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MONETARY POLICY AND FINANCIAL INCLUSION IN NIGERIA

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Abstract
Policymakers and practitioners require a nuanced grasp of financial inclusion to foster inclusive financial systems. This paper adopts a novel approach, using the Currency-in-Circulation to Money Supply/GDP ratio to aim for a more holistic assessment. The objective of this paper is to examine the impact of monetary policy variables on financial inclusion in Nigeria. It analyzes key factors such as rediscount rates, deposit rates, inflation rates, and exchange rates from 1981-2021. The Augmented Dickey-Fuller unit root test indicated the variables were stationary at I(0 and I (1). Bound test co-integration showed evidence of long run relationship among the variables. The techniques of autoregressive distributed lagged model and Granger causality analysis were used for model estimation. Results indicate that monetary policy has significant impact on financial inclusion, implying a mutual relationship between monetary policy and financial inclusion. Amongst others, it suggests that policymakers should integrate monetary policies, and prioritize financial inclusion alongside price stability and growth. Targeted interventions by monetary authorities should expand financial service access, especially for underserved populations.

Key Words: *ARDL Technique, Deposit Rate, Financial Inclusion, Granger Causality, Inflation Rate, Rediscount Rate.*

Introduction
Financial inclusion ensures access to financial services for individuals and businesses traditionally excluded from the mainstream system. It encompasses banking services, credit accessibility, and insurance provision, promoting informed financial decisions and economic empowerment (Agoba, Sare, & Bugri-Anarfo, 2017; Grohmann, Klühs, & Menkhoff, 2018; Naceur, Barajas, & Massara, 2017). Crucial for economic development, financial inclusion fosters growth, reduces poverty, and bridges societal gaps by empowering marginalized groups (Lapukeni, 2015; Lenka & Bairwa, 2016). In addition to societal benefits, financial inclusion contributes to financial stability, resilience, and innovation, driving the development of technology-enabled solutions (Anthony-Orji, Orji, Ogbuabor, & Onoh, 2019). Monetary policy, managed by central banks, aims to stabilize economies through interest rates, open market operations, and reserve requirements (Arshad *et al.*, 2021). Measuring monetary policy effectiveness in Nigeria involves assessing interest rates, money supply, inflation, exchange rates, and real

economic indicators (Arshad *et al.*, 2021). Though financial inclusion enhances monetary policy effectiveness by bolstering aggregate demand resilience, challenges remain, including informal financial practices and complex money demand dynamics (Salisu, 2022).

Financial inclusion in Nigeria confronts numerous hurdles, chiefly stemming from limited access to banking services, especially in rural areas. A lack of bank branches and financial literacy impedes individuals' ability to utilize available resources effectively. Informal financial networks further complicate matters, fostering mistrust in formal institutions. High fees and inadequate infrastructure exacerbate the situation, contributing to the financial exclusion of approximately 36.8% of adults (Central Bank of Nigeria, 2018). Demographic and regional disparities persist, with women and certain regions disproportionately affected (Tonuchi, Nwolisa, Obikaonu & Alase, 2021). Monetary policy faces challenges in Nigeria, including inflation volatility, exchange rate instability, and weak transmission mechanisms. Fiscal imbalances resulting from government borrowing hinder policy effectiveness, exacerbated by external shocks like fluctuations in oil prices. To address these challenges, the Central Bank of Nigeria (CBN) has implemented various initiatives, including the National Financial Inclusion Strategy (NFIS) and financial literacy programs (Olaoye, 2021).

The NFIS aims to broaden access to financial services through agent banking and mobile money services. Regulatory frameworks for microfinance and Islamic banking have been established to promote financial inclusion. Additionally, the CBN has introduced guidelines for agent banking, cashless policies, and fintech regulation to stimulate innovation and safeguard consumer interests (CBN, 2024). Recent efforts include a capitalization exercise for deposit money banks (CBN, 2024). Theoretical significance of studying the impact of monetary policy on financial inclusion lies in understanding how central banks' actions and policies influence the accessibility, availability, and affordability of financial services for individuals and businesses, particularly those who are traditionally underserved or excluded from the formal financial system. Studying their impact on financial inclusion helps elucidate the transmission mechanisms through which monetary policy actions influence the accessibility of financial services. Understanding how changes in interest rates impact borrowing patterns and credit availability among underserved populations is crucial for promoting financial inclusion. The empirical relevance of studying the impact of monetary policy on financial inclusion in Nigeria lies in its potential to inform policy decisions, promote economic development, and address key challenges facing the country's financial system. Empirical research on the impact of monetary policy on financial inclusion in Nigeria is highly relevant for addressing key challenges, informing policy decisions, and advancing the country's socioeconomic development agenda. By providing empirical evidence and actionable insights, such research can contribute to building a more inclusive and resilient financial system that supports sustainable economic growth and prosperity for all Nigerians.

Empirical studies on the impact of monetary policy on financial inclusion in Nigeria have yielded mixed results, with limited exploration of causality relationships. While some studies have examined individual monetary policy variables' effects, others have utilized different proxies for representing financial inclusion, leading to inconclusive outcomes (Ajisafe, Anyakudo, Akinkuotu, & Okunade, 2018; Olajide, Afolabi, & Titilayo, 2022; Tonuchi, Nwolisa, Obikaonu, & Alase, 2021). Several of the reviewed studies are constrained by their reliance on a single measure, failing to comprehensively assess the collective impact of monetary policy on financial inclusion in Nigeria. For instance, Anthony-Orji *et al.* (2019) exclusively examined the effects of individual monetary policy variable shocks on financial inclusion using the VAR framework, overlooking their combined influence.

Similarly, Olajide *et al.* (2022) examined the impact of different monetary policy variables on various proxies of financial inclusion, leading to inconclusive outcomes due to the lack of a unified measurement approach. In the measure of the proxy for financial inclusion, Tonuchi *et al.* (2021) utilized outstanding deposits with commercial banks (% of GDP) and the ratio of credit to the private sector (% of GDP), while Mbutor and Uba (2013) relied on outstanding deposits with commercial banks (% of GDP), but these indicators were deemed insufficient as they did not encompass the entire financial sector. To address these limitations, the present study adopts a novel approach, utilizing the ratio of Currency-in-Circulation (CIC) to Money Supply and Gross Domestic Product (GDP) as advocated by Olaoye (2021) in a Central Bank of Nigeria publication, providing a more comprehensive measure of financial inclusion in Nigeria. This study aims to address these limitations by adopting a comprehensive measurement approach and exploring causality relationships specific to Nigeria.

Conceptual Review

Monetary policy encompasses actions taken by central banks to influence credit availability and cost, aiming to stabilize monetary and price conditions. It operates through transmission channels, notably direct monetary and interest rate mechanisms. The former directly alters money supply, affecting aggregate spending, while the latter adjusts lending rates, impacting consumption and investment (Chinwuba, Akhor & Akwaden, 2015; Onwuteaka, Okoye, and Molokwu, 2019; Peters *et al.*, 2020).

Financial inclusion involves ensuring access to formal financial services, including savings, credit, and insurance, particularly for disadvantaged populations. It contributes to economic growth and social inclusion, recognized as a quasi-public good vital for universal access and empowerment (The World Bank, 2014; Ajisafe et al., 2018). The effectiveness of monetary policy relies on the extent of financial inclusion. A larger formal sector enhances policy impact by broadening the reach of interest rate adjustments. Conversely, limited financial inclusion undermines policy effectiveness, as monetary measures may not effectively influence the unbanked population (Olaoye, 2021).

