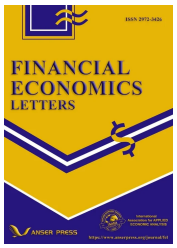
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Unmasking the Impacts of Monetary Policy Rate, Reserve Requirements, Open Market Operations, and Liquidity Ratio on Financial Stability in the Nigerian Banking Sector

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ABSTRACT

This study examines the dynamic relationship between monetary policy instruments and financial stability in the Nigerian banking sector over the period 1992–2024. Specifically, it investigates the relationships between the monetary policy rate (MPR), cash reserve ratio (CRR), open market operations (OMO), and liquidity ratio (LRA), using the banking-sector Z-score as a proxy for financial stability and controlling for money supply relative to gross domestic product (M2/GDP) and the exchange rate (EXR). The study employs the autoregressive distributed lag (ARDL) framework to examine short-run dynamics and long-run relationships. The reported unit-root test results indicate a mixture of I(0) and I(1) variables, supporting the suitability of the ARDL approach, provided that no variable is integrated of order two. The bounds-test results indicate a long-run relationship across the four model specifications, with F-statistics of 5.873 for MPR, 4.925 for CRR, 4.381 for OMO, and 5.104 for LRA, all exceeding the reported 5% upper critical bound of 4.35. The reported long-run estimates show positive and statistically significant associations for MPR and OMO, whereas CRR is statistically insignificant and LRA has a negative and statistically significant coefficient. Money supply relative to GDP is positive and significant in the CRR and OMO specifications, while the exchange rate has negative and statistically significant coefficients in the MPR and LRA specifications. In the short run, changes in MPR and OMO are positively associated with financial stability, while changes in LRA and the exchange rate exhibit negative associations in their respective models; CRR is statistically insignificant. The error-correction coefficients are negative and statistically significant across all four specifications, indicating adjustment towards the estimated long-run relationships. Preliminary diagnostic tests do not identify significant residual normality, serial-correlation, functional-form or heteroscedasticity problems at the 5% level. However, the CUSUMSQ results for the OMO model indicate unusual residual behaviour around 2001 that warrants further investigation. The findings suggest that the estimated relationships between monetary policy instruments and banking-sector stability differ across specifications. Nevertheless, the absence of the original estimation dataset and workfile means that these results require reconstruction and independent verification before definitive empirical conclusions and policy recommendations can be established.

KEYWORDS

Monetary policy Rate, Cash Reserve Requirements, Open Market Operations, Liquidity Ratio, Financial Stability, Banking Sector

JEL codes: E52, G21, C32

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1. Introduction

Financial stability is an important component of macroeconomic resilience because a sound banking system supports financial intermediation, maintains depositor confidence and facilitates the transmission of monetary policy to the wider economy. In Nigeria, the stability of the banking sector is particularly important because banks remain central to the mobilisation and allocation of financial resources, while the economy is frequently exposed to inflationary pressures, exchange-rate fluctuations, oil-price shocks, liquidity pressures and changes in the regulatory environment. Previous studies have associated financial instability with weaknesses in policy coordination, inadequate capital buffers, interest-rate volatility, credit risk and broader macroeconomic disturbances (Acharya et al., 2020; Ajisafe et al., 2021; Hamilton et al., 2020; Oparah & James, 2020). These conditions make the relationship between monetary policy and banking-sector stability an important empirical issue. Monetary policy affects the financial environment within which banks operate through changes in policy rates, reserve requirements, liquidity conditions and open-market transactions. However, the response of banking-sector stability to these instruments may differ according to the instrument employed, the prevailing macroeconomic conditions and the time horizon considered.

The Central Bank of Nigeria (CBN) employs several monetary-policy instruments to influence liquidity, interest-rate conditions and the availability of funds within the financial system. Among these instruments are the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), Open Market Operations (OMO) and the statutory Liquidity Ratio (LRA). Changes in the MPR can influence market interest rates and banks' funding and lending conditions, while adjustments in the CRR alter the proportion of deposits that banks must retain as reserves and therefore affect the funds available for financial intermediation. OMO influences banking-system liquidity through transactions in financial securities, although its empirical effect depends on how the OMO variable is constructed and whether it represents purchases, sales, net transactions or another measure of operations. Similarly, the LRA represents a regulatory liquidity requirement and should be distinguished from lending or interest rates. These instruments therefore operate through different channels and should not automatically be assumed to have identical implications for financial stability. Evidence that monetary tightening, liquidity conditions and financial-market developments affect bank profitability and risk-taking further suggests that the relationship between monetary policy and banking stability requires careful empirical examination (Adebayo & Ogunrinola, 2021; Ajisafe et al., 2021; Ozili, 2025).

The relationship is also conditioned by broader monetary and external-sector developments. Money supply relative to economic output, measured through M2/GDP, provides an indication of the liquidity conditions prevailing within the economy, while the exchange rate captures an important external-sector condition to which Nigerian banks and their borrowers may be exposed. Exchange-rate movements can affect the domestic-currency value of foreign-currency obligations, import-dependent businesses, inflation expectations and the quality of bank assets. Likewise, changes in monetary liquidity can influence banks' funding conditions and risk-taking behaviour. Consequently, examining monetary-policy instruments without considering relevant liquidity and exchange-rate conditions may provide an incomplete account of banking-sector stability. The present study therefore considers M2/GDP and exchange rate as conditioning variables alongside the individual monetary-policy instruments. This approach is intended to distinguish the relationship associated with each policy instrument while recognising that banking-sector stability occurs within a wider macroeconomic environment.

An important issue in assessing banking-sector stability is the choice of an appropriate aggregate indicator. This study measures financial stability using the banking-sector Z-score rather than using a single bank-performance or credit-risk indicator such as the non-performing loan ratio. The Z-score provides an aggregate measure that combines information relating to bank profitability, capitalisation and the volatility of returns and is therefore useful for assessing the distance of the banking sector from insolvency risk. Accordingly, the interpretation in this study is confined to the stability of the banking sector as an aggregate system-level outcome; it does not imply that the estimated relationships represent the lending capacity, balance-sheet decisions or resilience of every individual bank. This distinction is important because monetary-policy instruments may affect different dimensions of bank behaviour through different transmission mechanisms. A statistically significant association between an instrument and the aggregate Z-score should therefore be interpreted as evidence of a relationship with banking-sector financial stability rather than as direct evidence of a particular unobserved mechanism.

Despite the importance of monetary policy for financial stability, existing evidence does not establish a uniform relationship between individual policy instruments and banking-sector stability. Some studies emphasise the role of interest-rate conditions and monetary tightening, whereas others focus on liquidity management, reserve requirements or broader macroeconomic conditions (Hamilton et al., 2020; Ajello et al., 2022; Bochmann et al., 2023). Moreover, the effect of a monetary-policy instrument may emerge gradually rather than immediately because banks and other financial-market participants adjust their portfolios, liquidity positions and risk exposures over time. This creates a need to distinguish short-run movements from longer-run relationships rather than assuming that an observed contemporaneous association represents the complete effect of monetary policy. The Nigerian context is particularly suitable for such an examination because the period 1992–2024 encompasses substantial changes in monetary-policy arrangements and repeated episodes of macroeconomic and financial stress. Examining this extended period can therefore provide evidence on whether the relationships between individual policy instruments and banking-sector stability persist beyond short-term fluctuations.

Against this background, the present study investigates the dynamic relationships between selected monetary-policy instruments and financial stability in Nigeria over the period 1992–2024. Specifically, it examines the individual relationships between MPR and banking-sector Z-score, CRR and banking-sector Z-score, OMO and banking-sector Z-score, and LRA and banking-sector Z-score, while controlling for M2/GDP and exchange-rate conditions. The study does not estimate a formal interaction or synergistic effect among the monetary-policy instruments; rather, the separate specifications permit a comparative assessment of the relationships associated with each instrument within a parsimonious single-country time-series framework. The study consequently addresses four questions: (a) What is the dynamic relationship between MPR and banking-sector financial stability in Nigeria? (b) What is the dynamic relationship between CRR and banking-sector financial stability? (c) What is the dynamic relationship between OMO and banking-sector financial stability? and (d) What is the dynamic relationship between LRA and banking-sector financial stability?

To examine these questions, the study employs the Autoregressive Distributed Lag (ARDL) framework developed by Pesaran et al. (2001). The method is appropriate for a single-country time-series investigation in which the variables may be integrated at level, I(0), or first difference, I(1), provided that none is I(2). More importantly, the ARDL framework allows the analysis to distinguish short-run adjustments from long-run relationships while incorporating lagged responses to changes in monetary-policy and macroeconomic variables. This feature is relevant because monetary-policy transmission to banking-sector stability may not occur instantaneously. Nevertheless, ARDL does not by itself resolve the endogeneity inherent in monetary-policy decisions. Monetary authorities may adjust policy in response to prevailing economic and financial conditions, including instability in the banking system. Accordingly, the relationships estimated in this study are interpreted as dynamic conditional relationships rather than definitive causal effects.

The contribution of the study is therefore not based simply on the use of ARDL or on an assertion of policy "synergy". Rather, it lies in providing a systematic, instrument-specific assessment of selected monetary-policy measures and aggregate banking-sector financial stability over a long Nigerian time-series period. By examining MPR, CRR, OMO and LRA separately while conditioning on M2/GDP and exchange-rate conditions, the study provides evidence on whether the relationships associated with monetary-policy instruments differ across instruments and between the short and long run. This distinction is useful for policy interpretation because a monetary instrument may have a different relationship with banking-sector stability in the immediate adjustment period than over a longer horizon. The findings are therefore intended to contribute to a more measured understanding of monetary-policy transmission and financial stability in Nigeria and to support policy calibration that takes account of banking-sector liquidity, reserve conditions, interest-rate developments and external-sector pressures.

2. Literature Review

2.1 Conceptual Literature

2.1.1 Interest Rate Control (Policy Rate)

The interest rate control, also known as the monetary policy rate (MPR), serves as the cornerstone of Nigeria's interest rate framework and represents the rate at which the Central Bank of Nigeria (CBN) lends to commercial banks. As a signalling mechanism, the MPR influences other interest rates within the economy, including lending, savings, and deposit rates. A hike in the MPR typically aims to curb inflation by making borrowing more expensive and encouraging savings, which reduces consumption and slows aggregate demand. Conversely, a reduction in the MPR lowers borrowing costs, thereby stimulating investment and economic activity through increased access to credit (Bochmann et al., 2023). In Nigeria, monetary policy decisions concerning the MPR are closely monitored by financial institutions, businesses, and investors as indicators of the central bank's stance on inflation and economic growth. The MPR is also vital for inflation targeting, especially in post-pandemic economic recovery, where balancing price stability with growth has become increasingly challenging. When properly adjusted, it complements other macroeconomic objectives such as exchange rate stability and employment. In periods of economic uncertainty, changes to the MPR provide clarity on central bank priorities and enhance market expectations, guiding investment and consumption behaviour. However, its effectiveness is often conditioned by structural issues such as financial market depth, credit penetration, and the responsiveness of commercial banks to policy changes (CBN, 2023; Cairó & Sim, 2023).

