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# Inflation Dynamics and Monetary Policy Effectiveness in Nigeria

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**Abstract:** *This study investigates the dynamic interactions among exchange rate stability (LERS), inflation rate (IR), and money supply growth (MSG) in Nigeria from 1988 to 2023 using Autoregressive Distributed Lag (ARDL) and Granger causality techniques. Key statistical findings reveal bidirectional causal relationships: IR Granger-causes LERS (F-statistic = 4.9843, p = 0.0138), indicating that inflationary pressures undermine exchange rate stability, while LERS Granger-causes MSG (F-statistic = 3.5503, p = 0.0418), suggesting reactive monetary policy adjustments to exchange rate fluctuations. The ARDL model demonstrates a strong fit ($R^2$ = 0.9609), with a slow error correction rate (-0.1165), implying that 11.65% of disequilibrium corrects annually, reflecting structural inefficiencies. Unit root tests confirm stationarity at first difference for IR and LERS (I(1)) and at level for MSG (I(0)). Despite high explanatory power, the bounds test (F-statistic = 2.063) rejects long-run cointegration, highlighting transient relationships—contrary to regional studies but aligned with Nigeria's unique policy dynamics. Diagnostic tests confirm model robustness: no serial correlation (Breusch-Godfrey p > 0.05), homoskedastic residuals (Breusch-Pagan p > 0.05), and parameter stability (CUSUM within 5% bounds). Correlation analysis shows moderate inverse links between IR and LERS (-0.5408) and LERS-MSG (-0.3573), with weak IR-MSG association (0.1380). These findings underscore Nigeria's vulnerability to short-term inflationary shocks and reactive monetary policies. The study advocates for proactive inflation targeting anchored on forward-looking indicators and rules-based monetary frameworks to align money supply with long-term stability, mitigating exchange rate fluctuations. Policymakers must prioritise structural reforms to address inefficiencies and enhance policy coordination for sustained macroeconomic resilience.*
**Keywords:** inflation dynamics, monetary policy effectiveness, inflation rate, money supply growth and exchange rate stability.

## INTRODUCTION

Nigeria's persistent macroeconomic instability, characterised by inflation rate, money supply growth and exchange rate stability, underscores critical gaps in understanding the causal and moderating dynamics between inflation and monetary policy effectiveness. While existing literature acknowledges the role of inflation dynamics proxied by inflation rate and money

supply growth and their impact on exchange rate stability which is a proxy for monetary policy effectiveness, the theoretical, methodological and practical limitations of prior studies hinder the development of actionable policy frameworks. These gaps impede Nigeria's ability to achieve sustainable price stability and exchange rate sustainability, necessitating urgent scholarly intervention.

Current theoretical models inadequately explain the context-specific interaction between inflation dynamics and exchange rate stability in Nigeria. While monetary policy frameworks often assume a direct transmission mechanism between money supply growth and inflation, empirical evidence reveals contradictions. For instance, Okonjo-Iweala and Adeoye (2023) argue that fiscal dominance such as excessive government borrowing from the CBN distorts the money supply-inflation relationship, weakening exchange rate stability. Similarly, conflicting findings persist on whether inflation targeting or exchange rate targeting is more effective in Nigeria's import-dependent economy (Ibrahim & Musa, 2023). These contradictions highlight a theoretical void in modeling how external shocks, such as global oil price fluctuations, moderate the inflation-exchange rate nexus.

Methodologically, prior studies often rely on linear econometric models that fail to capture threshold effects or structural breaks in Nigeria's inflationary environment. For example, Eze et al. (2022) critique the oversimplification of money supply growth as a linear driver of inflation, ignoring critical thresholds where liquidity surges trigger hyperinflation. Additionally, many analyses use outdated datasets ending before 2020, excluding recent shocks such as the COVID-19 pandemic and geopolitical tensions, which have exacerbated currency instability (Mohammed & Sani, 2023). This methodological shortfall limits policymakers' ability to predict how inflation dynamics interact with external shocks to destabilise exchange rates.

Practically, Nigeria's monetary authorities face a dilemma: tightening money supply to curb inflation often leads to currency appreciation pressures, while expansionary policies to stabilize the exchange rate risk fueling inflation. The CBN's 2022 policy report admits that forex scarcity and speculative attacks have rendered traditional tools like interest rate adjustments ineffective (CBN, 2022). Furthermore, weak policy coordination between fiscal and monetary authorities exacerbates inflationary pressures, as seen in the 2023 subsidy removal crisis, which spiked fuel prices and worsened exchange rate fluctuation (Nwankwo, 2022). Without resolving these practical contradictions, Nigeria risks prolonged stagflation, eroded investor confidence, and social unrest.