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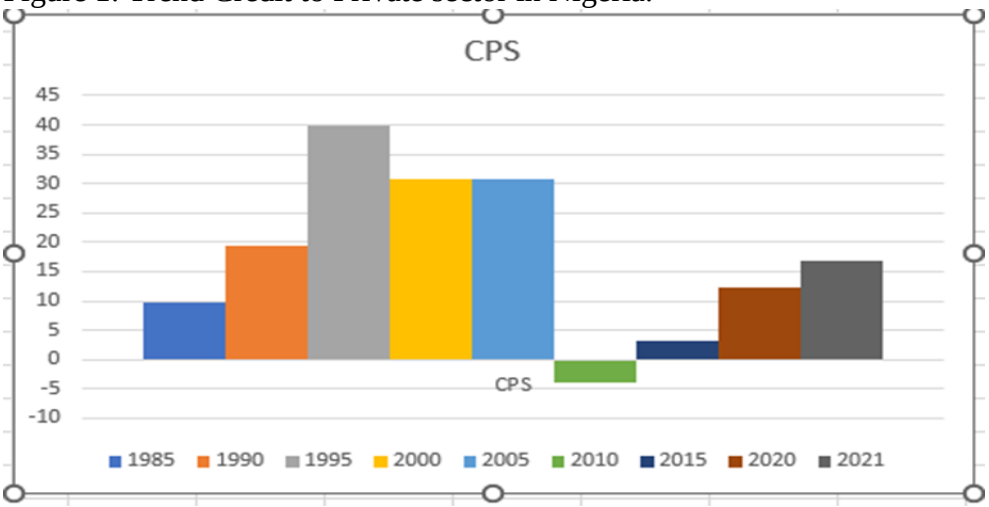
Table 1: Trend of Credit to Private sector and Money Supply in Nigeria

YEAR	CPS (NBillions)	M2 (NBillions)
1985	9.6	11.0
1990	19.5	49.1
1995	40.0	18.9
2000	30.9	62.2
2005	30.8	29.7
2010	-3.8	11.0
2015	3.3	24.6
2020	12.3	48.7
2022	16.8	14.7

Source: Central Bank of Nigeria Statistical Bulletin 2023

The trend of credit to the private sector in Nigeria shows fluctuations over the years. In 1985, credit to the private sector was 9.6, indicating a relatively low level of lending. By 1990, there was a significant increase to 19.5, suggesting a growth in lending activities by deposit money banks. This trend continued to rise, reaching 40.0 by 1995, indicating robust lending to the private sector. However, in 2000, there was a slight decrease to 30.9, possibly due to economic factors or changes in banking regulations. The trend remained relatively stable in 2005, with credit to the private sector at 30.8. In 2010, there was a notable decline to -3.8, indicating a contraction in lending or a decrease in demand for credit. The trend reversed in 2015, with credit to the private sector increasing to 3.3, suggesting a recovery or renewed lending activity. By 2020, there was a further increase to 12.3, indicating continued growth in lending. In 2021, credit to the private sector rose again to 16.8, reflecting ongoing lending activities by deposit money banks (CBN, 2022).This trend of Credit to Private sector is displayed in the Figure 1 below:

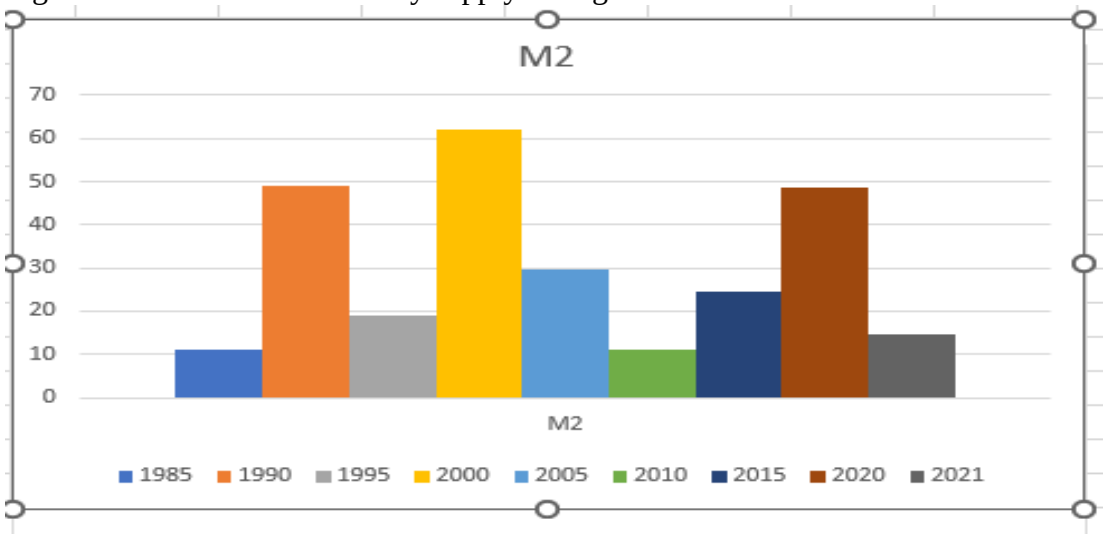
Figure 1: Trend Credit to Private sector in Nigeria.



The bar chart in Figure 1 illustrates the fluctuating trend of deposit money banks' credit to the private sector from 1985 to 2021, peaking at approximately N40 billion in 1995. Several factors could explain these fluctuations. Economic conditions, such as the implementation of the Structural Adjustment Programme in 1986, fluctuating GDP growth rates, inflation rates, and government policies, can influence banks' lending decisions. Changes in banking regulations, such as the Bank Consolidation policy in 2004, may impact the availability of credit by altering capital requirements or loan-to-deposit ratios. Additionally, shifts in consumer and business confidence, alongside changes in interest rates, can affect the demand for loans. External factors like global economic trends, such as the crude oil price crash, and geopolitical events, including high levels of insecurity and political and economic uncertainties, could also influence lending activities in Nigeria.

The trend of broad money supply in Nigeria exhibits various fluctuations over the years. Starting from 1985, the figures show a gradual increase from 9.6 to 40.0 by 1995, indicating robust growth during this period. However, from 2000 to 2005, there's a slight decline from 30.9 to 30.8, followed by a negative figure in 2005, indicating a contraction in the money supply. Subsequently, there's a rebound with positive figures in the following years, reaching 16.8 by 2021.

Figure 2: Trend of Broad Money supply in Nigeria.



Several factors could explain these movements in money supply by the Central Bank of Nigeria (CBN). Economic conditions, such as GDP growth, inflation rates, and government policies, play a significant role. For instance, periods of economic expansion may lead to increased money supply to support growing economic activities following the economic recessions during the 1980s). Conversely, during economic downturns, the CBN may have reduced money supply to curb inflationary pressures as shown in 1985, 1995, 2010 and 2021 (CBN, 2021).

Measuring Financial Inclusion

Olaoye (2021) delineates two primary approaches to measuring financial inclusion: supply-side and demand-side measures. Supply-side measures assess access factors enabling formal financial service utilization, while demand-side measures focus on account holder access frequency, mode, challenges, and alternative options. Demand-side measures of financial inclusion consider account holder access factors, including usage frequency, access mode, account purpose, access challenges, and alternative options (Olaoye, 2021). Conversely, supply-side measures encompass variables such as financial product variety and suitability, accessibility in terms of time and distance, pricing and terms, as well as the density of financial access points per adult and the number of accounts per capita. There are other specific measures of financial inclusion. First is the ratio of currency-in-circulation (CIC) to money supply and gross domestic product (GDP). The CIC serves as an essential gauge of cash utilization, measured both in relation to money supply and as a fraction of a country's GDP. An uptick in CIC volume signifies a decline in total deposits and accessible loans, reflecting the degree of financial inclusion (Olaoye, 2021). This measure is adopted as a measure of financial inclusion in this study. The Second measure is the ratio of Currency outside banks to money Supply. Currency outside banks delineates the CIC portion circulating beyond banking channels, utilized by the public for transactions. It mirrors the sophistication level of a nation's payment infrastructure, offering insights into financial inclusivity (Olaoye, 2021). There is also currency held by banks and volume of deposits/loans. Currency held by banks represents CIC stashed within bank reserves, encompassing naira holdings across Deposit Money Banks, Merchant Banks, and Non-Interest Banks. This metric serves as a barometer of financial inclusivity by depicting the magnitude of funds available within bank vaults. A substantial volume of currency held by banks (deposits) translates to increased loanable funds within the banking system (Olaoye, 2021).