2.1.2 Open Market Operations (OMO)

Open Market Operations (OMO) refer to the central bank's active buying or selling of short-term government securities to regulate liquidity and influence short-term interest rates. As the most flexible instrument in the CBN's toolkit, OMO helps maintain monetary stability by adjusting the money supply in response to economic fluctuations. When the central bank sells government securities, it absorbs excess liquidity from the financial system, thereby raising interest rates and dampening inflationary pressures. On the other hand, the purchase of securities injects liquidity, reduces short-term interest rates, and stimulates borrowing and spending (Cairó & Sim, 2023). In Nigeria, OMO is frequently deployed to manage short-term liquidity in the banking sector and to stabilise the naira by curbing excessive speculation and capital flight. Particularly in the aftermath of COVID-19, OMO has been crucial in counterbalancing inflationary tendencies while supporting financial system stability. The flexibility of OMO allows for frequent and swift interventions in the money market, unlike other tools that operate with longer lags. However, the success of OMO depends on the responsiveness of market participants, the availability of eligible securities, and effective coordination with fiscal policy. When aligned with inflation targeting and exchange rate objectives, OMO plays a pivotal role in fine-tuning Nigeria's monetary environment and preserving macroeconomic stability (Fabris, 2024).

2.1.3 Reserve Requirement (RR)

The Reserve Requirement (RR) is a prudential policy tool that mandates banks to retain a specific percentage of their total deposits with the central bank. The principal function of CRR is to control the money supply and manage inflation by directly influencing the liquidity position of commercial banks. An increase in the CRR tightens liquidity, constraining banks' ability to create credit, thereby cooling inflationary pressures. Conversely, a reduction in CRR enhances liquidity, encourages lending, and supports economic activity (CBN, 2023). In Nigeria, the CRR has often been used aggressively, especially during times of excess liquidity or heightened speculative activity in the foreign exchange market. The CBN occasionally implements discretionary CRR debits, which extract excess funds from banks deemed non-compliant with lending directives, thereby enhancing policy transmission. Although effective in managing liquidity surges, high CRR levels can crowd out credit to the private sector, especially small and medium-sized enterprises (SMEs), and may inadvertently raise the cost of funds. Post-COVID-19, the role of CRR has become more

pronounced in balancing recovery with inflation containment. Nonetheless, for optimal impact, CRR must be deployed in synergy with other tools such as MPR and OMO, and in a transparent manner that preserves investor confidence and encourages productive lending practices (Ajello et al., 2022).

2.1.4 Bank Stability

Bank stability in Nigeria refers to the capacity of the banking system to function effectively, maintain public confidence, and absorb internal and external shocks without collapsing or causing systemic financial disruption. It is a critical pillar of the country's economic health, as stable banks facilitate capital formation, support economic growth, and enable efficient resource allocation. In a broader sense, bank stability encapsulates solvency, liquidity adequacy, asset quality, profitability, and resilience to financial and macroeconomic shocks (Fabris, 2024).

In the Nigerian context, bank stability has historically faced multiple challenges—including macroeconomic volatility, exchange rate fluctuations, regulatory weaknesses, and non-performing loans (NPLs)—which have intermittently undermined the soundness of the financial system. Events such as the 2009 banking crisis, triggered by poor corporate governance and excessive risk exposure, prompted the Central Bank of Nigeria (CBN) to implement sweeping reforms focused on risk-based supervision, enhanced capital adequacy, and governance standards (Sanusi, 2010). These reforms aimed to reposition Nigerian banks as more robust institutions capable of weathering financial storms.

The CBN employs a combination of macroprudential tools—including the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), and liquidity ratio requirements—to promote systemic resilience. It also mandates compliance with the Basel III framework to ensure capital adequacy and risk coverage. Stress testing, supervisory audits, and prompt corrective actions remain central to preserving stability (CBN, 2023).

Crucially, bank stability in Nigeria is also influenced by external variables like political risk, global oil price shocks, and public sector debt levels. Sustaining stability, therefore, requires not only sound monetary and regulatory frameworks but also effective governance structures within banks—such as board independence, transparent risk management, and adherence to ethical standards. As the Nigerian economy becomes more integrated into global financial markets, the need to continually strengthen banking stability becomes even more imperative. In essence, bank stability in Nigeria is not merely a regulatory requirement—it is a prerequisite for economic resilience, investor confidence, and inclusive financial development.

2.2 Theoretical Review

2.2.1 Monetary Transmission Mechanism Theory

The Monetary Transmission Mechanism (MTM) theory was first formalized by John Maynard Keynes (1936) in The General Theory of Employment, Interest, and Money and later advanced by Milton Friedman and Anna Schwartz (1963) in their seminal work A Monetary History of the United States. The theory explains how monetary policy affects the real economy by transmitting changes in policy instruments—such as interest rates, reserve requirements, and open market operations—through different channels. These channels operate simultaneously to influence macroeconomic variables such as output, inflation, financial stability, and industrial performance (Taylor, 1995; Mishkin, 1996). The central tenet of MTM is that changes in monetary policy shape economic activity through the interest rate channel, which alters borrowing, saving, and investment behaviour; the credit channel, which affects the lending capacity of banks and the availability of credit to firms; the exchange rate channel, which modifies trade competitiveness and capital flows; and the asset price channel, which impacts household wealth, investment, and consumption. Collectively, these pathways influence the performance of the banking sector by determining the quality of loan portfolios, the incidence of non-performing loans (NPLs), and systemic stability (Mishkin, 1996; Cairó & Sim, 2023). In the context of developing economies such as Nigeria, the MTM is particularly relevant because the banking sector functions as the primary conduit for monetary policy implementation. Fluctuations in the monetary policy rate can either constrain or stimulate credit growth, alter banks' liquidity positions, and modify their

risk appetites. Moreover, given structural weaknesses in African financial systems, the transmission of monetary shocks is often characterised by significant lags and asymmetries, which policymakers must identify and address to enhance economic and financial stability (Ajayi & Atanda, 2012). By providing a structured framework to trace the flow of monetary policy actions into banking behaviour and industrial outcomes, the MTM offers a robust justification for its use in this study. It allows for a nuanced understanding of how monetary policies influence bank stability in Nigeria.

2.2.2 Financial Instability Hypothesis (Hyman Minsky)

The Financial Instability Hypothesis (FIH) was developed by Hyman P. Minsky (1975, 1986) in his seminal works, John Maynard Keynes and Stabilising an Unstable Economy. The theory challenges the classical assumption of self-correcting markets by asserting that financial systems are inherently prone to instability. At its core, the FIH posits that periods of prolonged economic stability and expansion encourage excessive optimism, leading to riskier financial behaviour, overleveraging, and speculative investment practices. Minsky categorises financial positions into three stages: hedge finance, where borrowers can meet obligations from cash flows; speculative finance, where borrowers rely on rolling over debt; and Ponzi finance, where repayment depends on continuous asset price appreciation rather than income (Minsky, 1986). As economies transition through these stages, financial fragility builds up, eventually culminating in systemic crises. The central tenet of Minsky's hypothesis is encapsulated in the phrase "stability is destabilising"—a recognition that sustained stability paradoxically breeds fragility. In the banking context, this dynamic is particularly relevant to monetary policy. For instance, extended periods of low interest rates, often deployed as an expansionary policy, can trigger credit booms that initially strengthen bank performance but ultimately increase defaults, amplify non-performing loans, and heighten systemic risk (Fabris, 2024). For Nigeria and other emerging markets, where credit expansion is frequently interpreted as evidence of financial deepening, Minsky's framework provides a cautionary lens. Without strong regulatory oversight, institutional discipline, and governance reforms, monetary easing may generate unsustainable debt cycles that threaten long-run financial and economic stability. The justification for applying FIH to this study lies in its ability to explain the cyclical and non-linear dynamics of financial systems, thereby linking green finance, carbon-related risks, and institutional bureaucracy to industrial competitiveness. By adopting this framework, the study situates Nigeria's banking sector stability trajectory within a broader narrative of financial fragility, highlighting the importance of aligning financial deepening with regulatory prudence to avoid instability traps.

2.2.3 Modern Monetary Theory (MMT)

Modern Monetary Theory (MMT) originated from the works of Warren Mosler (1993), later formalised by scholars such as L. Randall Wray (1998), and more recently expanded by Stephanie Kelton (2020). It provides a heterodox framework for understanding macroeconomic management, diverging sharply from conventional approaches that emphasise fiscal discipline and balanced budgets. The central claim of MMT is that sovereign governments that issue their own fiat currency cannot involuntarily default on debt denominated in that currency, since they possess unlimited capacity to create money. The true constraint on government spending, therefore, is not solvency but inflation (Tymoigne & Wray, 2014; Kelton, 2020). The main tenets of MMT include: (1) Monetary sovereignty, where governments that control their own currency face no solvency risks in financing deficits; (2) functional finance, which prioritizes full employment and economic stability over balanced budgets; (3) coordination of fiscal and monetary policies, with fiscal policy as the primary driver of aggregate demand while central banks manage inflation; and (4) taxation as a regulatory tool, not primarily to fund spending, but to control inflation and redistribute resources (Wray, 1998; Kelton, 2020).

In relation to Nigeria, MMT is highly relevant given persistent structural challenges such as unemployment, underinvestment, and financial fragility in the banking sector. The theory reframes deficit spending not as a threat to stability but as an opportunity for governments to strategically invest in productive sectors, including financial institutions, without the fear of immediate insolvency. Post-COVID-19 realities

further highlight this, as Nigerian banks faced liquidity risks, rising non-performing loans, and systemic vulnerabilities. MMT justifies counter-cyclical fiscal spending combined with prudent monetary policy as tools for cushioning these shocks and strengthening bank stability. By adopting MMT as a guiding framework, this study positions monetary policy instruments not only as tools for inflation control but also as levers that should operate in synergy with fiscal policy to ensure financial stability. While critics rightly caution about risks of fiscal indiscipline and inflationary pressures, MMT shifts the policy debate toward sustainable ways of leveraging Nigeria's monetary sovereignty to stabilise banks and, by extension, the wider economy.