Failure to address these gaps will perpetuate Nigeria's economic fragility. Persistent inflation erodes household purchasing power, exacerbating poverty levels, while exchange rate instability discourages foreign direct investment and escalates debt servicing costs. For instance, the Naira's depreciation increased Nigeria's external debt burden by 40% between 2021 and 2023 (CBN, 2022). Additionally, unanchored inflation expectations could trigger a wage-price spiral, further destabilising the exchange rate (Ibrahim & Musa, 2023). These outcomes highlight the urgency of re-evaluating monetary policy frameworks to break the inflation-exchange rate doom loop. This study aims to resolve these theoretical, methodological, and practical challenges by investigating how inflation dynamics influence

exchange rate stability in Nigeria, with emphasis on the moderating role of external shocks. Specifically, the study seeks to examine the impact of inflation rate and money supply growth on exchange rate stability in Nigeria.

## LITERATURE REVIEW

### Inflation Dynamics

Inflation dynamics can be defined as the evolving interaction between monetary, fiscal, structural, and external variables that influence inflationary behaviour over time. Elements such as money supply, interest rates, and exchange rates significantly shape inflation trends and expectations within a specific economic context (Rasool, 2023). Inflation dynamics is conceptualised through the frequency domain by analysing cyclical behaviour. It is the decomposition of inflation behaviour across different time horizons, identifying dominant influences such as inflation expectations in long-run cycles and energy prices in short-run variations (Martins & Verona, 2023). Inflation dynamics is described as non-linear, complex movements of inflation rates within an economic system, best captured through models like the logistic equation. Inflation patterns evolve due to both endogenous economic factors and external shocks, requiring advanced simulation techniques for analysis (Kapçiu et al., 2024). Inflation dynamics in the U.S. context is defined as the fluctuating process by which inflation responds to policy measures, economic expectations, and macroeconomic conditions (Taslima et al., 2024). Inflation dynamics is framed as being shaped by domestic structural characteristics particularly real wage rigidity and profit margins during periods of external shocks with emphasis on how national-level differences in economic institutions can mediate the extent and persistence of inflationary pressures (Papageorgiou & Rizos, 2024).

### Inflation Rate

Inflation rate is defined as the rate of change in the general price level of a fixed basket of consumer goods and services over time, typically measured using the Consumer Price Index (CPI). This definition emphasises the loss in purchasing power and its impact on household living standards (Bekri, 2022). Inflation rate is described as a sustained increase in the monetary prices of goods and services in an economy. Uncontrolled inflation can erode societal trust in the monetary system and hamper economic stability (Zhang, 2025). Inflation rate is defined as the measured rise in general price levels over time, often quantified using indices like the CPI and GDP deflator. The inflation rate is influenced by factors such as taxation, monetary supply, and fiscal policy changes (Elshqirat, 2024). Inflation rate as the increase in average prices and the corresponding decline in money's quality or purchasing power. It is a measure reflecting macroeconomic imbalances in production, wages, and resource use (O'g'li & Toxtasinovna, 2024). The macroeconomic condition characterised by increasing prices, influenced by factors such as interest rates, economic growth, and money supply is described as inflation rate both as a symptom and a driver of broader monetary trends (Damayanti and Jalunggono, 2022).

### Money Supply Growth

Money supply Growth is defined as the total quantity of currency and other liquid instruments circulating in the economy, such as printed notes, deposits, and liquid assets. The growth rate of this supply indicates how rapidly the economy is being infused with monetary resources, which directly affects the business cycle and economic stability (Sigdel, 2024). Money supply

growth rate is a key indicator used in monetary policy to measure how fast the total amount of money in circulation is expanding. A low and stable growth rate is emphasised as necessary to control inflation and stimulate sustainable economic development (Ismailov, 2022). Money supply growth rate reflects changes in M2 (broad money), which includes currency in circulation and various types of deposits. The rate of increase in M2 is used to evaluate its influence on economic growth both in the short and long run (Siphanthong, 2024). Money supply growth rate is defined as the rate at which the stock of money available in the economy changes over time. The different states of economic variables (e.g., inflation, GDP) influence how this rate affects macroeconomic indicators like output and prices (Buthelezi, 2023). Money supply growth rate is described as a measure of how the volume of money (particularly M2) changes in relation to economic activity. It is viewed as a central variable in expansionary monetary policy aimed at stimulating economic growth across developed, developing, and emerging nations (Vo and Tran, 2023).

**Monetary Policy Effectiveness**

Monetary policy effectiveness refers to the capacity of central banks to achieve price stability and macroeconomic objectives by influencing interest rates, money supply, and credit conditions, ensuring that policy actions transmit effectively to inflation and output (Mishkin, 2022). Monetary policy effectiveness is the degree to which central bank interventions stabilise inflation expectations and exchange rates, particularly in emerging markets where structural rigidities and dollarisation weaken policy transmission (Alamsyah & Habibullah, 2023). Monetary policy effectiveness is measured by the central bank's ability to mitigate exchange rate fluctuations and anchor inflation through credible policy frameworks, even amid external shocks such as commodity price fluctuations (Adeleye et al., 2022). Monetary policy effectiveness entails the successful use of policy tools (e.g., interest rates, reserve requirements) to manage liquidity and demand pressures, thereby achieving desired macroeconomic outcomes without exacerbating financial instability (IMF, 2023). Monetary policy effectiveness is the extent to which policy actions stabilise the currency and curb inflationary pressures in an economy, particularly where fiscal dominance or structural bottlenecks impede policy transmission (BIS, 2022).

