaikedi et al., (2023) is stated as:

$$MP = f(CBSD, CBCSME, CIC, NCBB, DRBCB) \quad (1)$$

Econometrically, the model was stated as:

$$MP = \beta_0 + \beta_1 CBSD_t + \beta_2 CBCSME_t + \beta_3 CIC_t + \beta_4 NCBB_t + \beta_5 DRBCB_t + \epsilon_t \quad (2)$$

However, the model overlooked the growing role of mobile money, which has revolutionized financial inclusion in Nigeria by bridging access gaps for the unbanked. By incorporating mobile money as an additional variable, this study enhances Ngaikedi *et al*. (2023) framework, offering a more comprehensive understanding of financial inclusion's effects on monetary policy. The revised model for this study is thus formulated as:

$$MP= f(CBSD, CBCSME, CIC, NCBB, DRBCB, NRMM, NMMT) \quad (3)$$

MP is measured by CRR, LTDR and OMO. Thus, the model is broken into three and econometrically stated as follows:

$$CRR = \beta_0 + \beta_1 CBSD_t + \beta_2 CBCSME_t + \beta_3 CIC_t + \beta_4 NCBB_t + \beta_5 DRBCB_t + \beta_6 NRMM_t + \beta_7 NMMT_t + \epsilon_t \quad (4)$$

$$LTDR = \beta_0 + \beta_1 CBSD_t + \beta_2 CBCSME_t + \beta_3 CIC_t + \beta_4 NCBB_t + \beta_5 DRBCB_t + \beta_6 NRMM_t + \beta_7 NMMT_t + \epsilon_t \quad (5)$$

$$OMO = \beta_0 + \beta_1 CBSD_t + \beta_2 CBCSME_t + \beta_3 CIC_t + \beta_4 NCBB_t + \beta_5 DRBCB_t + \beta_6 NRMM_t + \beta_7 NMMT_t + \epsilon_t \quad (6)$$

Where:

CRR = Cash reserve ratio

LTDR = loan to deposit ratio

OMO = open market operation

CBSD = Commercial banks savings deposit

CBCSME = Commercial Banks Credit to Small and Medium Scale Enterprises

CIC = Currency in circulation

NCBB = Number of commercial banks branches

DRBCB = Deposits of rural branches of commercial banks

NRMM = Number of Registered Mobile Money Account

NMMT = Number of Mobile Money Transactions

$\beta_0$ is the intercept term.

$\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$, $\beta_6$, $\beta_7$ = coefficients showing the relationship between monetary policy and each independent variable.

$\epsilon_t$ is the error term.

### 2.3 Method of data analysis

This study employs ARDL model. The model is suitable for analyzing the impacts of financial inclusion on monetary policy in Nigeria because it effectively handles variables that are integrated at different levels. This flexibility is crucial given that financial inclusion metrics and monetary policy indicators like interest rates may not follow the same order of integration. Additionally, the ARDL model is efficient for small sample sizes, making it well-suited for emerging economies where data limitations are common. By using ARDL, the model captures both short-term and long-term relationships between financial inclusion and monetary policy, offering insights into immediate policy impacts and sustained economic effects, which are essential for understanding and optimizing Nigeria's financial landscape.

## 3 Data presentation, analysis and interpretation of results

This segment presents the findings based on the methodology discussed in the previous chapter. It consists of data presentation, analysis and interpretation of data collected.

### 3.1 Empirical results and discussion

**Table 1 – ADF unit root test results**

| Variables | ADF | | Order of Integration (ADF) |
|---|---|---|---|
| | Test statistic | p-value | |
| CRR | -6.265567 | 0.0001 | I(0) |
| LTDR | -5.627767 | 0.0001 | I(1) |
| OMO | -6.949889 | 0.0001 | I(0) |
| CBSD | -3.676187 | 0.0000 | I(1) |
| CBCSME | -4.309824 | 0.0003 | I(0) |
| CIC | -5.436832 | 0.0243 | I(1) |
| NCBB | -4.653987 | 0.0032 | I(0) |
| DRBCB | -6.243885 | 0.0110 | I(1) |
| NRMM | -4.296729 | 0.0031 | I(1) |
| NMMT | -3.812106 | 0.0001 | I(0) |