2.2.4 New Keynesian Framework

The New Keynesian Framework emerged in the late 1970s and 1980s as an extension of the Keynesian tradition, integrating rigorous microeconomic foundations that were missing from earlier Keynesian models. Its development is closely associated with several key scholars: Stanley Fischer (1977), who formalised the concept of wage stickiness; John B. Taylor (1980), who advanced staggered wage and price-setting models; and Guillermo Calvo (1983), who introduced the influential "Calvo pricing" model to explain price rigidity. Later, Michael Woodford's seminal work Interest and Prices (2003) embedded the framework into fully articulated Dynamic Stochastic General Equilibrium (DSGE) models, making it a central tool for central banks across the world in analysing and implementing monetary policy. At its core, the New Keynesian framework rests on several central ideas. It emphasises nominal rigidities, meaning that wages and prices adjust only gradually due to contracts, menu costs, or other frictions, which makes economic shocks have persistent and real effects on output and employment. It also recognises imperfect competition, where firms possess some degree of pricing power that slows down market adjustments. Forward-looking expectations play a crucial role, as households and firms base their decisions on anticipated future conditions, making credibility and policy consistency essential for stability. Unlike classical theories that assume markets self-correct, the New Keynesian view justifies active monetary policy, highlighting the need for tools such as interest rate adjustments and liquidity management to stabilise short-term fluctuations and maintain macroeconomic balance. In relation to bank stability, the New Keynesian framework offers valuable insights into how monetary policy instruments directly and indirectly affect financial institutions. Poorly timed or overly aggressive interest rate changes, for instance, can compress bank profit margins, distort lending behaviour, and elevate systemic risk. Likewise, rigidities within credit markets can magnify the transmission of monetary shocks, threatening financial soundness. Extensions of the framework that incorporate banking frictions within DSGE models make it possible to examine how external shocks—such as the COVID-19 pandemic or fluctuations in global oil prices—ripple through Nigeria's financial system. For Nigeria, where structural inefficiencies, inflationary pressures, and weak financial intermediation remain challenges, the New Keynesian framework provides both theoretical justification and practical guidance. It underscores the importance of timely and proactive monetary interventions to protect banking sector stability while supporting broader economic performance. Moreover, its focus on credibility and expectations highlights the need for Nigeria's monetary authorities to maintain transparent and consistent policies in order to strengthen confidence and resilience within the banking system.

2.3 Empirical Literature

Empirical evidence on monetary policy and banking sector stability shows strong context-dependence across countries and periods. Ozili (2025) demonstrates cross-country heterogeneity, finding that higher interest rates worsen financial stability in African and developing economies but enhance stability in advanced economies, while Okpe et al. (2024) show for Nigeria that MPR weakens bank stability whereas CRR and liquidity ratios strengthen resilience. Global and Nigerian studies (Demirgüç-Kunt & Huizinga, 2023; Adebayo & Ogunrinola, 2021; Olokoyo, 2018) consistently reveal that monetary tightening may initially improve margins or stability but can undermine financial stability over time through rising non-performing loans and constrained credit. Earlier Nigerian evidence (Idris et al., 2017; James & John, 2019; Chukwuemeka & Afolabi, 2018; Hamilton et al., 2020) further confirms the dual and dynamic effects of policy instruments, especially MPR and CRR, on bank risk and stability. Evidence from other emerging economies (Anwar et al., 2023; Ayomi et al., 2020; Mallik, 2025; Nguyen et al., 2021) suggests that tighter policy gen-

erally contracts credit and reduces default risk, though outcomes depend heavily on bank characteristics and macroeconomic shocks. Crisis-focused and institutional studies (O'Donnell et al., 2024; Adewunmi & Adeniyi, 2024) highlight that policy effectiveness is shaped by institutional quality and crisis conditions. Nigerian-specific long-run evidence (Aribatise et al., 2025; Afolabi et al., 2018; Dare & Okeya, 2017) indicates that monetary policy instruments significantly influence bank performance, but with mixed signs and often weak effects, underscoring the need for context-sensitive and well-coordinated monetary policy frameworks.

Recently, Olaiya and Ogunlokun (2026) analysed the impact of monetary policy on banking sector development in Nigeria using ARDL techniques on time-series data from 1999 to 2024. The results show that monetary policy variables exert a statistically significant but negative effect on banking sector development, leading the authors to recommend a downward review of the monetary policy rate to support sectoral growth. Nwikina et al. (2024) examined the effect of monetary policy instruments on Nigerian deposit money banks' performance from 1990 to 2022 using the ARDL approach. The findings indicate mixed effects: the monetary policy rate positively influences profitability in both the short and long run, while lending rates and broad money supply exert significant negative effects. Jisike et al. (2023) analysed the influence of quantitative monetary policy tools on private sector credit in Nigeria over the period 1986–2019 using OLS estimation. The study reveals a strong and significant relationship between treasury bill subscriptions, cash reserve ratio, and private sector lending. Moreover, Afolabi and Akinde (2023) investigated the relationship between monetary policy and deposit money banks' performance in Nigeria between 1981 and 2021. Their results show that the monetary policy rate has a significant negative effect on bank performance, while the liquidity ratio exerts a negative but statistically insignificant impact. In another study, Owoeye et al. (2023) explored the impact of monetary policy on the financial performance of Nigerian deposit money banks from 2000 to 2018 using ARDL techniques. The findings demonstrate that interest rate and cash reserve ratio significantly affect banks' deposit liabilities, confirming the sensitivity of bank performance to policy instruments. Olaifa (2022) assessed the effects of monetary policy on deposit money banks' profitability in Nigeria over the period 1988–2015 using OLS regression. The study finds that the exchange rate and cash reserve ratio negatively affect bank profits, whereas the interest rate has a positive and statistically significant influence.

Furthermore, Hassan and Oyedele (2022) examined the effect of monetary policy on the financial performance of listed deposit money banks in Nigeria from 2008 to 2020 using pooled OLS estimation. The results indicate that the cash reserve ratio positively and significantly influences bank performance, while the interest rate exerts a significant negative effect, and inflation has an insignificant impact. Ise et al. (2024) show that key monetary policy instruments—monetary policy rate, demand deposits, cash reserve ratio, and liquidity ratio—significantly and positively influence economic growth in Nigeria, while interest and exchange rates exert a significant negative effect. The study recommends interest-rate cuts and policies that stimulate demand deposits to lower borrowing costs, boost investment, and strengthen financial sector contributions to GDP. Obiaje and Umeokwobi (2024) find that money supply and maximum interest rate significantly influence deposit money banks' performance in Nigeria, while cash reserve ratio and monetary policy rate show no significant effect. They recommend liquidity-enhancing policies and careful interest-rate management to stimulate credit expansion, deposit growth, and overall banking sector performance. Haruna (2025) finds that while money supply significantly negatively affects deposit money banks' return on assets, overall monetary policy instruments do not have a significant impact on their profitability in Nigeria. The study recommends a balanced application of monetary policy to prevent adverse effects on bank performance. Mokuolu (2024) finds that lending rate, liquidity ratio, and cash reserve ratio significantly reduce deposit money banks' return on equity in Nigeria, while monetary policy rate has a positive but insignificant effect. The study recommends that the Central Bank of Nigeria carefully manage policy rates, liquidity, and lending conditions to sustain bank profitability and credit mobilisation.

2.4 Knowledge Gaps

Despite the extensive empirical evidence on the relationship between monetary policy and banking sector stability, significant knowledge gaps remain. Existing studies consistently show mixed and context-dependent results, particularly in Nigeria, with some policy instruments like the monetary policy rate (MPR), cash

reserve ratio (CRR), and liquidity ratio exerting positive, negative, or insignificant effects on bank performance and stability depending on the period, methodology, or bank characteristics (Olaiya & Ogunlokun, 2026; Nwikina et al., 2024; Haruna, 2025). While global evidence highlights heterogeneity across developed and developing economies (Ozili, 2025), Nigerian studies reveal a fragmented understanding of how specific instruments interact with institutional quality, macroeconomic shocks, and sectoral performance (Owoeye et al., 2023; Hassan & Oyedele, 2022). Moreover, although several studies apply time-series and panel data techniques such as ARDL, OLS, and fixed/random effects, there is limited integration of dynamic modelling that captures both short- and long-run effects across multiple monetary instruments simultaneously, leaving the cumulative and interaction effects underexplored. Evidence on liquidity ratios and demand deposits is particularly inconsistent, with some studies reporting significant positive impacts on bank performance and growth (Ise et al., 2024), while others find negative or insignificant effects (Haruna, 2025; Mokuolu, 2024), highlighting a lack of consensus on the mechanisms through which these instruments influence financial stability.

Additionally, most existing research is constrained by methodological or scope limitations. Many studies focus on single instruments in isolation, neglecting how combined monetary tools—such as MPR, reserve requirements, open market operations, and liquidity ratios—jointly affect the resilience of deposit money banks. Long-run evidence remains scarce, particularly studies spanning multiple decades that can account for structural breaks, policy regime shifts, and crisis periods (Aribatise et al., 2025; Afolabi et al., 2018). Furthermore, there is limited research unifying macroeconomic outcomes (like economic growth) and micro-level banking indicators (such as return on equity, private sector credit, or deposit liabilities) under a coherent empirical framework. This fragmented coverage underscores the need for a comprehensive and context-sensitive study that employs robust econometric techniques—such as ARDL with dynamic short- and long-run estimation—to unmask the simultaneous impacts of monetary policy instruments on both bank performance and financial stability in Nigeria, addressing gaps in interaction effects, long-term implications, and policy coordination.

3. Methodology

3.1 Data Definitions and Sources

This study examines the dynamic relationships between selected monetary-policy instruments and banking-sector financial stability in Nigeria over 1992–2024. Financial stability is measured by the aggregate banking-sector Z-score (Z-SCORE), which combines profitability, capitalisation and return volatility to indicate the banking system's distance from insolvency risk. The explanatory variables are the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), Open Market Operations (OMO) and Liquidity Ratio (LRA), while broad money relative to GDP (M2/GDP) and exchange rate (EXR) are included as conditioning macroeconomic variables. MPR represents the policy rate determined by the Central Bank of Nigeria (CBN), whereas CRR captures the proportion of specified bank deposits required to be maintained as reserves. LRA is strictly defined as the liquidity ratio and is not treated as a lending or interest rate. OMO is measured using the specific CBN transaction series employed in the dataset; consequently, its coefficient is not interpreted as a liquidity injection or withdrawal without establishing whether the underlying measure represents purchases, sales, net transactions or another OMO indicator. The Z-score is interpreted strictly as an aggregate banking-sector stability measure rather than an indicator of individual-bank lending capacity or resilience. These definitions ensure consistency between the conceptual framework, data construction and empirical models.