**Exchange Rate Stability**

Exchange rate stability refers to the ability of a country's currency to maintain a predictable value relative to foreign currencies, minimising abrupt fluctuations that could disrupt trade, investment, or inflation dynamics (Adeleye et al., 2022). Exchange rate stability is the degree to which a central bank or monetary authority can sustain a pegged or managed exchange rate regime, avoiding excessive volatility caused by speculative attacks or external shocks (IMF, 2023). Exchange rate stability entails the absence of sharp currency depreciations or appreciations, ensuring that macroeconomic policies effectively anchor market expectations and reduce uncertainty for businesses and investors (World Bank, 2023). Exchange rate stability is achieved when a currency's value remains within a target band or aligns closely with fundamentals such as inflation differentials, current account balances, and foreign reserve adequacy (BIS, 2022). Exchange rate stability reflects the resilience of a currency to external pressures (e.g., commodity price swings or capital flow reversals), enabling sustainable economic growth and price competitiveness in international markets (Mishkin, 2022).

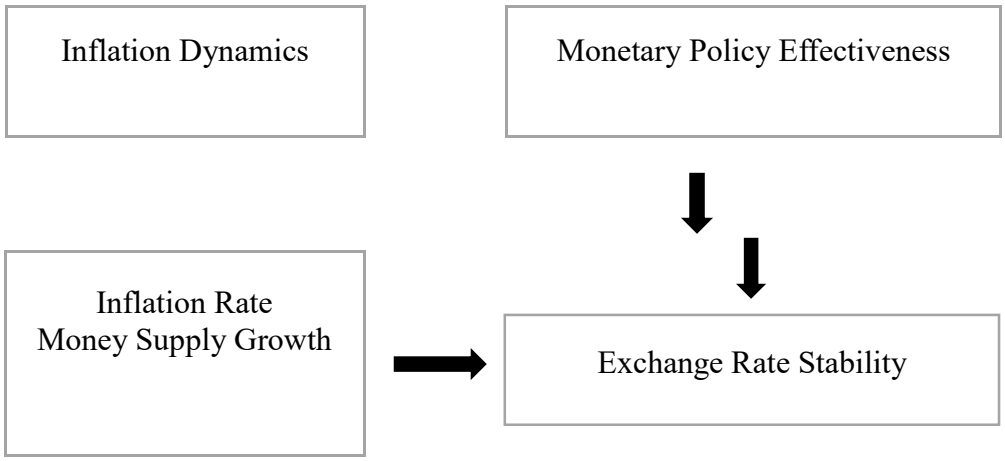


**Figure 2.1 Conceptual Framework**
Source: Author's Compilation, (2025).

**Theoretical Review**

This study employs the Mundell-Fleming Model (Mundell, 1963; Fleming, 1962) to analyse Nigeria's challenges in balancing inflation dynamics proxied by inflation rate and money supply growth and monetary policy effectiveness, measured through exchange rate stability. Central to the framework is the "impossible trinity" or policy trilemma, which posits that nations cannot simultaneously achieve exchange rate stability, monetary policy autonomy, and free capital mobility. Nigeria's managed floating exchange rate regime and partial capital controls exemplify this trilemma, as prioritising exchange rate stability and capital flow restrictions (e.g., forex rationing) undermines the Central Bank of Nigeria's (CBN) ability to control inflation through interest rate adjustments (Ajide & Raheem, 2023).

The model's first tenet, the policy trilemma, explains Nigeria's limited monetary autonomy. By managing the Naira's value and restricting capital outflows to conserve foreign reserves, the CBN sacrifices control over money supply growth, a key driver of inflation. For instance, raising interest rates to curb inflation is often ineffective because capital controls deter foreign investors, diluting policy impact. Simultaneously, forex shortages for critical imports (e.g., fuel) exacerbate inflation via exchange rate pass-through, creating a feedback loop (IMF, 2023). The second tenet, the exchange rate-inflation nexus, highlights how Nigeria's managed float regime generates conflicting objectives: tightening money supply to reduce inflation risks currency speculation, while defending the Naira depletes reserves and limits policy flexibility. Ajide and Raheem (2023) demonstrated that Nigeria's forex interventions (e.g., CBN's 2022 rationing) reduced monetary policy autonomy, worsening inflation. Similarly, the IMF (2023) noted that partial capital controls and exchange rate management weaken policy transmission, as efforts to stabilise the currency often escalate speculative activities. These findings align with the Mundell-Fleming prediction that partial adherence to trilemma goals leads to suboptimal outcomes. Structural factors further complicate Nigeria's policy landscape. Fiscal dominance exemplified by excessive government borrowing and fuel subsidy regimes distorts monetary policy effectiveness, as fiscal deficits are often monetised, fueling inflation (OkonjoIweala & Adeoye, 2023).