Theory of Financial Development

The Theory of Financial Development, often attributed to Bagehot (1873), posits that financial institutions efficiently allocate funds from savers to borrowers, facilitating investment and economic growth. It assumes a stable financial system where institutions are solvent and capable of fulfilling obligations. Financial institutions, particularly banks, provide liquidity by transforming short-term deposits into longer-term loans, promoting economic activity. Effective risk management practices prevent crises and maintain confidence. However, the theory's assumption of market efficiency may not always hold, leading to mispricing of assets and inefficiencies. It may underestimate the risk of instability and overlook distributional effects, potentially exacerbating income inequality. While advocating for government regulation, it may not fully appreciate the need for robust frameworks to address market failures. Additionally, focusing primarily on banks may overlook the role of non-bank financial institutions and markets in the financial system.

Monetary Theory Policy

Monetary policy theory's evolution, influenced by economists like Ricardo, Bagehot, Keynes, Friedman, and Hayek, elucidates money's role, central banking, and policy interventions in economic outcomes. Ricardo's "Principles of Political Economy and Taxation" (1817) introduced money's functions, while Bagehot's "Lombard Street" (1873) emphasized central banks and financial stability. 20th-century economists further advanced this theory.

Monetary policy theory offers strengths to the economy, such as swift adjustment of interest rates and money supply to stabilize the economy, with precision in implementation aiding specific objectives like price stability. Transparent communication and central bank independence enhance credibility. Yet, weaknesses include long and variable lags in policy effects, uncertainty in forecasting, and limitations in addressing economic problems, especially at the zero lower bound. Policy actions may also exacerbate distributional concerns regarding fairness and inequality.

Link between Monetary Policy and Financial Inclusion

The link between monetary policy theory and its impact on financial inclusion lies in how monetary policy decisions influence access to financial services and resources for underserved populations. Monetary policy affects interest rates, liquidity, and overall economic conditions, which in turn can affect the availability and affordability of financial services for individuals and businesses, especially those in marginalized or underserved communities. Adjustments in interest rates or quantitative easing measures aimed at stimulating economic growth can lower borrowing costs, making credit more accessible and potentially increasing financial inclusion. Conversely, actions aimed at curbing inflation or stabilizing financial markets may inadvertently tighten credit conditions, hindering financial inclusion efforts. Policymakers must consider these effects when designing and implementing monetary policy measures to ensure they promote financial inclusion and address disparities in access to financial services.

Empirical Review

The empirical literature review encompasses various studies investigating the relationship between financial inclusion and monetary policy. Ajisafe, Anyakudo, Akinkuotu, and Okunade (2018) investigated the impact of financial inclusion and monetary policy on poverty levels in Nigeria from 1986 to 2015, employing the autoregressive distributed lag (ARDL) approach to cointegration. Their analysis revealed that the effects of financial inclusion and monetary policy on poverty levels varied depending on the specific measurements employed. Simiolaly, Salisu (2022) examined the interplay between financial inclusion and monetary policy on the economic growth of Developing Countries, utilizing panel data spanning from 2010 to 2020. Employing the Generalized Method of Moment (GMM), the study concluded that both financial inclusion and monetary policy wielded a positive and significant influence on economic growth within developing countries during the examined period. Also, Anthony-Orji, Orji, Ogbuabor, and Onoh (2019) explored the effects of monetary policy shocks on financial inclusion in Nigeria through the vector autoregression model (VAR). Findings

reveals significant impacts of shocks to the minimum rediscount rate, interest rate, broad money supply, and deposit rates of deposit banks on financial inclusion in Nigeria.

Arshad, Ahmed, Ramzan, Shabbir, and Bashir Khan (2021) delved into the causal relationship between monetary policy effectiveness and financial inclusion across 40 countries for the period 2004-2018. The findings indicate that monetary policy effectiveness and financial inclusion do not contemporaneously impact each other. Similarly, Brownbridge, Bwire, Rubatsimbira, and Tinyinondi (2017) employed a panel vector error correction (PVEC) methodology to examine the hypothesis that economies with lower levels of financial inclusion experience weaker monetary policy transmission mechanisms compared to economies with higher levels of financial inclusion. The findings indicate that economies with higher levels of financial inclusion demonstrate stronger impulse responses. Ozili (2023) investigates monetary policy's effect on financial inclusion in major emerging markets (2004-2020). High monetary rates reduce bank depositors but boost bank branch expansion, impacting financial inclusion differently. Both contractionary and expansionary policies benefit specific indicators, but post-crisis, rising rates adversely affect all indicators.

Mbutor and Uba (2013) conducted an analysis on the impact of financial inclusion on monetary policy effectiveness in Nigeria spanning from 1980 to 2012. Their findings supported the notion that increasing financial inclusion could enhance the efficacy of monetary policy.

Olajide, Afolabi, and Titilayo (2022) investigated the impact of monetary policy on financial inclusion in Nigeria spanning from 1985 to 2019. The study utilized the autoregressive distributed lag (ARDL) approach. Findings revealed that monetary policy did not significantly affect financial inclusion in Nigeria throughout the period under investigation. Tonuchi, Nwolisa, Obikaonu, and

Alas (2021) examined the impact of monetary policy on achieving financial inclusion while also assessing whether FinTech enhances or hinders this relationship in Nigeria for the period 2009-2019. The technique of Fully Modified OLS, findings indicated that various measures of monetary policy effectiveness, such as the inflation rate and lending rate, significantly influenced financial inclusion in Nigeria. Additionally, the study discovered that incorporating FinTech into the model improved the efficacy of monetary policy on financial inclusion, contrary to the widespread belief that FinTech impedes monetary policy effectiveness.

Oanh, Le, and Le (2023) explored financial inclusion, monetary policy, and financial stability across 58 countries from 2004 to 2020. Using the PVAR method, they found divergent trends: in LFDCs, financial inclusion linked positively with stability but negatively with inflation and money supply growth. Conversely, in HFDCs, financial inclusion correlated positively with inflation and money supply growth, yet negatively with stability, inflation, and money supply growth. Furthermore, Marwa (2019) investigated the impact of financial inclusion on monetary policy transmission in Egypt,

utilizing annual data spanning from 2000 to 2017 using the techniques of Vector Error Correction Model (VECM) approach and Granger causality analysis. The results found that financial inclusion, money supply, and exchange rate shocks played a role in explaining variations in monetary policy effectiveness. In the long run, exchange rate shocks accounted for over 38 percent of the variations, while financial inclusion explained 21 percent. Moreover, bidirectional causality was observed from monetary policy to financial inclusion across all specifications examined.

Knowledge Gap

Previous research indicates a scarcity of studies examining how monetary policy affects financial inclusion, especially in Nigeria. While some investigations exist, their findings on this relationship remain inconclusive. Hence, this study aims to address this gap by introducing a novel approach. It utilizes a unique metric of financial inclusion—the ratio of currency in circulation/broad money supply to GDP, endorsed by Olaoye (2021). Employing the Autoregressive Distributed Lag (ARDL) technique, it assesses the impact of monetary policy variables on financial inclusion in both short and long terms, within the context of financial development. Additionally, the study aims to validate the causality relationship between monetary policy and financial inclusion using Nigerian data.