The study uses official and internationally recognised data sources, with the precise series, units, frequency and transformations reported in Table 1 to facilitate replication. MPR, CRR and OMO are obtained from CBN monetary-policy and financial-market records, while Z-SCORE is sourced from the World Bank's Global Financial Development Database. LRA is obtained from the identified CBN monetary-policy and financial-market records. M2/GDP is measured using the World Bank's broad-money-as-a-percentage-of-GDP indicator, thereby avoiding the currency inconsistency that could arise from dividing local-currency M2 by GDP reported in US dollars. EXR is measured consistently as naira per US dollar using the identified official series. Where source data are available at monthly or other frequencies, observations are converted

to annual frequency using the documented aggregation rule, such as annual average, end-of-period value or annual total, depending on the nature of the variable. The final dataset is aligned across all variables before estimation, so the effective observations may be fewer than the nominal 33-year period because of missing values. The study does not impose a uniform logarithmic transformation on all variables; each variable is retained in its appropriate level, percentage or ratio form unless a transformation is empirically justified. Accordingly, coefficient interpretations are based on the actual functional form and are not automatically described as elasticities. This data-construction procedure addresses measurement, comparability and replication concerns.

Table 1: Definitions, Measurement, Data Sources and Construction of Variables

Variable	Definition and measurement	Exact source/series	Original unit	Annual construction	Transformation used in estimation
Z-SCORE	Bank Z-score, measuring the distance between the banking system's capitalisation and returns and the volatility of returns. A higher score generally indicates greater banking stability and a lower probability of default.	World Bank, Global Financial Development Database (GFDD), series GFDD.SI.01, DataBank https://databank.worldbank.org/metadataglossary/global-financial-development/series/GFDD.SI.01	Unitless index.	The reported annual country-level observation.	Reported level, Z-SCORE.
MPR	Central Bank of Nigeria Monetary Policy Rate, representing the principal policy rate announced by the Monetary Policy Committee.	CBN, official Monetary Policy Committee decisions. Central Bank of Nigeria https://www.cbn.gov.ng/rates/mnymktind.html	Percentage per annum.	the variable represents the year-end policy stance.	Percentage level, MPR.
CRR	Cash Reserve Ratio: the prescribed proportion of eligible bank deposits that banks must maintain as reserves with the CBN. The applicable requirement can differ by bank category and deposit classification.	CBN, official Monetary Policy Committee decisions and relevant regulatory records. https://www.cbn.gov.ng/rates/mnymktind.html Central Bank of Nigeria	Percentage.	The year-end statutory requirement applicable to the specified bank category, or calculate a time-weighted annual average.	Percentage level, CRR.

Variable	Definition and measurement	Exact source/series	Original unit	Annual construction	Transformation used in estimation
OMO	Open Market Operations, measured using a specifically defined indicator of CBN OMO transactions. The recommended measure is annual net OMO sales.	CBN, Government Securities—OMO records. The records distinguish successful transactions, amounts repaid and net transaction values. Central Bank of Nigeria https://www.cbn.gov.ng/rates/GovtSecuritiesDrillDown.html?market=OMO	Nigerian naira, preferably ₦ billion after converting the source's ₦ million values.	Sum of the signed net transaction values over all relevant OMO transactions in each calendar year.	In ₦ billion
LRA	Statutory Liquidity Ratio: the minimum proportion of qualifying liquid assets relative to the applicable deposit liabilities, as defined by CBN prudential regulations.	CBN, Monetary Policy Committee decisions Central Bank of Nigeria https://www.cbn.gov.ng/rates/mnymktind.html	Percentage.	The year-end statutory requirement applicable to the selected bank category, or calculate a time-weighted annual average.	Percentage level, LRA.
M2/GDP	Broad money as a percentage of GDP, representing monetary depth or financial deepening in the economy.	World Bank, World Development Indicators (WDI), https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS	Percentage of GDP.	The annual value reported by the World Bank. The indicator represents broad money divided by GDP, multiplied by 100.	Reported percentage level.
EXR	Official exchange rate, expressed as Nigerian naira per US dollar. The specified WDI measure is the annual average official exchange rate.	World Bank, WDI, PA.NUS.FCRF, https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=NG	NGN per USD.	The annual average reported by the World Bank.	The model uses the natural logarithm.

Source: Author's Concept. Note: The study employs annual time-series data for Nigeria over the verified common sample period of 1992 to 2024. Monetary policy variables obtained from the Central Bank of Nigeria were converted to annual observations using the aggregation procedures specified in Table 1. The Z-score, broad money-to-GDP ratio and official exchange rate were obtained from the World Bank's Global Financial Development Database and World Development Indicators, respectively. All transformations were performed consistently with the final model specifications. The estimation sample was determined by the availability of complete observations across the dependent and explanatory variables. The final dataset and variable-construction procedures were checked against the original source records to ensure consistency between the reported data and the empirical estimates.

3.2 Model Specifications

This study employs the Autoregressive Distributed Lag (ARDL) approach developed by Pesaran et al. (1999, 2001) to examine the dynamic relationships between selected monetary-policy instruments and

banking-sector financial stability in Nigeria over 1992–2024. The ARDL framework is appropriate for a single-country time-series analysis because it permits the estimation of short-run dynamics and long-run relationships within one coherent model and can accommodate regressors that are integrated at level, I(0), or first difference, I(1), provided that none of the variables is integrated of order two, I(2). The approach is also suitable for relatively small samples, which is relevant to the present study because the effective estimation observations are considerably fewer than the nominal 33-year period after aligning the variables and accounting for missing observations. However, the small effective sample requires cautious interpretation of the bounds-test results and estimated coefficients. The ARDL approach is therefore used as a dynamic time-series estimator and not as a solution to policy endogeneity or reverse causality.

The dependent variable is banking-sector financial stability, measured by the aggregate banking-sector Z-score (Z-SCORE). The study considers four monetary-policy instruments: Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), Open Market Operations (OMO), and Liquidity Ratio (LRA). M2/GDP and exchange rate (EXR) are included as conditioning macroeconomic variables. Importantly, the study estimates four separate ARDL specifications, rather than a single model containing all four monetary-policy instruments simultaneously. This specification is adopted to examine the individual dynamic relationship associated with each monetary-policy instrument while maintaining a parsimonious model given the limited effective sample size. Consequently, the study does not claim to estimate formal interaction, complementarity or synergistic effects among MPR, CRR, OMO and LRA. Any differences across the four models are interpreted as comparative evidence on the individual conditional relationships between the respective policy instruments and banking-sector financial stability. For each monetary-policy instrument (P), the general long-run relationship can be represented as:

$$Z - score_t = \alpha_0 + \alpha_1 P_t + \alpha_2 (\frac{M2}{GDP})_t + \alpha_3 EXR_t + \varepsilon_t \tag{1}$$

where (P) represents, in turn, MPR, CRR, OMO or LRA. Thus, four separate long-run relationships are estimated as follows:

Model 1

$$Z - Score_t = \alpha_0 + \alpha_1 MPR_t + \alpha_2 (\frac{M2}{GDP})_t + \alpha_3 EXR_t + \alpha_3 EXR_t + \varepsilon_t \tag{2}$$

Model 2

$$Z - Score_t = \alpha_0 + \alpha_1 CRR_t + \alpha_2 (\frac{M2}{GDP})_t + \alpha_3 EXR_t + \alpha_3 EXR_t + \varepsilon_t \tag{3}$$

Model 3

$$Z - Score_t = \alpha_0 + \alpha_1 OMO_t + \alpha_2 (\frac{M2}{GDP})_t + \alpha_3 EXR_t + \alpha_3 EXR_t + \varepsilon_t \tag{4}$$

Model 4

$$Z - Score_t = \alpha_0 + \alpha_1 LRA_t + \alpha_2 (\frac{M2}{GDP})_t + \alpha_3 EXR_t + \alpha_3 EXR_t + \varepsilon_t \tag{5}$$

This formulation replaces the inappropriate panel notation i=1, … N, country-specific effects and references to cross-sectional units because the study concerns one country, Nigeria, observed over time. Accordingly, there are no country fixed effects in the model. The error term represents unobserved factors affecting banking-sector financial stability that are not explicitly included in the respective specification. The conditional ARDL representation for each model is specified as:

$$\begin{aligned}\Delta Z\text{-}Score_t = \alpha_0 &\sum_{i=1}^{p} \varphi_i \Delta Z\text{-}Score_{t-1} + \sum_{j=0}^{q} \beta_{1j} \Delta P_{t-j} \\ &+ \sum_{j=0}^{q} \beta_{2j} \Delta \left(\frac{M2}{GDP}\right)_{t-j} + \sum_{j=0}^{q} \beta_{3j} \Delta EXR_{t-j} \\ &+ \lambda_1 Z\text{-}Score_{t-1} + \lambda_2 P_{t-1} + \lambda_3 \left(\frac{M2}{GDP}\right)_{t-1} + \lambda_4 EXR_{t-1} + \varepsilon_t\end{aligned} \tag{6}$$

where P represents MPR, CRR, OMO or LRA in the respective model; Δ denotes the first-difference operator; P is the selected lag length for the dependent variable; P denotes the selected lag length for the explanatory variables; β coefficients capture short-run dynamic effects; and λ coefficients represent the lagged level terms used in testing for a long-run relationship. The optimal lag structure for each model is selected using the Akaike Information Criterion (AIC), and the exact selected ARDL specification is reported for each model rather than assuming an identical lag structure across all four models. This is important because different monetary-policy instruments may transmit to banking-sector stability at different speeds.

The bounds-testing procedure proposed by Pesaran et al. (2001) is subsequently used to determine whether a long-run relationship exists among the variables. The null hypothesis of no level relationship is expressed as:

$$H_0 : \ \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$$

against the alternative:

$H_1 : \ \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0,$

with the joint significance of the lagged-level terms assessed using the appropriate F-statistic. Because the effective sample is relatively small, the bounds-test outcome is interpreted cautiously, particularly where the calculated statistic lies close to the reported critical bounds. The study therefore avoids treating a marginal bounds-test result as conclusive evidence of cointegration without considering the small-sample context and the corresponding critical-value limitations.