Additionally, oil dependency exposes the economy to external shocks, exacerbating exchange rate volatility. For example, declining oil revenues limit the CBN's capacity to defend the Naira, creating chronic currency instability. While the Mundell-Fleming Model assumes perfect capital mobility, scholars like Ajide and Raheem (2023) adapt it to Nigeria's context by incorporating "imperfect" capital mobility. This adaptation reflects the reality of partial capital controls, which create a quasi-trilemma where limited policy autonomy coexists with unstable outcomes. The study concludes that Nigeria's inflation and exchange rate instability are structural consequences of its trilemma choices rather than mere policy failures. To mitigate these challenges, reforms addressing fiscal dominance, enhancing policy credibility, and optimising forex management are critical.

**Empirical Review**

Henry and Jubrilla (2024) investigated the nexus between money supply and real output in Nigeria, evaluating the neutrality of money hypothesis using annual data from 1980 to 2022. The study combined the Autoregressive Distributed Lag (ARDL) framework with a discrete threshold regression model to analyse long- and short-term dynamics. The results supported the long-run neutrality of money, implying that money supply expansion does not sustainably enhance real output growth over extended periods. However, short-term non-neutrality was observed, with money supply exerting a transient influence on output. Inflation consistently hindered real output growth in both time horizons, while the real effective exchange rate negatively impacted long-term output but exhibited a short-run stimulatory effect. The analysis also identified structural breaks prior to 2000 that significantly shaped GDP trends across timeframes. To address these findings, the study advocated for a balanced fiscal-monetary policy approach, stressing fiscal restraint to steer real economic outcomes. It urged Nigeria's Central Bank (CBN) to establish clear inflation targets to curb GDP erosion over time and to prioritize domestic production and export expansion to achieve a sustainable exchange rate equilibrium for the naira.

Harper et al. (2024) the relationship between Nigeria's real GDP (RGDP) and key macroeconomic factors including money supply, inflation, government expenditure, government revenue, and exchange rates from 2004 to 2019. Employing a multiple regression analysis, the study revealed significant explanatory power ($R^2 = 0.723$), indicating that 72.3% of RGDP variations were accounted for by these variables. The results indicated that government expenditure and revenue had substantial positive effects on economic growth, while inflation and money supply were negatively associated with RGDP. Exchange rates demonstrated a modest positive influence on growth, though this effect was relatively weaker. The study underscored the necessity of harmonising fiscal and monetary policies to enhance Nigeria's economic stability and sustainable development.

Asuzu and Anyanwu (2023) delved into the intricate dynamics of the money supply-inflation relationship in the context of Nigeria's dynamic economic landscape. Focusing on determining the threshold level of monetary policy, proxied by the Monetary Policy Rate (MPR), at which changes in money supply become inflationary, the research builds upon a foundation of prior literature. The TAR model was employed on data between 2010Q1 and 2023Q2. Key findings emphasised the enduring long-term relationship between money supply and inflation, nuanced interactions influenced by auxiliary factors, and the pivotal role of the Central Bank of Nigeria

(CBN) in managing inflation through adept use of monetary policy tools. Notably, the study contributed a unique focus on determining a potential threshold level of interest rates at which money supply exerts adverse effects on inflation. Policy implications stressed the importance of optimal monetary policy management, coordination between monetary and fiscal authorities, and flexibility to navigate external shocks.

Bashir (2022) analysed the relationship between inflation and economic growth in Nigeria using the Autoregressive Distributed Lag (ARDL) framework. The study focused on macroeconomic variables such as GDP, inflation, interest rates, money supply, and government consumption expenditure, utilising annual data from 1990 to 2020. The ARDL findings revealed that inflation, interest rates, and money supply exerted a detrimental effect on economic growth, while government consumption expenditure positively contributed to growth. Based on these outcomes, the research stressed the importance of proactive fiscal and monetary policies to curb inflationary pressures and stabilise interest rates, thereby mitigating their negative economic consequences. It also advocated for calibrating money supply levels to ensure interest rate equilibrium, preventing liquidity traps, and fostering long-term sustainable growth in Nigeria.

Ashiru (2022) analysed the connection between money supply growth and food inflation in Nigeria, utilising monthly data spanning January 1996 to December 2021. The study first assessed the stationarity of the variables through the Augmented Dickey-Fuller (ADF) test. An Autoregressive Distributed Lag (ARDL) model, estimated via Ordinary Least Squares (OLS), was constructed to evaluate both contemporaneous and delayed effects of money supply on food inflation. The results revealed a significant immediate impact of money supply on food inflation, with no statistically meaningful lagged influence identified. Consequently, the research concluded that controlling money supply expansion serves as an effective strategy for curbing food inflation in Nigeria, emphasising the importance of timely monetary interventions.