Materials and Methods

The present study adopts the *ex post facto (cause/effect)* research design. The theory of financial development serves as the framework for the present study. Time series data for the period 1981-2021 were sourced from the Central Bank of Nigeria Statistical Bulletin. The researcher utilized Eviews 9.0 Econometric software for data analysis. The current study employed the Autoregressive Distributed Lag (ARDL) Bound testing procedure to investigate the co-integration (long-run) relationship between financial inclusion and monetary policy variables, as well as to analyze short-run and long dynamics. The ARDL approach to co-integration has gained prominence in recent years (Charemza & Deadman, 1992).

This model incorporates an adequate number of lags to capture the data generating process within a general-to-specific modeling framework (Laurenceson & Chai, 2003). Additionally, a dynamic error correction model (ECM) can be derived from ARDL through a straightforward linear transformation (Banerjee, Dolado, Galbraith, & Hendry, 1993). The ECM integrates short-run dynamics with long-run equilibrium while preserving long-run information. It is also argued that employing the ARDL approach circumvents issues arising from non-stationary time series data (Laurenceson & Chai, 2003). In addition, the Granger causality technique is used to estimate the causality relationship between monetary policy variables and financial inclusion.

Prior to model estimation, pre-estimation tests of the time series data for unit root were done using the Augmented Dickey-Fuller unit root test and the bound test cointegration. In this study, the Augmented Dickey-Fuller (ADF) test is employed to test for the presence of a unit root in the time series. The ADF equation is presented as follows:

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$$\Delta y_t = \delta y_{t-1} + \sum_{i=1}^{P} \alpha i \Delta y_{t-i} + \mu_t \quad (3.12)$$

The testing procedure involves examining the student-t ratio for the parameter δ. The critical values of the test, termed DF and ADF statistics, are all negative and greater in absolute terms than standard critical t-values. Thus, if the null hypothesis cannot be rejected, indicating that the series Yt cannot be stationary.

Decision Rule: Reject Ho if the absolute DF or ADF t-statistic > 5% critical values. Otherwise, accept Ho.

According to Pesaran, Shin and Smith (2001), the bound test is essentially computed based on an estimated error correction version of the autoregressive distributed lag (ARDL) model, utilizing the Ordinary Least Square (OLS) estimator. The ARDL bounds test is suitable for small or finite sample data compared to other conventional co-integration approaches. Its adaptability to small sample studies is noteworthy, particularly considering the limited sample period of this study (41 years). An F-test of the joint significance of the coefficients of the lagged levels of the variables was employed to test the hypothesis of no co-integration among the variables against the presence of co-integration. The F-test has a nonstandard distribution regardless of whether the variables are 1(0) or 1(1). Pesaran et al. (2001) proposed two sets of adjusted critical values that provide the lower and upper bounds used for inference. One set assumes that all variables are 1(0), while the other assumes that they are all 1(1). If the computed F-statistics fall above the upper bound critical value, the null hypothesis of no cointegration is rejected. Subsequently, the short and long-run ARDL model is estimated. Conversely, if it falls below the lower bound, the null hypothesis cannot be rejected, and the short-run parameters are estimated using the error correction modeling version of ARDL. Finally, if it falls between the lower and upper bounds, the result would be inconclusive. Before performing the ARDL model, all variables' level of integration will be tested because if any variable is I(2) or above, the ARDL approach will not be applicable (Ilyas, Hafiz, Afzal & Tahir, 2010).

Lag Selection Criteria

The ARDL method estimates (p+1)k regressions to determine the optimal lags for each variable, where p represents the maximum number of lags and k denotes the number of variables in the equation. Given that annual data is utilized, a maximum lag of 1 (p) is selected, following the approach of Pesaran and Pesaran (1997). The optimal model can be identified using model selection criteria such as the Schwartz-Bayesian Criteria (SBC) and Akaike Information Criteria (AIC).

Hypotheses

An F-test of the joint significance of the coefficients of the lagged levels of the variables is utilized to examine the hypothesis of no co-integration among the variables against the presence of co-integration. The null hypothesis posits no co-integration relationships between the dependent variables and the independent variables in the three equations:
Ho1: ∝= 1 ∝= 2= ∝= 3= ∝= 4 ∝= 5 ∝= 6

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Decision Rule:
If the computed F-statistics exceed the upper bound critical value, the null hypothesis of no cointegration is rejected. If it falls below the lower bound, the null hypothesis cannot be rejected. However, if it falls between the lower and upper bounds, the result is inconclusive.

Model Specification
The linear model in this study mirrored the one used by Anthony-Orji, Orji, Ogbuagbor and Onoh (2019). A linear model showing the relationship between financial inclusion and monetary policy variables is shown as thus:
Financial inclusion = *f*(MPV) …….Eqn 1.
Monetary policy variable is a function of minimum rediscount rate, broad money supply, deposit bank rates.
MPV = *f*(MRR, M2, DPR)……..Eqn 2
If we substitute equation 3.2 in 3.1, we have:
Financial inclusion = *f*(MRR, M2, DPR)……Eqn 3.

As a departure from previous studies, the present study adopted the use of the ratio of currency in circulation to broad money supply as proxy for financial inclusion, in contrast with Anthony-Orji et al (2019) who measured financial inclusion as rural deposit of commercial banks. In addition, having used broad money supply as a component of the measure of financial inclusion in the present study, the present researcher dropped the use of the ratio of broad money supply to GDP for fear of committing specification bias in the model.

With the aid of the reviewed literature, stochastically, the model becomes:
$FI_t = \beta_0 + \beta_1 \text{MRR}_t + \beta_2 \text{DPR}_t + \beta_3 \text{INF}_t + \beta_4 \text{EXR}_t + \beta_5 \text{RGDP}_t + \varepsilon$ ……Eqn 4.
The proxy for financial inclusion in this study is derived from the literature.
FI= Financial inclusion, (ratio of currency in circulation/broad money supply to GDP, Olaoye, 2021)
MRR = Minimum Rediscount Rate (Anthony-Orji et al (2019; Salisu 2022)
DBR= Deposit rates of deposit banks (Anthony-Orji et al 2019 ;)
INF = Inflation rate (Salisu, 2022)
EXR = Nominal exchange rate (Salisu, 2022)
RGDP = real GDP (level of economic activity, Arshad, Ahmed, Ramzan, Shabbir,Bashir & Khan 2021)
β_0 = parametric constant
β_1 - β_5= regression coefficients
ε = error terms
A priori expectations:
$f(\beta_1) < 0$; $f(\beta_2) > 0$; $f(\beta_3) < 0$; $f(\beta_4) < 0$; $f(\beta_5) > 0$;
The short-run and long-run formulations of the ARDL model are re-specified as follows:

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$$\Delta AFI_t = \propto_0 + \propto_{1i} \sum_{i=1}^{q} \Delta FI_{t-1} + \propto_{2i} \sum_{i=0}^{q} \Delta MRR_{t-i} + \propto_{3i} \sum_{i=0}^{q} \Delta DPR_{t-1} + \propto_{4i} \sum_{i=0}^{q} \Delta INF_{t-i} + \propto_{5i} \sum_{i=0}^{q} \Delta EXR_{t-i} + \propto_{6i} \sum_{i=0}^{q} \Delta RGDP._{t-i} + \beta_1 MRR_t + \beta_2 DPR_t + \beta_3 INF_t + \beta_4 EXR_t + \beta_5 RGDP_t + \varphi ECM \quad \ldots\ldots\ldots\ldots\ldots Eqn\ 5.$$

$\propto_i$= short regression coefficients and i= 0, 1,…,n
β = long run regression coefficients
φ = error correction coefficient (speed of adjustment from the short run to the long run equilibrium after a shock).