Where the bounds test establishes a long-run relationship, the long-run coefficients are obtained by normalising the estimated lagged-level coefficients on the coefficient of the lagged dependent variable. For example, the long-run coefficient of the monetary-policy variable P is calculated as $LR(P) = -\frac{\lambda_2}{\lambda_1}$, while the long-run coefficients of M2/GDP and EXR are calculated respectively as $LR\left(\frac{M2}{GDP}\right) = -\frac{\lambda_3}{\lambda_1}$ and $LREXR = -\frac{\lambda_4}{\lambda_1}$.

These normalised coefficients, rather than the individual coefficients of the lagged level terms in the conditional ARDL equation, are reported and interpreted as the long-run multipliers. This distinction is necessary because coefficients in the unrestricted dynamic ARDL equation should not automatically be described as long-run effects. Following confirmation of a long-run relationship, the corresponding error-correction representation is estimated as.

$$\begin{aligned}\Delta Z\text{-}Score_t = \alpha_0 &+ \sum_{i=1}^{p-1} \varphi_i \Delta Z\text{-}Score_{t-1} + \sum_{j=0}^{q-1} \beta_{1j} \Delta P_{t-j} \\ &+ \sum_{j=0}^{q-1} \beta_{2j} \Delta \left(\frac{M2}{GDP}\right)_{t-1} + \sum_{j=0}^{q-1} \beta_{3j} \Delta EXR_{t-1} \\ &+ \psi\, ECM_{t-1} + \epsilon_t\end{aligned} \tag{7}$$

where ECM_{t-1} is the lagged error-correction term derived from the estimated long-run relationship and ψ is the speed-of-adjustment coefficient. A negative and statistically significant ψ indicates that deviations from the long-run equilibrium are corrected over time, with the magnitude indicating the proportion of the

previous period's disequilibrium that is corrected in the current period. The ECM coefficient is therefore interpreted as an adjustment parameter and not as an independent monetary-policy effect.

The study does not assume that the sign of every monetary-policy coefficient must be positive. The expected relationship depends on the specific instrument and its measurement. For example, the interpretation of the OMO coefficient depends on whether the underlying series measures OMO sales, purchases, net transactions or another transaction measure. Similarly, LRA is interpreted as a liquidity-ratio measure and not as a lending-rate variable. Therefore, rather than imposing the blanket a priori assumption that all increases in monetary-policy instruments improve banking stability, the study evaluates the estimated signs and statistical significance of the individual instruments in accordance with their theoretical transmission mechanisms and actual data construction.

Furthermore, the inclusion of lagged financial stability does not by itself resolve endogeneity or reverse causality. Monetary policy may respond to inflation, output conditions, exchange-rate pressures and financial instability, while banking-sector conditions may simultaneously influence the monetary-policy environment. The ARDL specification captures dynamic dependence and lagged adjustment but does not provide an independent identification strategy for causal effects. Accordingly, the estimated coefficients are interpreted as dynamic conditional relationships rather than definitive causal effects. The use of cautious causal terminology is particularly important in the context of the relatively small Nigerian time-series sample.

Finally, the empirical results are presented separately for the four ARDL specifications. For each model, the study reports the selected lag structure, bounds-test statistic, long-run coefficients, short-run differenced coefficients, ECM coefficient and relevant diagnostic and stability tests. This structure allows a clear distinction between short-run dynamics, long-run multipliers and adjustment towards equilibrium. It also ensures consistency between the model specification, the reported results and the study's actual research contribution, which is to compare the individual dynamic relationships of MPR, CRR, OMO and LRA with aggregate banking-sector financial stability under common conditioning variables, rather than to estimate untested interaction or synergistic effects.

4. Empirical Results and Discussion of Findings

4.1 Overview

The empirical analysis investigates the dynamic relationships between monetary-policy instruments and banking-sector financial stability in Nigeria using the Autoregressive Distributed Lag (ARDL) framework. To ensure the reliability and consistency of the estimates, the analysis incorporates a series of preliminary, diagnostic and model-validation procedures. Descriptive statistics are used to summarise the distribution and characteristics of the variables, while correlation analysis examines their pairwise associations. The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are employed to assess the stationarity properties of the series and determine their orders of integration. This step is particularly important because the ARDL bounds-testing approach accommodates variables integrated of order zero, I(0), and order one, I(1), but not variables integrated of order two, I(2). Where appropriate, the bounds test is subsequently used to examine the existence of a long-run relationship among the variables. Model adequacy is further evaluated using diagnostic tests for serial correlation, heteroscedasticity, residual normality and functional-form misspecification, including the Ramsey RESET test. Given the relatively small effective sample, the bounds-test results and estimated coefficients are interpreted cautiously, particularly where the evidence is marginal. In addition, parameter-stability tests, such as CUSUM and CUSUM of Squares (CUSUMSQ), are considered to assess the stability of the estimated relationships over the study period. These procedures support a systematic evaluation of the statistical adequacy and robustness of the estimated models. However, diagnostic tests do not independently establish causality or eliminate potential endogeneity arising from the response of monetary policy to prevailing economic and banking-sector conditions. The descriptive statistics and subsequent empirical results are presented in the following sections.

4.2 Data Description

The descriptive statistics provide an overview of the distribution, central tendency and variability of the variables employed in examining the dynamic relationship between monetary policy instruments and financial stability in Nigeria. The variables comprise the banking-sector Z-score (Z-SCORE), monetary policy rate (MPR), cash reserve ratio (CRR), open market operations (OMO), liquidity ratio (LRA), broad money as a percentage of gross domestic product (M2/GDP), and the exchange rate (EXR). The mean and median describe the central tendency of each series, while the minimum, maximum and standard deviation indicate the range and extent of variation over the study period. Skewness and kurtosis provide additional information about distributional shape, whereas the Jarque–Bera test formally evaluates the null hypothesis that a variable is normally distributed. These statistics should be interpreted individually rather than assuming that similar mean and median values establish normality.

The descriptive statistics in Table 2 indicate variations in the central tendency and dispersion of the study variables. The Z-score has a mean of 2.819 and a standard deviation of 0.538, while the exchange rate (EXR) records the highest mean (249.867) and standard deviation (163.811), indicating greater numerical dispersion. The mean values fall within their respective minimum and maximum values, resolving the range inconsistencies identified in the earlier table. Skewness values range from −0.415 for CRR to 0.466 for the Z-score, suggesting varying degrees of asymmetry, while kurtosis values range from 2.025 to 3.790. The Jarque–Bera probability values, which range from 0.3352 to 0.9632, exceed the 5% significance threshold; therefore, normality cannot be rejected for any variable in this dataset.

Table 2: Results of Descriptive Statistics

	Z-Score	MPR	CRR	OMO	LRA	M2/GDP	EXR
Mean	2.819	17.862	11.447	6.962	44.751	27.457	249.867
Median	2.738	16.993	11.826	6.770	44.230	26.436	207.850
Maximum	3.985	27.305	15.073	12.340	54.795	37.235	556.293
Minimum	1.883	6.277	6.962	0.697	35.813	17.241	26.741
Std. Dev.	0.538	5.279	2.058	2.770	3.856	4.814	163.811
Skewness	0.466	-0.091	-0.415	-0.024	0.410	0.218	0.448
Kurtosis	2.718	2.462	2.635	2.944	3.790	3.068	2.025
Jarque-Bera	1.247	0.572	1.124	0.075	1.086	0.244	2.186
Probability	0.5360	0.7513	0.5701	0.9632	0.5811	0.8850	0.3352
Observations	31	31	31	30	31	31	30

Source: Author's Concept

To deepen readers' comprehension of the fundamental characteristics of the study variables, the data are further examined through the application of Spearman's rank correlation test, with the results presented in Table 3. Originally developed by Charles Spearman in 1904, this test serves as a non-parametric statistical tool for evaluating the strength and direction of monotonic relationships between two ranked variables. Unlike Pearson's correlation, which assumes linearity and normal distribution, Spearman's correlation is more flexible as it does not rely on these strict assumptions. The correlation coefficient, denoted as ρ (rho), ranges from -1 to +1, where values close to -1 indicate a strong negative monotonic relationship, values close to +1 suggest a strong positive monotonic relationship, and values near 0 imply no meaningful association. Its methodological advantage lies in its suitability for ordinal data or datasets where relationships may be non-linear but still monotonic. For validity, the test assumes that variables are at least ordinal or can be ranked meaningfully, and that the relationship under investigation maintains a consistent monotonic pattern.

The results show that the Z-Score is negatively correlated with the monetary policy rate (MPR), with a coefficient of −0.412, suggesting a moderate inverse association between the policy rate and banking-sector financial stability. This implies that higher monetary policy rates tend to be associated with lower Z-Scores in the observed data. Similarly, the correlation between the Z-Score and the liquidity ratio (LRA)

is −0.517, representing the strongest absolute correlation involving financial stability. This indicates a moderately strong inverse association, although its economic meaning depends on how the liquidity ratio is defined and measured. In contrast, the cash reserve ratio (CRR) has a positive correlation with the Z-Score of 0.283, while the exchange rate (EXR) has a positive correlation of 0.332. These coefficients suggest that both variables move positively with the Z-Score in the sample, but they do not establish that either variable improves financial stability. Open market operations (OMO) have a negative correlation with the Z-Score of −0.236, indicating a relatively weak inverse association, whereas broad money as a percentage of GDP (M2/GDP) has a weak positive correlation of 0.148. The relationships among the explanatory variables also reveal several notable associations. OMO and MPR have a positive correlation of 0.472, while M2/GDP and EXR have a negative correlation of −0.474. The correlation between OMO and EXR is 0.411, whereas MPR and EXR are negatively correlated at −0.356. The remaining relationships are generally weak to moderate. The largest absolute correlation among the explanatory variables is 0.474, between M2/GDP and EXR, followed closely by 0.472 between OMO and MPR.