Apanisile and Akinlo (2022) investigated the efficacy of monetary policy transmission in Nigeria through a Bayesian-estimated sticky-price Dynamic Stochastic General Equilibrium (DSGE) model. The study's relevance stems from Nigeria's reliance on an implicit inflation targeting framework for monetary policy implementation. Using quarterly data from 2000 to 2019 sourced from the World Development Indicators, the authors compared two monetary policy frameworks: monetary aggregate targeting and implicit inflation targeting. Results revealed that under the implicit inflation targeting regime, monetary policy channels effectively transmitted policy signals to the broader economy. However, the explicit use of a monetary aggregate framework was shown to weaken these transmission mechanisms. The study concluded that formalising inflation targeting as an explicit policy framework would enhance Nigeria's ability to harness its benefits, such as improved policy clarity and macroeconomic stability. This recommendation underscores the need for institutional reforms to align policy design with Nigeria's economic objectives.

## METHODOLOGY

This study adopts ex-post facto research design because the data for the study is already stored in the data base of World Development Indicator (WDI) which cannot be altered by any researcher. The population of the study comprises of data from the Nigerian economic factor which includes inflation dynamics index relationship to inflation rate and money supply growth as well as exchange rate stability which is the proxy for monetary policy effectiveness. The sample period that is adopted is from 1988 to 2023 (35 years) and the sampling technique used in this study is convenience sampling technique because the data is available on WDI. The method of data collection for this research is secondary data being time series from 1988 to 2023 which is a vital instrument needed in any research work to be able to carry out the analysis of this research work. The model specification is as follows:

$ERS = b_0 + b_1IR_t + b_2MSG_t + e$----------(1)

The ARDL Model was adapted from Arotiba and Omankhanlen (2021):

$D\ In\ HDI = b_0 + \sum_{pi=0} b_1 DInINFR_{t-i} + \sum_{pi=0} b_2 DInEXCHR_{t-i} + \sum_{pi=0} b_3 DInINTR_{t-i} + \mu_t$------(2)

Where; HDI = Human Development Indicator; INFR = Inflation Rate; EXCHR = Exchange Rate; INTR= Interest Rate

Following the stated model specification, equation 2 is restructured to incorporate the ARDL framework over different quantile ranges.

ARDL Model

$D\ In\ ERS = b_0 + \sum^{p}_{i=0} b_1 DInIR_{t-i} + \sum^{p}_{i=0} b_2 DInMSG_{t-i} + \mu_t$----------Equation 3

Where; ID = Inflation Dynamics; MPE = Monetary Policy Effectiveness; IR = Inflation Rate; MSG = Monetary Supply Growth ERS = Exchange Rate Stability $b_0$ = Beta coefficient for the constant; $b_1$, $b_2$ = Coefficients of the parameters of the model $e$ = Error term $_t$ = Time $\mu_t$ = Error term which captures the effects of other factors or variables on the dependent variable but not included in the model. The variables remains as they have been described earlier, D represents the difference in respective variables and (-) is a lag sign. ARDL bound test requires a null hypotheses for no co-integration: $H_0 = b_1 = b_2$; which means non-existence of long run relationship for equation 3. Inflation dynamics, measured by inflation rate and money supply growth, are central to understanding Nigeria's economic environment. High inflation rates, averaging 16.5% between 2019 and 2023, have eroded purchasing power and disrupted economic planning.

Concurrently, rapid money supply growth driven by fiscal deficits and expansionary monetary policies has amplified liquidity, often outpacing real economic output and fueling inflationary pressures (Adeleye et al., 2021). While the CBN employs tools such as monetary policy rates and open market operations to control money supply, the transmission mechanisms to inflation and exchange rates remain inconsistent, partly due to structural bottlenecks and informality in the financial sector.

Exchange rate stability, a proxy for monetary policy effectiveness, is critical for Nigeria's import-dependent economy. Currency depreciation, such as the Naira's 60% loss in value

against the USD between 2020 and 2023, has heightened import costs, worsening inflationary trends and creating a feedback loop. Studies suggest that monetary policy's ability to stabilise the exchange rate is moderated by external shocks, such as fluctuations in global oil prices and foreign reserve adequacy (Okafor & Ezeaku, 2022). For instance, declining oil revenues, which account for 90% of Nigeria's export earnings, limit the CBN's capacity to defend the Naira, undermining policy credibility.

This study used Autoregressive Distributed Lag Estimation Techniques for method of data analysis. Autoregressive Distributed Lag (ARDL) was chosen for the estimation due to some of its obvious merits. It is a dynamic approach which is capable of estimating the lag of the dependent variables, thus, can eliminate multicollinearity issues; it has the capability of choosing different lags for each variables; it can be estimated when variables are stationary at a level or first difference.

**Table 3.1: Measurement of Variable**

| S/No | Variable | Abbreviation | Measuring Unit |
|---|---|---|---|
| 1 | Inflation Rate | IR | Inflation, consumer prices (annual %) |
| 2 | Monetary Supply Growth | MSG | Broad money growth (annual %) |
| 3 | Exchange Rate Stability | ERS | Official exchange rate (LCU per US$, period average) |

Source: Author's Compilation, (2025).

Based on the explanatory/independent variables in the model, the a priori expectations below reflect the propositions of the selected empirical review concerning the dependent variable.