It is widely acknowledged that regression analysis addresses the dependence of one variable on another, without necessarily implying causation (Gujarati, 2005). The primary aim of causality analysis, facilitated by the Granger causality test, is to determine if a causal relationship exists between two variables of interest. Below is the Granger specification model: Therefore:

$$FI_t = \beta_o + \sum_{i=1}^{p} \beta_1 FI_{t-i} + \sum_{i=1}^{p} \beta_2 MRR_{t-i} + \sum_{i=1}^{p} \beta_3 DPR_{t-i} + \sum_{i=1}^{p} \beta_4 INF_{t-i} + \sum_{i=1}^{p} \beta_3 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 RGDP_{t-i} + \mu_t \qquad 3.6$$

$$MRR_t = \alpha_o + \sum_{i=1}^{p} \alpha_1 FI_{t-i} + \sum_{i=1}^{p} \alpha_2 MRR_{t-i} + \sum_{i=1}^{p} \alpha_3 DPR_{t-i} + \sum_{i=1}^{p} \alpha_3 INF_{t-i} + \sum_{i=1}^{p} \alpha_4 EXR_{t-i} + \sum_{i=1}^{p} \alpha_4 RGDP_{t-i} + \mu_t \qquad 3.7$$

$$DPR_t = \lambda_o + \sum_{i=1}^{p} \lambda_1 FI_{t-i} + \sum_{i=1}^{p} \lambda_2 MRR_{t-i} + \sum_{i=1}^{p} \lambda_3 DPR_{t-i} + \sum_{i=1}^{p} \lambda_3 INF_{t-i} + \sum_{i=1}^{p} \lambda_4 EXR_{t-i} + \sum_{i=1}^{p} \lambda_4 RGDP_{t-i} + \mu_t \qquad 3.8$$

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$$INF_t = \theta_o + \sum_{i=1}^{p} \theta_1 FI_{t-i} + \sum_{i=1}^{p} \theta_2 MRR_{t-i} + \sum_{i=1}^{p} \theta_3 DPR + \sum_{i=1}^{p} \theta_3 INF_{t-i} + \sum_{i=1}^{p} \theta_4 EXR_{t-i} + \sum_{i=1}^{p} \theta_4 RGDP_{t-i} + \mu_t \quad 3.9$$

$$EXR_t = \Pi_o + \sum_{i=1}^{p} \Pi_1 FI_{t-i} + \sum_{i=1}^{p} \Pi_2 MRR_{t-1} + \sum_{i=1}^{p} \Pi_3 DPR_{t-i} + \sum_{i=1}^{p} \Pi_3 INF_{t-i} + \sum_{i=1}^{p} \Pi_4 EXR_{t-i} + \sum_{i=1}^{p} \Pi_4 RGDP_{t-i} + \mu_t \quad 3.10$$

$$RGDP_t = \vartheta_o + \sum_{i=1}^{p} \vartheta_1 FI_{t-i} + \sum_{i=1}^{p} \vartheta_2 MRR_{t-1} + \sum_{i=1}^{p} \vartheta_3 DPR_{t-i} + \sum_{i=1}^{p} \vartheta_3 INF_{t-i} + \sum_{i=1}^{p} \vartheta_4 EXR_{t-i} + \sum_{i=1}^{p} \vartheta_4 RGDP_{t-i} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots Eqn\ 11.$$

Decision Rule:
If the probability value is less than 0.05, the alternative hypothesis is accepted otherwise the null hypothesis is accepted.

Table 2: Definition of variables

Variable	Description	unit	Sources
FI	Ratio of currency in circulation to broad money supply	N billion	CBN Statistical Bulletin 2021
MRR	Minimum rediscount rate	In percent	CBN Statistical Bulletin 2021.
DPR	Deposit rates of deposit money banks	In percent	CBN Statistical Bulletin 2021
INF	Inflation Rate	Aggregate price level in %	CBN Statistical Bulletin 2021
EXR	Nominal exchange rate	Naira	CBN Statistical Bulletin 2021
RGDP	Real Gross Domestic Product	N billion	CBN Statistical Bulletin 2021

Source: Author's Compilation of Study variables

Results and Discussion

This section commences with the presentation of the preliminary tests of the time data. First is the correlation analysis for the association of the data.

Correlation Test

Table 3: Result of the Correlation Matrix

	FI	MRR	DPR	INF	EXR	RGDP
FI	1.00					
MRR	0.38	1.00				
DPR	-0.24	0.63	1.00			
INF	0.43	0.34	0.11	1.00		
EXR	-0.79	-0.08	0.54	-0.32	1.00	
RGDP	-0.90	-0.18	0.51	-0.34	0.92	1.00

Source: Authors' computation with EView(10)

The result of the pairwise correlation coefficient shows that all the coefficient are less than 0.8 as suggested by Gujarati (2005), except for RGDP vs. EXR whose value is 0.92. This outcome does not pose any worry because the variables will be transformed during estimation.

Result of Unit Root test for Stationarity

The time series are tested for stationarity. The result is shown in Table 4.

Table 4: Result of ADF Unit Root Test of the Variables

Variable	Level Form		First Difference		Order of integration
	ADF test statistic	Probability	ADF test statistic	Probability	
FI	-0.280196	0.9189	-3.185972	0.0287	I(1)
MRR	-3.334522	0.0198	-	-	I(0)
DPR	-2.893999	0.0549	-7.017383	0.0000	I(1)
EXR	2.719631	1.0000	-4.067937	0.0030	I(1)
INF	-3.106393	0.0341		-	I(0)
RGDP	0.614430	0.9884	-3.302757	0.0215	I(1)

Source: Authors' computation with EView(10)

The result of the Augmented Dick-Fuller Unit root test is presented in Table 4.2. Using the probability values of the ADF t-statistic, the result shows that all the time series variables were stationary at first difference, I(1), (FI, DPR, EXR and RGDP), except MRR and INF which were stationary at level, I(0). This paper presents for co-integration. The result of the co-integration test is presented in Table 5.

Table 5: Result of Bound Test Cointegration Test

Null Hypothesis: D(RGDP) has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.302757	0.0215
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				

Source: Authors' computation with EView(10)

Table 5 presents the result of the co-integration analysis. The calculated result indicates that the probability value of the value of the F- statistic (-3.302757) exceeds the 5 per cent critical value (-2.938987). This implies that there is a long run relationship among the variables in the model.

Regression Result

Two regression results are presented in this section: the ARDL estimates and the Granger causality result. After estimating the basic ARDL regression at 4 lags for both the dependent and the independent variables, the result yielded the selected lag model as: (1, 4, 3, 0, 3, 3).