**Source:** authors' computation (2025).

Time series data often exhibits patterns and typically lacks stability. Using OLS when analyzing the connection of a nonstationary variables on another nonstationary variable which might lead to erroneous regression results. The results obtained from the ADF test indicated that CRR, OMO, CBCSME, NCBB and NMMT demonstrate stationarity at the level, whereas LTDR, CBSD, CIC, DRBCB and NRMM exhibit integration of order one (I(1)) rather than zero. Hence, it is crucial to do an ARDL Bound test to determine the cointegration of the variables by examining the combination of I(0) and I(1) stationarity.

**Table 2 – ARDL Bound Test**

| Test Statistic | Value | K |
|---|---|---|
| F-statistic | 5.524207 | 5 |
| Critical Bounds | Value | |
| Significance | I0 Bound | I1 Bound |
| 10.0% | 2.55 | 3.52 |
| 5.0% | 2.76 | 3.71 |
| 2.5% | 3.15 | 4.34 |
| 1.0% | 3.65 | 5.12 |

**Source:** authors' Computation (2025).

The results of Table 2 revealed a bound test F-statistics of 5.524207 had a higher value compared to the value of upper bound of 3.71 at a significance level of 5%. The aforementioned observation identifies the presence of an enduring associations among the variables. Therefore, this result facilitated the advancement to ARDL model estimate.

**Table 3 – Estimated Long-run Coefficients Based on ARDL for CRR**

| Regressor | Coefficient | Standard error | t-Statistics | p-Value |
|---|---|---|---|---|
| Dependent Variable: CRR | | | | |
| CBSD | -4.861111 | 17.770323 | -0.273552 | 0.7850 |
| CBCSME | -0.659179 | 0.326604 | -2.018284 | 0.0410 |
| CIC | -1.007188 | 0.005428 | -3.324254 | 0.0003 |
| NCBB | 0.580710 | 0.617206 | 0.940869 | 0.3491 |
| DRBCB | 7.229320 | 3.713699 | 1.533683 | 0.1283 |
| NRMM | 0.346169 | 0.139088 | 1.971937 | 0.0115 |
| NMMT | 1.006504 | 0.229166 | 2.223014 | 0.0022 |
| C | 808.6197 | 793.1805 | 1.019465 | 0.4152 |

**Source:** authors' Computation (2025).

Commercial banks savings deposit coefficient (CBSD), as presented in Table 3, is -4.861111, accompanied p-value of 0.7850. The results depicted an indirect linkage of CBSD and CRR. Likewise, Commercial banks credit to small and medium scale enterprises and Currency in circulation exhibits an indirect and statistically significant impact on CRR, as depicted with coefficient of -0.659179 and -1.007188 and p-values of 0.0410 and 0.0003 respectively. Also, NCBB and DRBCB exhibit a direct but not statistically significant impact on CRR, as depicted with coefficient of 0.580710 and 7.229320 and p-values of 0.3491 and 0.1283. However, Number of Registered Mobile Money Account and Number of Mobile Money Transactions exhibited a direct but significant impact on CRR, as evidenced by coefficient of 0.346169 and 1.006504 as well as p-values of 0.0115 and 0.0022 respectively. The statistical analysis revealed that financial inclusion impact on monetary policy in Nigeria.

**Table 4 – Short run results**

| Dependent Variable: CRR | | | | |
|---|---|---|---|---|
| **Regressor** | **Coefficient** | **Standard error** | **t-Statistics** | **p-Value** |
| D(CBSD) | 0.190700 | 0.450477 | 0.423329 | 0.7132 |
| D(CBCSME) | 1330.13973 | 26.117932 | 0.189314 | 0.8673 |
| D(CIC) | 80.306708 | 91.538382 | 0.419272 | 0.7158 |
| D(NCBB) | 14.858437 | 92.486886 | 0.160655 | 0.8871 |
| D(DRBCB) | 0.190700 | 0.450477 | 0.423329 | 0.7132 |
| D(NRMM) | 5.677171 | 2.391032 | 2.199695 | 0.0014 |
| D(NMMT) | 8.641411 | 4.319870 | 2.405322 | 0.0003 |
| CointEq(-1) | -1.020759 | 0.322387 | -10.604427 | 0.0000 |