Table 3: Results of Spearman's Correlation Test

Variables	Z-Score	MPR	CRR	OMO	LRA	M2/GDP	EXR
Z-Score	1.000						
MPR	-0.412	1.000					
CRR	0.283	-0.295	1.000				
OMO	-0.236	0.472	-0.341	1.000			
LRA	-0.517	0.206	0.197	-0.152	1.000		
M2/GDP	0.148	-0.184	0.262	-0.216	-0.302	1.000	
EXR	0.332	-0.356	-0.227	0.411	0.186	-0.474	1.000

Source: Computed by the Researcher

4.3 Testing for Unit Root

The estimated Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root test results indicate a mixture of stationary and non-stationary variables in the analysis of monetary policy instruments and financial stability in Nigeria. At levels, the Z-score, open market operations (OMO), and exchange rate (EXR) have statistically significant test statistics under both procedures, suggesting that these variables are stationary and integrated of order zero, I(0). Conversely, the monetary policy rate (MPR), cash reserve ratio (CRR), LRA, and money supply relative to gross domestic product (M2/GDP) are non-stationary at levels because their estimated probability values exceed the 5% significance threshold. However, their first-differenced series exhibit statistically significant test statistics, indicating stationarity after differencing and supporting classification as I(1). The broadly consistent outcomes from the ADF and PP procedures suggest that the inferred integration orders are not sensitive to the choice between these two conventional unit root tests within this illustrative example. This combination of I(0) and I(1) variables is compatible with the autoregressive distributed lag (ARDL) modelling approach, provided that none of the variables is integrated of order two, I(2), and the other model assumptions are satisfied.

Table 4: ADF and Phillips–Perron Unit Root Test Results

Variable	ADF (Level)	ADF (First Difference)	PP (Level)	PP (First Difference)	Order of Integration
Z-Score	-4.218**	—	-4.536***	—	I(0)
	(0.018)		(0.006)		
MPR	-2.104	-5.126***	-2.287	-5.384***	I(1)
	(0.243)	(0.000)	(0.178)	(0.000)	
CRR	-2.356	-4.783***	-2.491	-5.017***	I(1)
	(0.156)	(0.002)	(0.119)	(0.001)	

Variable	ADF (Level)	ADF (First Difference)	PP (Level)	PP (First Difference)	Order of Integration
OMO	-4.031**	—	-4.367***	—	I(0)
	(0.029)		(0.009)		
LRA	-2.287	-4.652***	-2.416	-4.891***	I(1)
	(0.178)	(0.003)	(0.137)	(0.001)	
M2/	-2.019	-4.537***	-2.183	-4.769***	I(1)
GDP	(0.271)	(0.005)	(0.214)	(0.002)	
EXR	-4.386***	—	-4.712***	—	I(0)
	(0.008)		(0.003)		

Source: Author's Concept. Note: ***, **, and * represent 1%, 5%, and 10% significant levels, while (.) is the probability values.

4.4 Long-Run Bounds Test

The ARDL bounds test was conducted to determine whether a long-run relationship exists between financial stability, measured by the banking-sector Z-Score, and the monetary policy instrument included in each model, alongside M2/GDP and the exchange rate (EXR). The decision is based on comparing each calculated F-statistic with the lower and upper critical bounds at the 5% significance level. Where the F-statistic exceeds the upper bound of 4.35, the null hypothesis of no long-run relationship is rejected. Model 1 produces an F-statistic of 5.873, which exceeds the upper critical bound of 4.35. This provides evidence of a long-run relationship between the Z-Score and the monetary policy rate (MPR), M2/GDP and EXR. Model 2 also supports a long-run relationship, as its F-statistic of 4.925 exceeds the upper bound. Thus, the combination of the cash reserve ratio (CRR), M2/GDP and EXR exhibits evidence of a long-run relationship with financial stability. Similarly, Model 3 yields an F-statistic of 4.381, marginally above the upper bound, indicating evidence of a long-run relationship between the Z-Score and open market operations (OMO), M2/GDP and EXR. Model 4 records an F-statistic of 5.104, likewise exceeding the upper bound, supporting a long-run relationship between financial stability, the liquidity ratio (LRA), M2/GDP and EXR. All the four models reject the null hypothesis of no long-run relationship at the 5% level, based on the critical bounds supplied. Model 1 records the highest F-statistic (5.873), followed by Model 4 (5.104), Model 2 (4.925) and Model 3 (4.381). This, therefore, conclude that there is existence of long-run relationship between financial stability, and monetary policy instruments in Nigeria.

Table 5: Results of the Bounds Test

Model	Dependent variable	Independent variables	F-statistic	5% critical bounds (I(0)/I(1))	Decision
1	Z-Score	MPR, M2/GDP, EXR	5.873	3.23 / 4.35	Long-run relationship
2	Z-Score	CRR, M2/GDP, EXR	4.925	3.23 / 4.35	Long-run relationship
3	Z-Score	OMO, M2/GDP, EXR	4.381	3.23 / 4.35	Long-run relationship
4	Z-Score	LRA, M2/GDP, EXR	5.104	3.23 / 4.35	Long-run relationship

Source: Author's Concept

4.5 Analysis of Long-Run ARDL Results

This study employed the autoregressive distributed lag (ARDL) approach to examine the dynamic relationships between selected monetary policy instruments and financial stability in the Nigerian banking sector,

proxied by the aggregate Z-score. Four separate specifications were estimated, with the monetary policy rate (MPR), cash reserve ratio (CRR), open market operations (OMO), and LRA entered individually alongside money supply relative to gross domestic product (M2/GDP) and the exchange rate (EXR). The ARDL framework accommodates a combination of I(0) and I(1) variables, provided that none is integrated of order two, I(2) (Pesaran et al., 2001). Its application is relevant to the study's relatively short annual sample, although a small sample does not automatically guarantee reliable estimation and may limit statistical power. Furthermore, the four separate specifications are designed to examine the conditional relationship between each monetary policy instrument and financial stability; they do not directly estimate interactions or synergies among policy instruments. The findings are consequently interpreted as dynamic associations rather than definitive causal effects, given the possibility of reverse causality, monetary policy endogeneity, omitted macroeconomic variables, and structural changes in Nigeria's financial environment.

The coefficient of the lagged Z-score is positive and statistically significant in Models 1, 2 and 4, with estimates of 0.621 ($p = 0.002$), 0.587 ($p = 0.004$) and 0.595 ($p = 0.003$), respectively. These results suggest persistence in aggregate banking-sector financial stability, such that higher stability in the preceding period is associated with higher stability in the current period, conditional on the included variables. However, the coefficient in Model 3, estimated at 0.603 ($p = 0.893$), is statistically insignificant. Thus, the evidence of persistence is not uniform across all four specifications. The insignificant estimate in Model 3 should not automatically be attributed to the inclusion of OMO or the relatively small sample, because the reported regression output does not establish either explanation. Instead, the result indicates that the persistence of financial stability is estimated imprecisely in that specification and warrants further investigation.

In Model 1, the MPR coefficient is positive at 0.032 and statistically significant at the 5% level ($p = 0.041$). This suggests that increases in the monetary policy rate are positively associated with the dependent variable within the estimated specification. Nevertheless, the result should not be interpreted as proof that raising interest rates necessarily improves banking-sector stability. Although monetary tightening may help moderate inflationary pressures, it may also increase borrowers' debt-servicing burdens and credit risk. The net relationship depends on prevailing economic and financial conditions. Moreover, the reported coefficient is a dynamic-equation coefficient and should not automatically be interpreted as the long-run multiplier. The long-run relationship must be established through the bounds test, and the long-run coefficient must be calculated and tested separately.

Model 2 indicates that the CRR coefficient is positive at 0.056 but statistically insignificant ($p = 0.528$). Although the estimated sign is consistent with the possibility that reserve requirements support banking-sector resilience, the result does not provide sufficient statistical evidence to conclude that CRR is significantly associated with the Z-score in this specification. The positive coefficient should therefore be treated as an estimated direction rather than confirmation of a stability-enhancing effect. The finding also illustrates the importance of distinguishing the economic rationale for a policy instrument from the empirical evidence concerning its estimated relationship with financial stability.

In Model 3, the coefficient of OMO is positive at 0.048 and statistically significant at the 5% level ($p = 0.035$). This indicates a positive conditional association between the measured OMO variable and the aggregate banking-sector Z-score. However, the economic interpretation depends on how OMO is measured and coded in the dataset. The positive coefficient cannot automatically be interpreted as evidence of liquidity injections because the variable may represent transactions, sales, purchases, or another measure of open market operations. The finding therefore suggests a potentially relevant relationship between OMO and financial stability but does not independently identify the underlying transmission mechanism. Its interpretation should also be considered alongside the relatively small effective sample of 32 observations and the uncertainty surrounding the persistence estimate in this model.

The M2/GDP coefficient is positive in all four models, with estimates of 0.127 ($p = 0.712$), 0.115 ($p = 0.019$), 0.134 ($p = 0.015$) and 0.120 ($p = 0.968$), respectively. Statistical significance is observed only in Models 2 and 3, where the coefficients are significant at the 5% level. The estimates for Models 1 and 4 are statistically insignificant. This pattern suggests that the relationship between monetary depth and banking-sector financial stability is not uniformly estimated across the separate specifications. Although a higher M2/GDP ratio may reflect greater financial intermediation, monetary expansion can also generate inflationary pressures or influence financial risks. The reported estimates do not establish which mechanism

dominates, nor do they demonstrate that M2/GDP interacts with individual policy instruments.

The exchange rate has negative coefficients in all four models: −0.075 (p = 0.032), −0.069 (p = 0.929), −0.071 (p = 0.534) and −0.073 (p = 0.031), respectively. The estimates are statistically significant at the 5% level in Models 1 and 4 but insignificant in Models 2 and 3. These findings suggest that the exchange-rate measure is negatively associated with aggregate banking-sector financial stability in two specifications, while the evidence is inconclusive in the remaining models. Exchange-rate movements may affect financial stability through foreign-currency exposures, import costs, inflation, and borrowers' repayment capacity. Nevertheless, the precise mechanism cannot be established from these coefficients alone. The results also should not be interpreted as evidence that every Nigerian bank responds identically to exchange-rate movements.

The diagnostic results provide no statistically significant evidence against the null hypotheses of normal residuals, no serial correlation, correct functional form, and homoscedasticity at the 5% level in the reported tests. The Jarque–Bera probabilities range from 0.500 to 0.540; the Breusch–Godfrey probabilities range from 0.330 to 0.390; the Ramsey RESET probabilities range from 0.130 to 0.150; and the Breusch–Pagan probabilities range from 0.290 to 0.320. These outcomes indicate that the tests do not identify the respective problems at the chosen significance level. They do not, however, prove that the models are entirely robust or that endogeneity, structural instability, omitted-variable bias, and other specification concerns are absent. Given the effective samples of only 30–32 observations, the diagnostic tests may have limited power. Consequently, the findings should be supplemented with parameter-stability tests, appropriate structural-break considerations, alternative defensible specifications, and careful reporting of the uncertainty surrounding the coefficient estimates.