**Table 3.2: A priori expectation for the explanatory variable in the model**

| S/No | Explanatory Variable | Relationship with Dependent Variable |
|---|---|---|
| 1 | Inflation Rate | Positive |
| 2 | Monetary Supply Growth | Positive |

Source: Author's Compilation, (2025).

## RESULTS AND DISCUSSIONS

The dataset obtained from World Development Index in this study was firstly exported and prepared in an excel spreadsheet and then imported into the E-views 12 software, respectively, to carry out descriptive statistics, unit root test, correlation matrix and ADRL analysis on the variables. Many factors informed the choice of software for each analysis; for instance, it is easy to obtain a correlation matrix with probability values using the E-views software. This informed the use of the software in this study's analysis. The raw and computational details of the data in this study for operational purposes are available (refer to the appendix).

The variables IR and MSG were weighted in percentages whereas ERS was expressed in local currency unit. Therefore, it is necessary to attach weight to ERS, a natural logarithm of ERS was done before the Analysis.

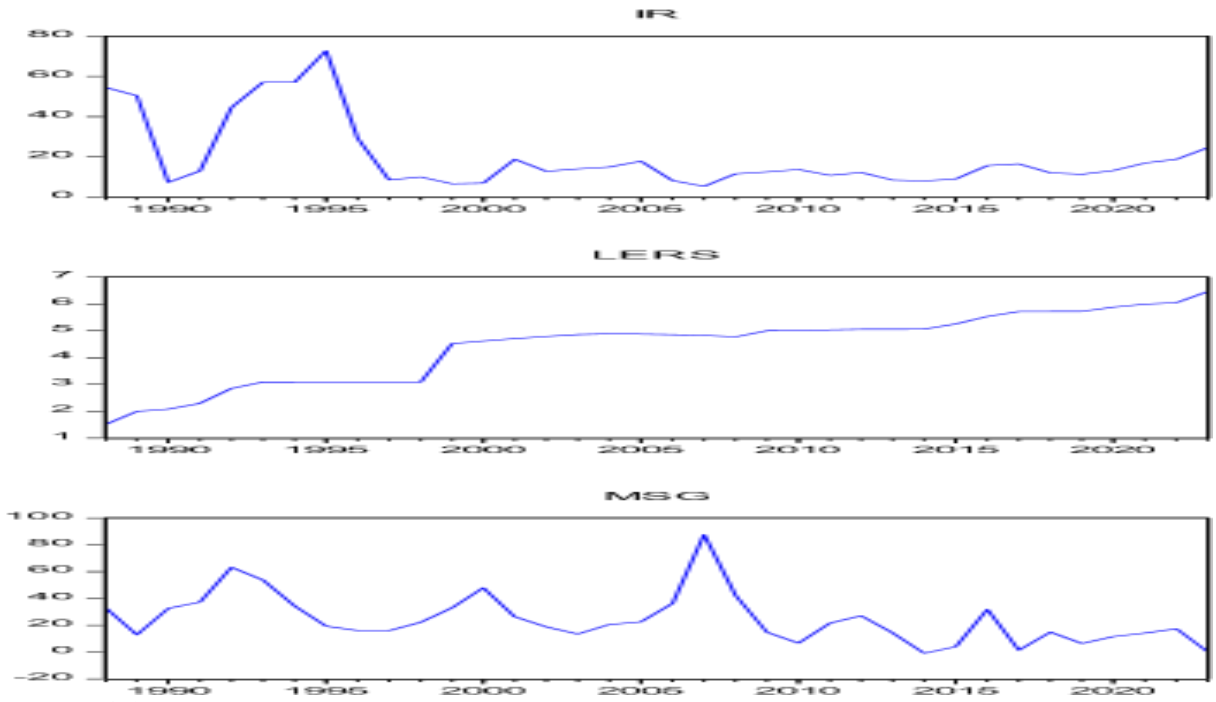


**Figure 4.1: Trend In Variables**
Source: Author's Compilation, (2025).

From the figure 4.1, the LERS line shows high instability at the beginning, followed by reduced fluctuations and relative stability in later periods which suggests that the exchange rate experienced instability in earlier years possibly due to policy changes, currency crises, or external shocks. LERS improved, indicating greater exchange rate control or market stabilisation through interventions or reforms. The final slight uptick suggests a modest return to minor fluctuations. IR on the other hand, shows that there's a steady upward trend with a few plateaus meaning inflation has been rising over time, with brief periods of stability. The trend implies persistent inflationary pressures, possibly from monetary expansion, structural inefficiencies, or global price shocks. The step-like patterns suggest periods of inflation targeting or intervention before subsequent increases. However, MSG is dynamic, with sharp rises and falls, though the overall range narrows slightly over time this reflects inconsistent monetary policy or reactive central banking, where money supply responds rapidly to inflation, exchange rate movements, or fiscal deficits. The high fluctuations suggests lack of policy consistency or external constraints on monetary control.