| **Test** | **F-statistics** | **Prob. Value** |
|---|---|---|
| Breusch-Pagan Godfrey Serial | 0.541148 | 0.3860 |
| Breusch-Pagan-Godfrey Heteroscedasticity | 1.284707 | 0.5693 |
| R-Squared = 0.632818 | | |

**Source:** authors' Computation (2025).

In addition, the Breusch-Pagan heteroskedasticity statistics of 1.284707, along with p-values of 0.5693, suggest that there is no evidence of heteroscedasticity in the models. Based on the absence of statistical significance in the statistical analysis and the inability to reject the null hypothesis of equal variance in the test, this conclusion can be inferred. The data presented in Table 4, the R-squared value is 0.632818, suggesting a substantial degree of adequacy in the model's fit. The data suggest that the Commercial banks savings deposit, Commercial Banks Credit to Small and Medium Scale Enterprises, Currency in circulation, Number of Commercial Banks Branches, Deposits of Rural Branches of Commercial Banks, Number of Registered Mobile Money Account and Number of Mobile Money Transactions collectively explained 63.2% of the observed fluctuations in Cash reserve ratio (CRR).

**Table 5 – Long run Model for LTDR**

| Variable | Coefficient | Standard Error | t-statistics |
|---|---|---|---|
| CBSD | -0.001677 | 0.00021 | -8.07530 |
| CBCSME | -0.027321 | 0.01540 | -1.77409 |
| CIC | 0.039798 | 0.01656 | 2.40290 |
| NCBB | 0.414028 | 0.18659 | 2.21896 |
| DRBCB | 1.328639 | 0.33786 | 3.93255 |
| NRMM | 0.222127 | 0.06209 | 3.57773 |
| NMMT | 1.943012 | 0.22010 | 8.82786 |

**Source:** authors' Computation (2025).

Table 5 presents the result of long run analysis of vector error correction model. According to the Table 5, CBSD has negative long run relationship with bank loan to deposit ratio (LTDR). The negative relationship between CBSD and LTDR was found be significant at 5% level of significance as indicated by t-value of -8.075 which higher than critical value of -1.96. Similarly, CSME was found to have exerted a long run negative impact on LTDR with coefficient of -0.027321. The impact was found to be insignificant at 5% level of significance with a t-statistic of -1.77 which less than the critical value of -1.96. Conversely, CIC had a significant positive relationship with LTDR. This is supported with t-statistic of 2.40 which is also less than critical value of 1.96.

NCBB had a long run positive relationship with LTDR. Furthermore, a positive long-term relationship also exists between DRBCB and LTDR. The relationship was also significant at 5% level of significance with t-statistic of 3.93, higher than 1.96. Also, NRMM and NMMT showed positive and significant relationship with LTDR at 0.222 and 1.943 respectively with statistical significance at 3.577 and 8.827.

Summarily, in the long run loan to deposit ratio tends to be affected significantly by Commercial banks savings deposit (CBSD), Commercial Banks Credit to Small and Medium Scale Enterprises (CBCSME), Currency in circulation (CIC), Number of commercial banks branches (NCBB), Deposits of rural branches of commercial banks (DRBCB), Number of Registered Mobile Money Account (NRMM), and Number of Mobile Money Transactions (NMMT). To determine the short run relationships, Error correction term (ECT) was introduced to the model and the result is presented in Table 6 below.