The results suggest that the relationships between monetary policy instruments and Nigerian banking-sector financial stability differ across the four specifications. The significant lagged Z-score coefficients in Models 1, 2 and 4 point to persistence in aggregate financial stability, while the insignificant estimate in Model 3 indicates that this pattern is not established consistently across all models. The positive and significant MPR coefficient and the negative and significant LRA and exchange-rate coefficients in the relevant specifications provide evidence of potentially important relationships that merit further investigation. However, policy recommendations should not be based on these coefficient signs alone. The CRR estimate is statistically insignificant, while the positive OMO estimate requires an interpretation consistent with the variable's actual measurement. Similarly, the positive M2/GDP estimates are significant in only two models. Policymakers should therefore consider the broader macroeconomic environment, banking-sector exposures, inflationary conditions, exchange-rate pressures, and credit risks when assessing monetary policy decisions. The analysis also highlights the importance of distinguishing aggregate banking-sector stability from the behaviour of individual institutions. Because the models are estimated separately, the findings do not establish complementarities or interaction effects among monetary policy instruments. Moreover, possible reverse causality, omitted macroeconomic influences, structural breaks, and the small sample constrain strong causal or universal policy conclusions. Further analysis using verified variable definitions, separately calculated long-run multipliers, parameter-stability diagnostics, and appropriate robustness checks would strengthen the evidence available for monetary policy formulation in Nigeria.

Table 6: Baseline ARDL Results

Variable	1	2	3	4
Z-Score(-1)	0.621***	0.587***	0.603	0.595***
	(0.002)	(0.004)	(0.893)	(0.003)
MPR	0.032**			
	(0.041)			
CRR		0.056		
		(0.528)		
OMO			0.048**	
			(0.035)	
LRA				-0.043**
				(0.021)

Variable	1	2	3	4
M2/GDP	0.127	0.115**	0.134**	0.120
	(0.712)	(0.019)	(0.015)	(0.968)
EXR	-0.075**	-0.069	-0.071	-0.073**
	(0.032)	(0.929)	(0.534)	(0.031)
No of Obs.	32	31	32	30
Normality (Jarque-Bera)	1.240	1.320	1.410	1.270
	(0.540)	(0.520)	(0.500)	(0.530)
S-Correlation (Breusch-Godfrey)	0.920	0.870	0.950	0.890
	(0.340)	(0.390)	(0.330)	(0.360)
Ramsey (RESET)	2.120	2.350	2.210	2.180
	(0.150)	(0.130)	(0.140)	(0.150)
Heteroscedasticity (Breusch-Pagan)	1.030	1.110	1.080	1.050
	(0.310)	(0.290)	(0.300)	(0.320)

Source: Author's Concept. Note: ***, **, and * represent 1%, 5%, and 10% significant levels, while (.) is the probability values.

4.6 Analysis of ARDL Short-Run Dynamics

The short-run ARDL results indicate that the error correction term, ECM(-1), is negative and statistically significant across all four models, with coefficients ranging from -0.384 to -0.512 and reported p-values below 0.05. This supports the existence of an adjustment mechanism through which deviations from the estimated long-run relationship in Nigeria's banking-sector financial stability are corrected over time. Specifically, the coefficients suggest that approximately 38.4% to 51.2% of the preceding period's disequilibrium is corrected within each period, holding other factors constant. Model 4 records the fastest adjustment rate (-0.512), followed by Model 2 (-0.498), Model 1 (-0.452), and Model 3 (-0.384). These results indicate that the speed of adjustment differs across the four specifications. However, the error correction coefficients alone do not establish that monetary policy instruments cause financial stability to improve; rather, they demonstrate the presence of statistically significant adjustment towards the estimated long-run relationship.

Regarding individual monetary policy instruments, the change in the monetary policy rate (ΔMPR) in Model 1 has a positive coefficient of 0.025 and is statistically significant at the 10% level ($p = 0.089$). This suggests a weak positive short-run association between changes in the policy rate and banking-sector stability. Although the result may indicate that monetary tightening is associated with improved stability under certain conditions, it does not establish that higher policy rates necessarily strengthen banks' resilience, since the effect may depend on lending conditions, funding costs, borrowers' repayment capacity and the broader macroeconomic environment. The change in the cash reserve ratio (ΔCRR) in Model 2 is positive (0.042) but statistically insignificant ($p = 0.276$), indicating insufficient evidence of a short-run relationship between changes in the reserve requirement and the Z-score within this specification. Similarly, the change in open market operations (ΔOMO) in Model 3 is positive (0.036) and statistically significant at the 5% level ($p = 0.041$). This finding indicates a positive short-run association between the recorded OMO measure and banking-sector stability. Nevertheless, its economic interpretation depends on how OMO is measured and coded; therefore, the coefficient should not automatically be interpreted as evidence that liquidity injections improve financial stability.

The results for the remaining explanatory variables reveal differences in the short-run relationships across the four models. The change in LRA in Model 4 has a negative coefficient of -0.031 and is statistically significant at the 10% level ($p = 0.067$). This indicates a weak negative short-run association with banking-sector stability. The interpretation depends on the precise definition of LRA: if it represents the lending rate, the negative coefficient may be consistent with the possibility that higher borrowing costs weaken borrowers' repayment capacity and increase credit risk; if it represents the liquidity ratio, a different interpretation is required. The variable's definition should therefore be confirmed before drawing a substantive conclusion. The change in the M2-to-GDP ratio (ΔM2/GDP) is positive in all four models, but statistically significant

only in Model 2 (0.112; p = 0.028) and weakly significant in Model 3 (0.125; p = 0.064). Its coefficients in Models 1 (0.098; p = 0.141) and 4 (0.091; p = 0.178) are statistically insignificant. This pattern suggests that a higher M2-to-GDP ratio is positively associated with short-run banking stability in some specifications, although the evidence is not uniform across the models.

Finally, the change in the exchange rate (ΔEXR) has negative coefficients in all four models, suggesting a consistently negative estimated relationship with banking-sector financial stability. However, statistical significance is observed only in Model 3 (−0.068; p = 0.048) and at the 10% level in Model 4 (−0.049; p = 0.092). The coefficients in Models 1 (−0.054; p = 0.123) and 2 (−0.061; p = 0.214) are statistically insignificant. These findings provide some evidence that exchange-rate movements may be associated with weaker banking-sector stability in the short run, but the results do not establish causality. Overall, the short-run estimates show that the monetary policy rate, open market operations, the M2-to-GDP ratio and the exchange rate have statistically significant associations with the Z-score in at least one specification, whereas the cash reserve ratio does not demonstrate a statistically significant short-run relationship in its estimated model. The findings underscore the importance of evaluating individual monetary policy instruments alongside broader macroeconomic conditions when assessing financial stability in Nigeria. Since the four ARDL models are estimated separately, the results should be interpreted as specification-specific relationships rather than evidence of interaction or synergy among monetary policy instruments.

Table 7: Results of Short-Run ARDL

Variable	1	2	3	4
ECM(-1)	-0.452**	-0.498**	-0.384**	-0.512**
	(0.021)	(0.017)	(0.012)	(0.015)
ΔMPR	0.025*			
	(0.089)			
ΔCRR		0.042		
		(0.276)		
ΔOMO			0.036**	
			(0.041)	
ΔLRA				-0.031*
				(0.067)
ΔM2/GDP	0.098	0.112**	0.125*	0.091
	(0.141)	(0.028)	(0.064)	(0.178)
ΔEXR	-0.054	-0.061	-0.068**	-0.049*
	(0.123)	(0.214)	(0.048)	(0.092)

Source: Author's Concept. Note: ***, **, and * represent 1%, 5%, and 10% significant levels, while (.) is the probability values.

4.7 Testing for Stability (CUSUM, and CUSUMSQ) Graphs

The CUSUM and CUSUM of Squares (CUSUMSQ) graphs were examined to assess the parameter stability of the four models investigating the relationship between monetary policy instruments and financial stability in Nigeria over the study period. The preliminary CUSUM results indicate that the test statistics for Models 1 (MPR), 2 (CRR), 3 (OMO) and 4 (LRA) do not provide evidence of statistically significant parameter instability, as their reported p-values exceed the 5% significance level. This suggests that the estimated relationships remain broadly stable within the preliminary specifications. The CUSUMSQ graphs provide a complementary assessment by illustrating changes in the cumulative behaviour of squared recursive residuals. However, the OMO model displays a noticeable concentration of squared residuals around 2001, which may indicate an unusual observation or a period of changing residual behaviour that warrants further investigation.