ARDL Regression Result

Table 5: Result of ARDL Regression Estimates

ARDL Cointegrating And Long Run Form				
Dependent Variable: FI				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MRR)	-0.001498	0.001293	-1.158087	0.2628
D(MRR(-1))	0.001030	0.001163	0.885364	0.3883
D(MRR(-2))	0.000835	0.001098	0.760671	0.4573
D(MRR(-3))	-0.002367	0.001059	-2.233995	0.0392
D(DPR)	0.001558	0.000955	1.631524	0.1212
D(DPR(-1))	-0.004404	0.001342	-3.282905	0.0044
D(DPR(-2))	-0.002741	0.001193	-2.297202	0.0346
D(EXR)	-0.000330	0.000095	-3.481599	0.0029
D(INF)	-0.000447	0.000239	-1.868569	0.0790
D(INF)	-0.000279	0.000377	-0.738447	0.4703
D(INF)	0.000629	0.000257	2.447754	0.0255
D(LRGDP)	0.064075	0.089380	0.716881	0.4832
D(LRGDP(-1))	-0.454399	0.134133	-3.387667	0.0035
D(LRGDP(-2))	0.198511	0.079107	2.509394	0.0225
CointEq(-1)	-0.631023	0.119269	-5.290761	0.0001
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

MRR	-0.005920	0.004151	-1.425924	0.1720
DPR	0.022490	0.003467	6.486045	0.0000
EXR	-0.000523	0.000106	-4.923975	0.0001
INF	-0.002430	0.000635	-3.824524	0.0014
LRGDP	-0.251976	0.032367	-7.785052	0.0000
C	2.530628	0.319674	7.916266	0.0000
R-squared	0.885628	Mean dependent var	-0.004959	
Adjusted R-squared	0.783295	S.D. dependent var	0.027698	
S.E. of regression	0.012894	Akaike info criterion	-5.557624	
Sum squared resid	0.003159	Schwarz criterion	-4.773934	
Log likelihood	120.8160	Hannan-Quinn criter.	-5.281336	
F-statistic	8.654395	Durbin-Watson stat	2.373009	
Prob(F-statistic)	0.000011			

Source: Authors' computation using EView(10)

In the result of the regression model shown in Table 5, the coefficient of -0.001498, for the minimum rediscount rate (MRR) indicates the estimated effect of a one-unit change in MRR on the dependent variable, financial inclusion (FI) in the current year. Since the coefficient is negative in the current year, it suggests that there is an inverse relationship between MRR and FI in the short run. The same result is similar in the long run where the coefficient for MRR is 0.005920. In terms of statistical significance, the probability values of the statistic in both horizons are 0. 2628 and 0.1720 respectively. This implies that these two variables are not statistically significance in influencing financial inclusion over the period under study. The result shows that the coefficient of deposit money banks rate for the short and long run are 0.001558 and 0.022490 respectively. This result indicates the estimated effect of a one-unit change in DPR on the dependent variable, financial inclusion (FI) in the current year on both horizons. Statistically, the value of the probability of DPR is 0.1212 and 0.0000 in the short run and long run respectively. This means that DPR has a significant impact on financial inclusion in the short run, but insignificant in the long run.

The relationship between exchange rate (EXR) and financial inclusion in the short run and in the long run were negative and statistically significant as shown in Table 6 above. One unit appreciation (increase in the value of Naira to the dollar) in domestic exchange rate leads to an increase in financial inclusion by -0.000330 unit and -0.000523 unit in the short run and long run respectively. The probability values of the t-statistic for the both horizons were below 0.05, meaning that both variables were statistically significant in influencing financial inclusion. The relationship between inflation rate (INF) and financial inclusion was negative. One unit increase in inflation rate leads to a decline leads to a decline in financial inclusion in Nigeria in the short run (-0.000447) and in the long run (-0.002430). Statistically speaking, INF is weakly significant in the short run (P(t) = 0.0790), but fully significant in the long run (P(t) = 0.0014).

The relationship between RGDP and Financial inclusion is positive in the short run (0.064075), but not in the long run (-0.25197). Though, RGDP was not statistically

significant in the short run (P(t) = 0.4832), but it was significant in the long run (P(t) = 0.0000).

The statistically significant error correction coefficient (-0.631023) implies that deviations from the long-run equilibrium relationship between the variables in this ARDL model are corrected relatively quickly. In other words, if financial inclusion (FI) deviates from its long-run equilibrium level, it will adjust towards that equilibrium at a speed indicated by the magnitude of the error correction coefficient. Since the coefficient is negative, it suggests that there is a tendency for financial inclusion to adjust downwards if it exceeds its long-run equilibrium, and vice versa. Overall, the presence of a statistically significant error correction term suggests that the ARDL model adequately captures the adjustment dynamics between financial inclusion (FI) and the other variables included in the model.

Overall, the F-statistic (8.6543965) and its associated low probability (0.0001) indicate that the ARDL regression model, considering minimum rediscount rate, deposit money banks rate, inflation rate, and exchange rate, is statistically significant in explaining the variation in financial inclusion. Similar to these findings, Anthony-Orji, Orji, Ogbuabor, and Onoh (2019) demonstrated significant impacts of shocks to various monetary policy indicators on financial inclusion using vector autoregression. Additionally, Tonuchi, Nwolisa, Obikaonu, and Alas (2021) asserted the significant influence of measures like inflation rate and lending rate on financial inclusion. Conversely, Olajide, Afolabi, and Titilayo (2022) concluded no significant impact of monetary policy on financial inclusion in Nigeria.

Granger Causality Regression Analysis

The result of the Granger causality analysis is presented in Table 6:

Table 6: Result of Granger Causality Regression Estimates

Pairwise Granger Causality Tests			
Null Hypothesis:	Obs	F-Statistic	Prob.
MRR does not Granger Cause FI	39	6.13660	0.0053
FI does not Granger Cause MRR		1.29180	0.2879
DPR does not Granger Cause FI	39	3.61981	0.0376
FI does not Granger Cause DPR		1.03605	0.3658
INF does not Granger Cause FI	39	2.23239	0.1228
FI does not Granger Cause INF		6.39775	0.0044
EXR does not Granger Cause FI	39	2.43461	0.1028
FI does not Granger Cause EXR		0.19720	0.8220
LRGDP does not Granger Cause FI	39	1.75560	0.1881
FI does not Granger Cause LRGDP		6.79970	0.0033

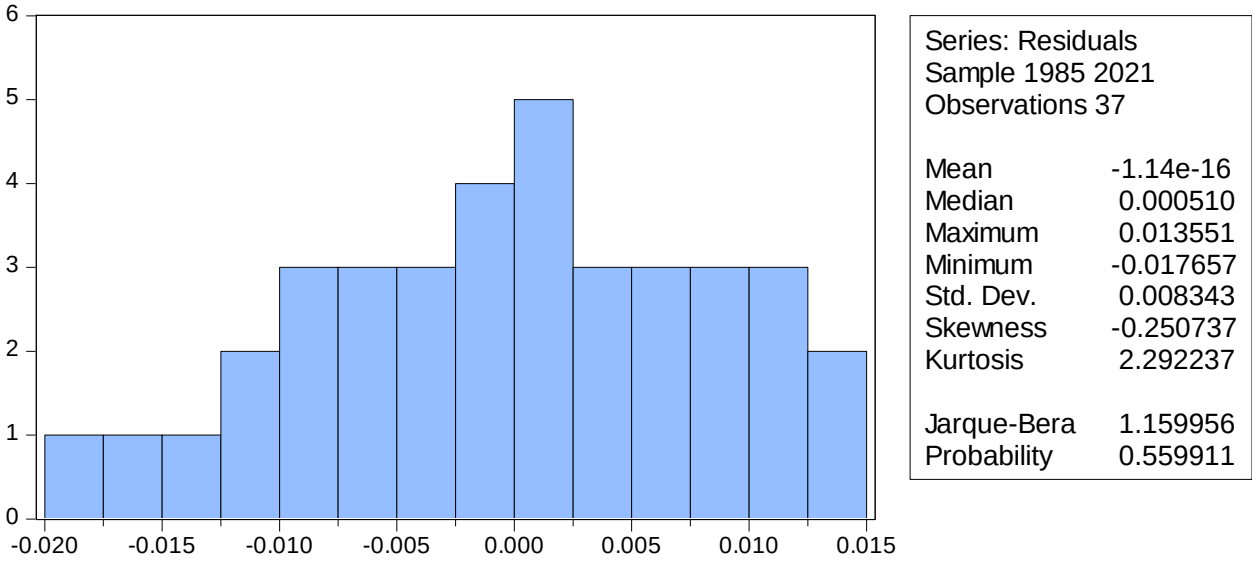
Source: Authors' computation using EView(10)

Based on the value given to the first null hypothesis (0.0053), therefore, there is evidence to conclude that past values of MRR do Granger cause FI. In other words, the past values of MRR contain information that helps predict the current value of FI. Since the p-value (0.2879) is greater than the conventional significance level of 0.05, we fail to reject the null hypothesis. Therefore, we do not have evidence to conclude that past values of FI Granger cause MRR. In other words, the past values of FI may not contain information that helps predict the current value of MRR. The same analogy is extended to other variables and hypotheses in Table 6 above. In summary, generally, it could be summarized that Monetary policy variables Granger cause financial inclusion (FI), evidenced by significant probabilities. FI Granger causes inflation rate (INF) but not exchange rate (EXR). This finding contradicts Arshad, Ahmed, Ramzan, Shabbir, and Bashir Khan (2021), who argued that monetary policy effectiveness and financial inclusion do not contemporaneously influence each other.