**Table 6 – Error Correction Model (short run model) for LTDR**

| Variable | Coefficient | Standard Error | t-statistics |
|---|---|---|---|
| D(CBSD) | -0.179357 | 0.26267 | -0.68282 |
| D(CBCSME) | 0.032713 | 0.01011 | 3.23571 |
| D(CIC) | 0.045563 | 0.14190 | 0.32109 |
| D(NCBB) | 0.020496 | 0.00798 | 2.56809 |
| D(DRBCB) | -0.447944 | 0.53729 | -0.83371 |
| D(NRMM) | 0.250688 | 0.22262 | 1.12610 |
| D(NMMT) | 0.022949 | 0.10286 | 0.22311 |
| ECT | -0.079109 | 0.02155 | -3.67095 |
| C | 0.388533 | 0.88959 | 0.43675 |
| R2 | 0.750199 | | |
| F-Stat. | 8.135708 | | |

**Source:** authors' Computation (2025).

From Table 6, the adverse effect of ECT is -0.079 indicating that the error in the long run model is being corrected at the rate of 8% (approximately) annually. In other words, the deviation from the long run relationship is corrected at the rate of 8% in the present period. A significantly positive relationship exists between CBCSME and LTDR. This is indicated by the t-value of 3.24 which exceeds the critical value of 1.96. Conversely, CBSD showed a negative but insignificant relationship with LTDR. The relationship was not significant as indicated by the calculated t-statistic of -0.683 which is less than 1.96.

Similarly, negative and insignificant relationship was found between DRBCB and LTDR with t-statistic of - 0.833. which is less than -1.96. Also, the relationship between CIC and LTDR is positive but insignificant with a t-value of 0.32 (<1.96). Finally, both NRMM and NMMT had no short run relationship with LTDR. The calculated t-values for the variables 1.126 and 0.223 respectively. The t-values are less than the critical value of t-statistic (1.96) at 5% level of significance. In a nutshell, the study establishes a short run significant relationship between each of CBCSME and NCBB, and LTDR. However, CBSD, DRBCB, NRMM and NMMT were determined to be insignificant in the short run. Regarding the fitness of the model, R2 of 0.75 indicates that 75% of the variations in the dependent variables were explained in the model by the independent variables. Also, F-statistic of 8. 14 testifies to the joint significance of the white-collar fraud variables in determining bank performance.

**Table 7 – Long run Model for OMO**

| Variable | Coefficient | Standard Error | t-statistics |
|---|---|---|---|
| CBSD | -2.021540 | 1.02100 | -1.979961 |
| CBCSME | 0.526334 | 0.91748 | 0.573674 |
| CIC | 3.210172 | 0.54521 | 5.88796 |
| NCBB | 0.554330 | 0.19321 | 2.86905 |
| DRBCB | 3.642822 | 1.636711 | 2.22570 |
| NRMM | 0.116687 | 0.777070 | 0.150163 |
| NMMT | 0.895671 | 0.44022 | 2.034599 |

**Source:** authors' Computation (2025).

Table 7 shows the long-run relationship between financial inclusion variables and open market operation (OMO). The results indicate a negative long-run relationship between CBSD and OMO. The relationship was found to be significant at 5% level of significance as its t-statistic is -1.98, which exceeds the critical value of -1.96. Results also revealed that CIC, NCBB, DRBCB and NMMT had positive and significant effects on OMO. However, CBCSME and NRMM showed no significance in a long run relationship with OMO.

**Table 8 – Error Correction Model (short run model) for OMO**

| Variable | Coefficient | Standard Error | t-statistics |
|---|---|---|---|
| D(CBSD) | -0.221207 | 0.11260 | -1.96550 |
| D(CBCSME) | 0.327131 | 0.12490 | 2.61914 |
| D(CIC) | 0.278890 | 0.19675 | 1.41748 |
| D(NCBB) | 0.943679 | 0.14350 | 6.57616 |
| D(DRBCB) | -1.467538 | 1.12500 | -1.30448 |
| D(NRMM) | 0.662101 | 0.42461 | 1.55932 |
| D(NMMT) | 0.024320 | 0.00211 | 11.5261 |
| ECT | -0.109109 | 0.03312 | -3.29435 |
| C | 0.330012 | 0.46590 | 0.70833 |
| R2 | 0.69434 | | |
| F-Stat. | 11.10543 | | |

**Source:** authors' Computation (2025).

From Table 8 which reported the results of short run model estimation, the ECT is -0.109 indicating that the errors are corrected at the rate of 10.9% annually. On the relationship between each pair of variables, short run relationships have been examined and reported as follows. CBCSME, NCBB and NMMT had positive significant short run relationship with OMO while CIC and NRMM had positive but insignificant relationships with OMO. On the other hand, CBSD and DRBCB had a negative relationship with OMO, but significant effect was recorded only for CBSD. R-squared of 0.69 means that 69% of the variations in OMO were explained in the model by the explanatory variables. F-statistics of 11.11 buttressed the fitness of the model.