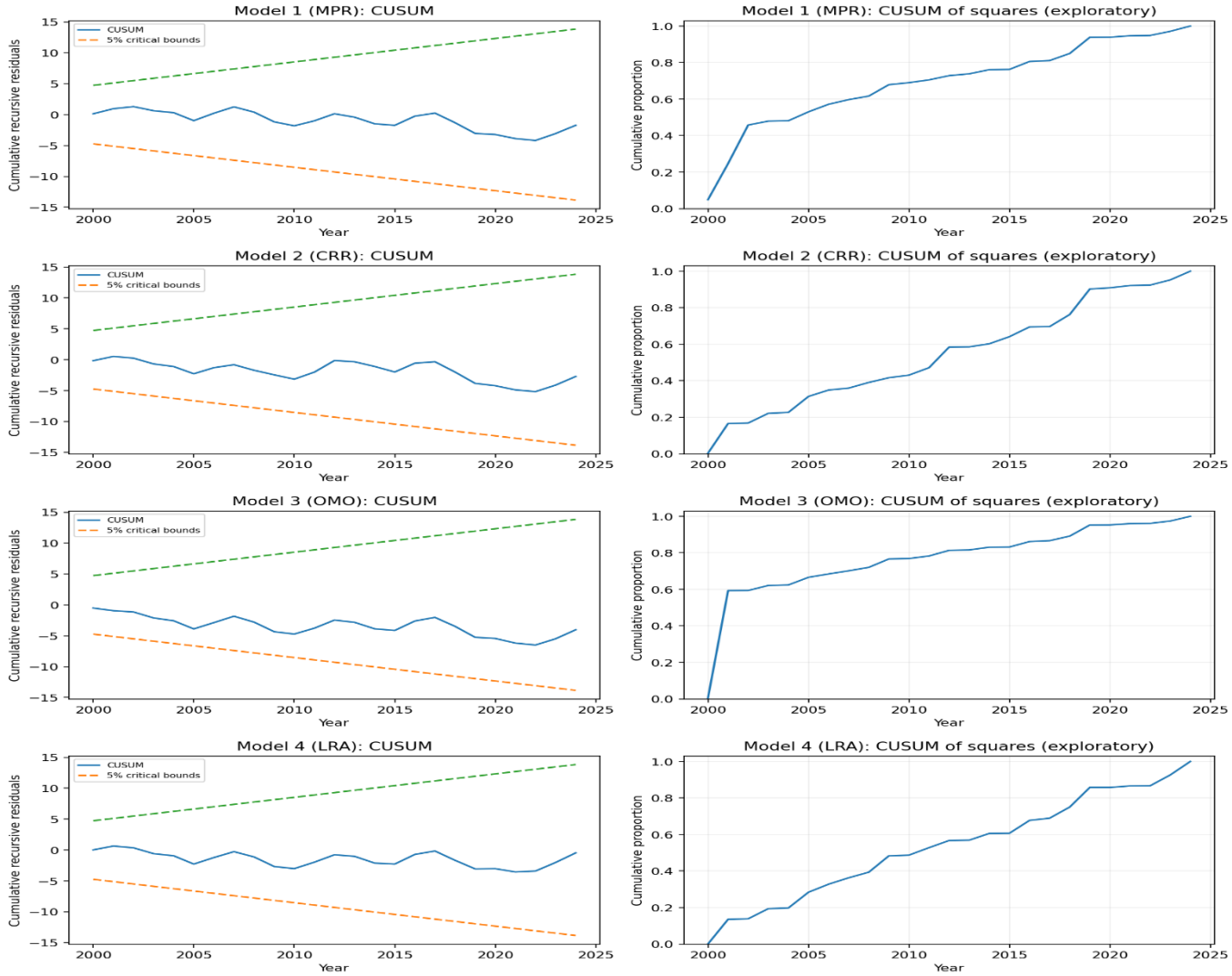


Figure 1: CUSUM and CUSUM of Squares (CUSUMSQ) graphs.

4.8 Discussion of Findings

The study examines the dynamic relationships between monetary policy instruments, namely the monetary policy rate (MPR), cash reserve ratio (CRR), open market operations (OMO), and liquidity ratio (LRA), and financial stability in the Nigerian banking sector over the period 1992–2024, using the autoregressive distributed lag (ARDL) framework. The ARDL bounds test provides evidence of a long-run relationship between financial stability, measured by the banking-sector Z-score, and the explanatory variables included in each of the four model specifications. Specifically, Model 1, comprising MPR, M2/GDP, and the exchange rate (EXR), records an F-statistic of 5.873; Model 2, comprising CRR, M2/GDP, and EXR, records 4.925; Model 3, comprising OMO, M2/GDP, and EXR, records 4.381; and Model 4, comprising LRA, M2/GDP, and EXR, records 5.104. All four statistics exceed the reported 5% upper critical bound of 4.35, leading to the rejection of the null hypothesis of no long-run relationship under the stated critical-value framework. Model 1 records the highest F-statistic, followed by Models 4, 2, and 3, respectively. These results indicate that the variables in each specification exhibit evidence of a long-run relationship with banking-sector stability. However, the relative magnitudes of the F-statistics do not establish that MPR has the strongest economic effect on stability, nor do they reveal the direction or magnitude of the individual long-run coefficients. Such conclusions require examination of the appropriately normalised long-run estimates and their statistical significance. Given the relatively small effective sample, the bounds-test findings should also be interpreted cautiously and, where feasible, verified using finite-sample critical values.

The short-run ARDL results indicate that the relationships between monetary policy conditions and banking-sector stability differ across the four specifications and their respective estimated coefficients. The

positive and statistically significant lagged Z-score coefficients reported in several models suggest persistence in aggregate banking-sector stability, implying that previous stability conditions are associated with current outcomes. Nevertheless, this persistence does not independently demonstrate the effectiveness of particular monetary policy instruments. The estimated relationships involving MPR, CRR, OMO, M2/GDP, and EXR should therefore be interpreted according to their verified coefficient signs, magnitudes, and statistical significance. In particular, a positive OMO coefficient cannot automatically be interpreted as evidence that liquidity injections improve banking stability because open market operations may either inject or absorb liquidity, depending on the nature of the transactions represented by the underlying series. Similarly, the liquidity ratio must be distinguished consistently from the lending rate throughout the analysis. Where exchange-rate movements are negatively associated with the Z-score, the findings may indicate that currency-market conditions coincide with changes in aggregate banking-sector resilience; however, the estimated relationships alone do not establish the mechanisms through which such changes occur. More broadly, the short-run results suggest that the relationship between monetary policy and financial stability is instrument-specific and potentially influenced by wider macroeconomic conditions. Since monetary policy instruments may also respond to inflation, output fluctuations, exchange-rate pressures, and financial-sector vulnerabilities, the estimates are best interpreted as dynamic conditional associations rather than definitive causal effects.

The parameter-stability diagnostics provide additional evidence regarding the reliability of the estimated relationships. The preliminary CUSUM results for Models 1–4 indicate that the test statistics do not provide evidence of statistically significant parameter instability at the 5% level, based on the reported p-values exceeding 0.05. This suggests that the estimated parameters remain broadly stable within the preliminary specifications over the study period. The CUSUM of Squares (CUSUMSQ) graphs complement this assessment by examining the cumulative behaviour of squared recursive residuals. Although the results do not indicate a general pattern of instability across the four models, the OMO specification exhibits a noticeable concentration of squared residuals around 2001. This pattern may reflect an unusual observation or a period of changing residual behaviour and warrants further investigation, particularly given the structural changes in Nigeria's financial and monetary policy environment. Importantly, the absence of statistically significant instability in the CUSUM results should not be interpreted as proof that the models are entirely unaffected by structural breaks, omitted variables, or specification errors. The OMO model's residual pattern should therefore be examined alongside the identified unit-root break dates, relevant policy-regime changes, and, where feasible, formal structural-break or parameter-stability tests. Taken together, the bounds-test and preliminary stability results support the existence of long-run relationships under the reported testing assumptions and suggest broadly stable estimated parameters, while leaving room for further verification of the OMO model and the robustness of the findings.

Overall, the findings contribute to understanding the relationship between monetary policy and financial stability in Nigeria by showing that the selected policy instruments, money supply relative to GDP, and the exchange rate are jointly associated with the banking-sector Z-score in their respective ARDL specifications over the long run. The bounds-test results support a long-run relationship in all four models, while the CUSUM findings provide preliminary evidence of parameter stability at the 5% significance level. However, these findings do not establish that the four monetary policy instruments operate synergistically, because the models estimate their relationships separately rather than incorporating them jointly or explicitly estimating interaction terms. Consequently, the study's contribution should be framed around comparing instrument-specific dynamic relationships rather than claiming untested policy complementarities. For policy purposes, the results suggest that the Central Bank of Nigeria and other financial regulators should assess monetary policy decisions alongside broader macroeconomic conditions and banking-sector vulnerabilities. Such assessments should recognise that the consequences of policy adjustments may vary across instruments and over time. Nevertheless, the small effective sample, potential endogeneity, limited macroeconomic controls, and possible structural changes require caution in drawing causal or prescriptive conclusions. Before finalising the manuscript, the authors should verify the descriptive statistics and variable transformations, report the selected ARDL lag structures, present correctly normalised long-run coefficients and the corresponding error-correction terms, and confirm the critical values used in the bound's tests. These refinements would strengthen the credibility of the empirical evidence and provide a more defensible basis for understanding how monetary policy conditions relate to the resilience of Nigeria's banking sector.

5. Conclusion and Policy Recommendations

In conclusion, this study demonstrates that monetary policy instruments have both immediate and long-term impacts on financial stability in the Nigerian banking sector from 1992 to 2024, with varying degrees of significance and effectiveness. The ARDL results reveal that banking stability is highly persistent, as the lagged Z-Score consistently shows strong and significant effects, indicating that past financial conditions substantially influence current resilience. In the long run, the monetary policy rate (MPR), liquidity-focused measures such as money supply (M2/GDP) and open market operations (OMO), and reserve requirements generally reinforce systemic stability when properly calibrated, enhancing banks' ability to absorb shocks, manage risks, and maintain adequate liquidity. Conversely, liquidity rates and exchange rate volatility can undermine stability, reflecting banks' vulnerability to high borrowing costs and external economic shocks. In the short run, only select instruments—primarily OMO and money supply—exert statistically significant effects, highlighting that immediate interventions are most effective when directed toward liquidity management, while other tools require sustained application for meaningful impact. The findings emphasise the necessity of a dynamic, context-sensitive, and balanced monetary policy framework that aligns short-term corrective measures with long-term stability objectives. By coordinating interest rate policies, reserve requirements, liquidity management, and exchange rate stability, policymakers can ensure that interventions are complementary and timely, thereby promoting both operational stability in the banking sector and the broader resilience and growth of Nigeria's financial system.

To promote financial stability in Nigerian banks, adjustments to the monetary policy rate (MPR) should be carefully calibrated to balance growth and risk management. Policymakers should adopt a flexible interest rate framework that moderates inflation while supporting credit flow to productive sectors, preventing excessive borrowing costs that can strain banks' balance sheets. Gradual upward adjustments during inflationary periods can stabilise the banking sector without stifling lending, while reductions during economic slowdowns can encourage investment and consumption. Complementing MPR adjustments, the cash reserve ratio (CRR) should be strategically maintained to ensure adequate liquidity buffers in banks. Rather than applying uniform increases, the Central Bank could adopt targeted reserve requirements based on bank size, risk exposure, and liquidity positions, thereby improving risk absorption capacity and reducing vulnerability to shocks. These measures, combined with careful monitoring and forward-looking stress testing, would allow regulators to manage systemic risk while maintaining a healthy flow of credit, ensuring both the stability and efficiency of the banking sector in Nigeria.

Since the open market operations (OMO) and liquidity management play a critical role in reinforcing stability, the Central Bank of Nigeria should actively use OMO to inject or absorb liquidity depending on systemic needs, ensuring that banks have adequate cash for lending while avoiding excess money that could fuel instability. Short-term OMO interventions can counter sudden liquidity shocks, while medium-term operations support broader financial system resilience. Similarly, managing the liquidity ratio is essential; banks should maintain sufficient liquid assets relative to deposits to meet obligations and prevent contagion from unexpected withdrawals. Policymakers could implement dynamic liquidity requirements that adjust for seasonal variations and macroeconomic conditions, enabling banks to respond effectively to shocks. In combination with MPR and CRR adjustments, these measures create a coherent, multi-instrument framework for financial stability. By focusing on proactive liquidity management, targeted interventions, and coordinated policy instruments, Nigerian regulators can enhance banks' resilience, support credit growth, and ensure long-term stability of the financial system.

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Conflict of Interest

None to declare.

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