Post-Estimation Result

Model reliability tests are done to verify if the results obtained in the regression above satisfy the assumptions of the Ordinary Least Squares. Normality test is essential to ascertain the distribution of the data set in the model.

Figure 1: Result of the test of OLS residual for normality



With a JB statistic of 1.159956 and a probability of 0.559911, surpassing 0.05, the null hypothesis isn't rejected, suggesting the residuals likely follow a normal distribution. In other words, the non-significant JB statistic indicates the regression model's residuals are probably normally distributed, lacking significant deviation from normality.

Test for Serial Correlation of Errors

Table 7: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.004765	Prob. F(2,15)	0.0799
Obs*R-squared	10.58342	Prob. Chi-Square(2)	0.0050

Source: Authors' computation using EView*(10)*

F-statistic's probability value (0.0799) exceeds 0.05, indicating failure to reject the null hypothesis of no serial correlation in the residuals. Insufficient evidence suggests no serial correlation exists. The Obs*R-squared value (0.0050) is low, indicating minimal variance in squared residuals explained by lagged dependent variables, implying little systematic pattern explained by them in the residuals.

Test for Serial heteroscedasticity

Table 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.540157	Prob. F(19,17)	0.9019
Obs*R-squared	13.92842	Prob. Chi-Square(19)	0.7878
Scaled explained SS	1.899803	Prob. Chi-Square(19)	1.0000

Source: Eviews 9 computation of result of heteroscedasticity

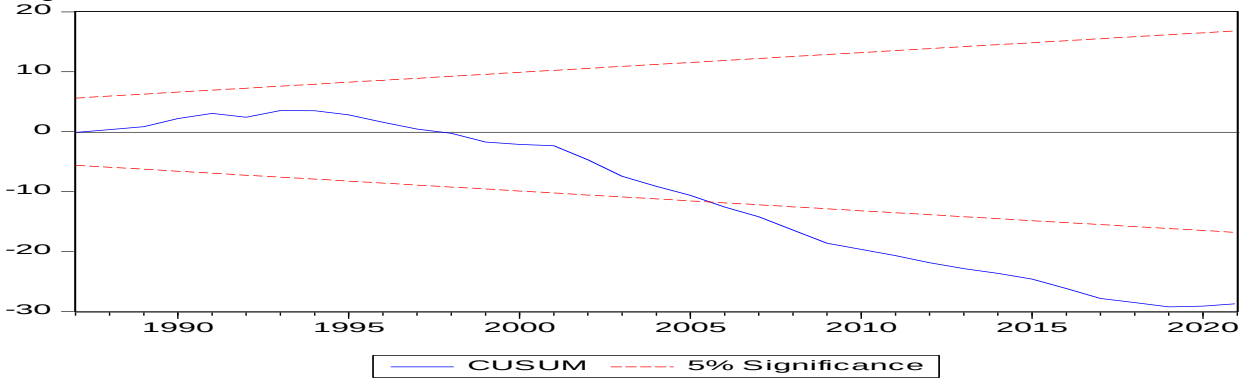
The probability value (p-value) for the Breusch-Pagan-Godfrey test is 0.9019, suggesting no significant departure from homoscedasticity. The Obs*R-squared value of 0.7878 indicates a substantial portion of residual variance explained by the model's independent variables. Overall, these values imply a well-fitting model with no notable evidence of heteroskedasticity in the residuals, affirming its reliability in explaining variability in the dependent variable.

Stability Diagnostic Test

CUSUM test

The CUSUM (Cumulative Sum) test is used to detect structural change or instability in the parameters of a regression model over time. When the blue line (CUSUM statistic) falls between the two red lines, it indicates stability or no evidence of structural change.

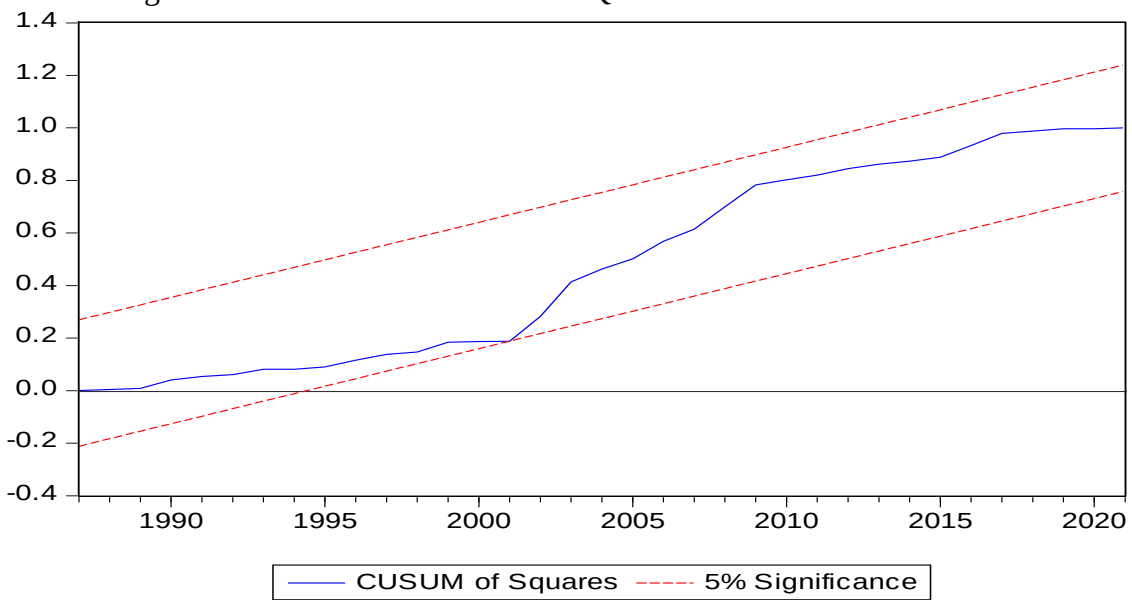
Figure 2: The result of CUSUM Tests.



Source: Authors' computation using EView(10)

The break in the lower red line around 2005 implies that there may have been a structural change or shift in the underlying relationship between the variables in the regression model. Overall, the break in the lower red line in the CUSUM test suggests a need for further analysis to identify and understand the structural change or instability in the regression model that occurred around 2005.

Figure 3: The result of CUSUM of SQUARE test



From 1981-2021, the blue line between the red lines implies no structural change or instability in regression model parameters. This consistent trend reassures reliability and consistency, suggesting a stable representation of variable relationships

Conclusion and Recommendations

Policymakers and practitioners require a nuanced grasp of financial inclusion to foster inclusive financial systems. Varied proxies gauge financial inclusion, yet may lack comprehensiveness. This paper adopted a novel approach, using the currency-in-circulation to money supply/GDP ratio advocated by Olaoye (2021), aiming for a more holistic assessment. Investigating the causality between monetary policy and financial inclusion in Nigeria, it analyzes key factors such as rediscount rates, inflation, and exchange rates from 1981-2021, employing ARDL regression and Granger causality analysis. Results highlight monetary policy's significant impact on financial inclusion. Granger causality analysis suggests a mutual relationship between monetary policy and financial inclusion, emphasizing the need for policymakers to consider the interplay between these variables in fostering inclusive economic growth.