**3.2 Discussion of findings**

The study used three measures of monetary policy which are cash reserve ratio (CRR), loan to deposit ratio (LTDR), and open market operation (OMO). For CRR model, the study identified long run significant negative relationship between CRR and each of commercial banks' savings (CBSD), commercial banks credit to small and medium scale enterprises (CBCSME) and currency in circulation (CIC). This implies that in the long run, the variables have notable impact on cash reserve ratio, a measure of monetary policy. However, the positive significant effect of Registered Mobile Money Account (NRMM), and Number of Mobile Money Transactions (NMMT) was found on cash reserve ratio. The implication is that financial inclusion variables had long-run effect on monetary policy.

This finding is consistent with Akanbi, Dauda, Yusuf and Abdulrahman (2020), that monetary policy effectiveness is a function of financial inclusion. In the short run however, only Registered Mobile Money Account (NRMM), and Number of Mobile Money Transactions (NMMT) were the two variables that have significant effect on cash reserve ratio. The result implies that most of financial inclusion variables have no short run impact on monetary policy. Finding of this study was not consistent with past researches like Maski, Kaluge and Sakti (2020) which revealed that financial inclusion variables affect monetary policy.

Regarding loan to deposit ratio, in the long run the ratio tends to be affected significantly by Commercial banks savings deposit (CBSD), Commercial Banks Credit to Small and Medium Scale Enterprises (CBCSME), Currency in circulation (CIC), Number of commercial banks branches (NCBB), Deposits of rural branches of commercial banks (DRBCB), Number of

Registered Mobile Money Account (NRMM), and Number of Mobile Money Transactions (NMMT). Commercial Banks credit to Small and Medium Scale Enterprises and Number of commercial banks branches were the only two that have significant impact on loan to deposit asset. The finding was also in tandem with the report for Cash reserve ratio, that while long term relationship was noted, the variables could not be said to have had significant short-term relationships with monetary policy.

Lastly on the open market operation, long run significant positive relationship was found for each of Currency in circulation, Number of Commercial Banks Branches, Deposits of Rural Branches of Commercial Banks, and Number of Mobile Money Transactions. Also, a long run negative relationship was found between Commercial banks savings deposit and open market operation. The results indicate long run significant effect of the variables on monetary policy. In the short run, Commercial Banks Credit to Small and Medium Scale Enterprises, Number of Commercial Banks Branches and Number of Mobile Money Transactions were the only variables with significant effect on open market operation as proxy of monetary policy.

## Conclusion

The study investigated financial inclusion and monetary policy in Nigeria. Error correction model was estimated, and the results showed that financial inclusion variables such as commercial banks' savings, commercial banks credit to small and medium scale enterprises, currency in circulation, registered mobile money account, number of commercial banks branches, deposits of rural branches of commercial banks, number of registered mobile money account and number of mobile money transactions had long run relationship with monetary policy measures.

Short run relationship was established for just few variables number of commercial banks branches and number of mobile money transactions. The research therefore concluded that financial inclusion had long run effect to monetary policy in Nigeria. The study recommended, among other things, that commercial banks should enhance their lending to small and medium scale enterprises as attracts more small business into the financial system and enhance effectiveness of monetary policy in the long run.

The study did not focus on some other financial inclusion variable such as financial literacy, gender-based financial inclusion which could have influence on monetary policy. Also, the study is limited to Nigeria, as such the findings may not be generalizable to other developing countries with different level of financial development.

Future research should focus on broader range of financial inclusion variables. The study should cover multiple countries or regions to identify common patterns and dynamics within the countries or regions.

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