**Table 4.1: Descriptive Statistics**

| CHARACTERISTICS | LERS | IR | MSG |
|---|---|---|---|
| **Mean** | 4.433834 | 20.17865 | 24.35798 |
| **Std. Dev.** | 1.305409 | 17.37302 | 18.39149 |
| **Skewness** | -0.664903 | 1.688189 | 1.365181 |
| **Kurtosis** | 2.340310 | 4.608459 | 5.445743 |
| **Jarque-Bera** | 3.305363 | 20.98061 | 20.15480 |
| **Probability** | 0.191536 | 0.000028 | 0.000042 |
| **Observations** | 36 | 36 | 36 |

Source: Author's Compilation, (2025).

Table 4.1 highlights key descriptive statistics for the variables. Money supply growth (MSG) exhibits the highest mean value (24.35), followed by Inflation Rate (IR; 20.17), while exchange rate stability (LERS) shows the lowest mean (4.43). Standard deviation values, reflecting data dispersion around the mean, are highest for MSG (18.39) and IR (17.37), indicating greater variability, whereas LERS demonstrates minimal spread (1.30). Skewness measures reveal asymmetric distributions: IR and MSG are positively skewed (right-tailed), concentrating data mass on the left, while LERS is negatively skewed (−0.665), signifying a left-tailed distribution. All variables display positive kurtosis (>3), suggesting leptokurtic distributions characterised by sharp peaks and heavy tails, which implies a higher likelihood of outliers compared to a normal distribution.

**Table 4.2: Unit Root Test**

| VARIABLES | LEVELS | | FIRST DIFFERENCE | | ORDER OF INTEGRATION |
|---|---|---|---|---|---|
| | t-STAT | ADF Critical Value | t- STAT | ADF Critical Value | |
| **LERS** | - | - | -2.9511 | -5.6518** | I(1) |
| **IR** | - | - | -2.9511 | -5.1102** | I(1) |
| **MSG** | -2.9484 | -3.2313 | - | - | I(0) |

Source: Author's Compilation, (2025).

Unit root tests at a 5% significance level in Table 4.2, demonstrates that LERS and inflation rate (IR) became stationary after first differencing, indicating integration of order one [I(1)]. Conversely, money supply growth (MSG) exhibited stationarity at its original level, classified as integrated of order zero [I(0)].

**Table 4.3: Correlation Matrix for variable in Model**

| | IR | LERS | MSG |
|---|---|---|---|
| **IR** | 1.000000 | -0.540776 | 0.138034 |
| **LERS** | -0.540776 | 1.000000 | -0.357286 |
| **MSG** | 0.138034 | -0.357286 | 1.000000 |

Source: Author's Compilation, (2025).

Looking at table 4.3, IR and LERS (-0.5408) have negative and moderate correlation which suggests that as inflation increases, exchange rate stability tends to worsen (log value decreases), and vice versa. This indicates an inverse relationship, consistent with economic theory. IR and MSG (0.1380) have weak positive correlation which implies a slight tendency for inflation to rise with money supply growth, though the relationship is not strong. LERS and MSG (-0.3573) have moderate negative correlation which indicates that increased money supply growth is associated with reduced exchange rate stability.

**Table 4.4: Granger Causality**

| **Null Hypothesis:** | **F-Statistic** | **Prob.** |
|---|---|---|
| IR does not Granger Cause LERS | 4.98432 | 0.0138 |
| LERS does not Granger Cause MSG | 3.55031 | 0.0418 |

Source: Author's Compilation, (2025).

From the table 4.4, the first row shows that F-statistic is 4.9843 and p-value is 0.0138. Since the p-value is less than 0.05, we reject the null hypothesis. Therefore, Inflation Rate (IR) Granger-causes Exchange Rate Stability (LERS) which means that past values of inflation contain useful information for predicting current exchange rate stability. The second row shows that F-statistic is 3.5503 and p-value is 0.0418. The p-value is also less than 0.05, so we reject the null hypothesis. Therefore, Exchange Rate Stability (LERS) Granger-causes Money Supply Growth (MSG) which means that past values of exchange rate stability help predict future values of money supply growth.

**Table 4.5: Optimal Lag Length Criteria**

| **Lag** | **LogL** | **LR** | **FPE** | **AIC** | **SC** | **HQ** |
|---|---|---|---|---|---|---|
| 1 | -256.7968 | 115.6390* | 2393.894* | 16.29071* | 16.83490* | 16.47382* |

Source: Author's Compilation, (2025).

Looking at table 4.5, the Akaike Information Criterion (AIC) was selected to determine the optimal lag length for the time series model because AIC at Lag 1 is 16.29071* which indicates that lag 1 has the lowest AIC value among all considered lags and a lower AIC means a betterfitting model with fewer parameters.

**Table 4.6: ARDL Bound test estimates for variables LERS, IR and MSG**

| **Test Statistic** | Value | Signif. | I(0) | I(1) |
|---|---|---|---|---|
| | | | Asymptotic: n=1000 | |
| **F-statistic** | 2.063144 | 10% | 3.17 | 4.14 |
| **k** | 2 | 5% | 3.79 | 4.85 |
| | | 2.5% | 4.41 | 5.52 |
| | | 1% | 5.15 | 6.36 |

Source: Author's Compilation, (2025).