This paper recommended that policymakers should adopt an integrated approach to monetary policy design and implementation. This approach should prioritize policies that

promote financial inclusion alongside traditional macroeconomic objectives such as price stability and economic growth. Policymakers can develop targeted interventions aimed at expanding access to financial services, particularly for underserved populations. The Granger causality analysis suggests a mutual relationship between monetary policy and financial inclusion, emphasizing the need for policymakers to dynamically adjust monetary policy measures in response to changes in financial inclusion indicators and vice versa. Policymakers should leverage the feedback mechanisms identified by the Granger causality analysis to fine-tune monetary policy interventions and enhance their effectiveness in promoting inclusive economic growth. This adaptive approach to policy formulation can help address emerging challenges and maximize the impact of monetary policy on financial inclusion outcomes.

References

Agoba, A. M., Sare, Y. A., & Bugri-Anarfo, E. (2017). Financial inclusion and monetary policy: A review of recent studies. *Ghana Journal of Development Studies*, 14(1), 23 254.

Ajisafe, R. A. Anyakudo, I. O. , Akinkuotu F. & Okunade, S. O. (2018). Financial inclusion, monetary policy and poverty level in Nigeria, *African Journal of Applied Research*, 4(2) 253-268 http://www.ajaronline.com http://doi.org/10.26437/ajar.04.02.2018.22

Anthony-Orji, O. I., Orji, A., Ogbuabor, J. E. & Onoh, J. E. (2019). Financial inclusion and monetary policy shocks nexus in Nigeria: a new empirical evidence, *Journal of Academic Research in Economics*, 11(2), 364-388

Arshad, M. U. Ahmed, Z., Ramzan, A., Shabbir, M. N., Bashir, Z., & Khan, F. N. (2021) Financial inclusion and monetary policy effectiveness: A sustainable development approach of developed and under-developed countries. *PLoS ONE* 16(12): e0261337. https://doi.org/10.1371/journal.pone.0261337

Banerjee, A., Dolado, J. J., Galbraith, J. W., & Hendry, D. F. (1993). Co-integration, error correction and the econometric analysis of non-stationary data. Oxford University Press.

Brownbridge, M., Bwire, T., Rubatsimbira, D. & Tinyinondi, G. A. (2017). The impact of financial inclusion on the interest rate channel of the monetary policy transmission mechanism, *Bank of Uganda Working Paper Series Working Paper* No. 05/2017.

CBN. (2021). Central Bank of Nigeria Monetary Policy Series No. 5. Publisher.

CBN. (2022). Central Bank of Nigeria Statistical Bulletin 2022. Publisher.

Central Bank of Nigeria. (2018). National financial inclusion strategy (Revised). In Central Bank of Nigeria, Abuja. Retrieved from: https://www.cbn.gov.ng/out/2019/ccd/national%20financial%20inclusion%20strategy.pdf

Central Bank of Nigeria. (2024). Review of minimum capital requirements for commercial, merchant, and non-interest banks in Nigeria: Circular to all commercial, merchant and non-interest banks; and promoters of proposed banks. Financial Policy Regulation Department. Garki, Abuja-Nigeria. Email: fprd@cbn.gov.ng. Website: www.cbn.gov.ng. FPR/DIR/PUB/CIR/002/009.

Charemza, W. & Deadman, F., (1992), New Directions in Econometric Practice, Edward Elgar Publishing, London.

Chinwuba O., Akhor, S. O., & Akwaden, S.T. (2015). Monetary policy innovations and growth rate of output in Nigeria. *International Journal of Economics and Business Management*, 1(8), 80-94

Grohmann, A., Klühs, T., & Menkhoff, L. (2018). Does financial literacy improve financial inclusion? Cross country evidence. *World Development*, 111, 84-96

Gujarati, D. N. (2005). *Basic Econometrics* (5th Ed.). New York: McGraw-Hill

Ilyas M., Hafiz K. A., Muhammad A. & Tahir M. (2010). Determinants of manufacturing value added in Pakistan: an application of bounds testing approach to cointegration, *Pakistan Economic and Social Review*, 48(2), 209-223

Lapukeni, A. F. (2015). The impact of financial inclusion on monetary policy effectiveness: the case of Malawi. International *Journal of Monetary Economics and Finance*, 8(4): p. 360–384

Laurenceson, J. & Chai, J. C. H., (2003), Financial reform and economic development in China, Edward Elgar, Cheltenham.

Lenka, S. K., & Hairwa, A K. (2010) Does financial inclusion affect monetary policy in SAARC countries? *Cogent Fronomics and Funes*. 4(1), 1137011

Marwa, E. (2019). The relationship between financial inclusion and monetary policy transmission: the case of Egypt, 9, *IISES International Academic Conference*, London, https://www.iises.net/proceedings/iises-international-academic-conference-london/front-page , *DOI: 10.20472/IAC.2019.045.014*

Mbutor, M. O. and Uba, I. A. (2013). The impact of financial inclusion on monetary policy in Nigeria, *Journal of Economics and International Finance*, 5(8), 318-326, DOI: 10.5897/JEIF2013.0541.

Naceur, S. B., Barajas, A., & Massara, A. (2017), Can Islamic banking increase financial inclusion? In Handbook of empirical research on Islam and economic life. Edward Elgar Publishing

Olajide, A. R., Afolabi, A. A. R. & Titilayo, A. O. (2022). Effects of monetary policy on

financial fnclusion: An empirical evidence from Nigeria, *Annals of "Dunarea de Jos" University of Galati Fascicle I. Economics and Applied Informatics*, 28(3), 74-80. DOI https://doi.org/10.35219/eai15840409290.

Olaoye, O. J. (2021). Financial inclusion in Nigeria, *Understanding Monetary Policy Series* NO 15, 1-16 Central Bank of Nigeria Publications

Oanh, T.T. K., Le, T. T. V., & Le, Q. D. (2023). Relationship between financial inclusion, monetary policy and financial stability: An analysis in high financial development and low financial development countries. *Heliyon, 9*(6), e16647.

Onwuteaka, I.C., Okoye, P. V. C., & Molokwu, I.M. (2019). Effect of monetary policy on economic growth in Nigeria. *International Journal of Trend in Scientific Research and Development*, 3(3), 590-597

Ozili, P. K. (2023). Impact of monetary policy on financial inclusion in emerging markets. *Journal of Risk and Financial Management*, 16, 303. https://doi.org/10.3390/jrfm16070303

Peters, I., Yaaba, B., Adetoba, O., Tomologu-Okunomo, A., & Tonuchi, E. J. (2020).

How effective is monetary policy in the presence of high informality in Nigeria. *Journal of Accounting, Business and Finance Research,* 10(2), 84-93. Available at: 10.20448/2002.102.84.93.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Economics*, 16(3), 289–326.

Salisu A. (2022). Relationship between financial inclusion and monetary policy on economic

growth: Evidence from panel data drawn from a sample of developing countries. *European Scientific Journal, ESJ*, 18 (22), 225. https://doi.org/10.19044/esj.2022.v18n22p225

Tonuchi, E. J., Nwolisa, U. C., Obikaonu, C. P. & Alase, A. G. (2021). Monetary policy effectiveness and financial inclusion in Nigeria: FinTech, 'the Disrupter' or 'Enabler', *International Journal of Applied Economics, Finance and Accounting*, 9(1), 19-27

World Bank, 2014. *Global Financial development Report 2014. Financial Inclusion*. Washington DC: World Bank