The bound test cointegrating is used to check the long-run relationship that exists between all the variables in the model. From the result presented on table 4.6, the F-statistic (2.063144) at 5% which is 3.79 fails to reject hypotheses because it is less integration I(0) and this means that there is no evidence of a long-run cointegration (levels) relationship between all variables in the model.

**Table 4.7: ARDL estimates for Variables**

| | | | |
|---|---|---|---|
| **R-squared** | 0.960913 | **Mean dependent var** | 4.517308 |
| **Adjusted R-squared** | 0.955702 | **S.D. dependent var** | 1.223108 |
| **S.E. of regression** | 0.257429 | **Akaike info criterion** | 0.255418 |
| **Sum squared resid** | 1.988091 | **Schwarz criterion** | 0.477611 |
| **Log likelihood** | 0.530182 | **Hannan-Quinn criter.** | 0.332119 |
| **F-statistic** | 184.3816 | **Durbin-Watson stat** | 2.205067 |
| **Prob(F-statistic)** | 0.000000 | | |

Source: Author's Compilation, (2025).

From table 4.7, the R-squared is 0.9609 which means the model explains about 96.1% of the variation in the dependent variable. This is very high, suggesting a strong fit. The Adjusted Rsquared on the other hand is 0.9557 which means that the adjusted for the number of predictors is still very high, confirming the model's strength even after penalising for extra variables. The Standard Error of Regression (S.E.) which is 0.2574 indicates that the typical error in prediction is relatively small. The Akaike Info Criterion (AIC), Schwarz Criterion (SC), Hannan-Quinn Criterion (HQ) which are 0.2554**,** 0.4776 and 0.3321 respectively, help in model comparison where lower values suggest a better model is useful when comparing multiple ARDL specifications. The F-statistic is 184.3816 and Prob(F-statistic) is 0.0000 reveals that the overall model is statistically significant that means the joint impact of all explanatory variables is not zero. Durbin-Watson (DW) which is 2.2051 shows that this value is close to 2, suggesting no significant autocorrelation in the residuals which is a desirable feature in time series models. This shows that the ARDL model is well-specified, statistically significant, and has a very good fit.

**Table 4.8: Error Correction Form**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| CointEq(-1)* | -0.1165 | 0.0453 | -2.5694 | 0.0154 |

Source: Author's Compilation, (2025).

As seen in table 4.8, the negative sign in the coefficient is expected and confirms that the model is stable and adjusts back toward its equilibrium. The absolute value 0.1165 suggests that about 11.65% of the disequilibrium from the previous period is corrected in the current period. In other words, it will take about 8.6 periods if 1 is divided by 0.1165 to fully return to equilibrium after a shock. The p-Value 0.0154 is less than 5% reflecting high significance at 5% level and the t-statistic -2.5694 which is the high absolute value, further confirms strong statistical significance.

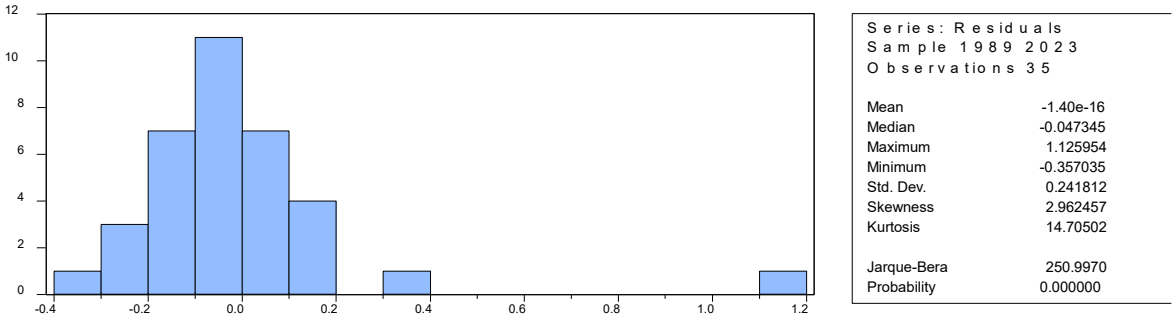


Figure 4.2: Histogram – Normality Graph
Source: Author's Compilation, (2025).

From figure 4.2, the skewness (2.96) shows positive and significantly > 0 which indicates the distribution is right-skewed (longer tail on the right) which suggests that large positive residuals are more frequent than expected in a normal distribution. The kurtosis (14.71) which is far greater than the normal value of 3 and indicates leptokurtosis (a distribution with heavy tails) implying that there are more extreme values (outliers) than a normal distribution. JarqueBera Statistic (250.9970), p-value (0.000000) shows that residuals are not normally distributed so the null hypothesis is rejected.

**Table 4.9: Breusch-Godfrey Serial Correlation LM Test**

| **Breusch-Godfrey Serial Correlation LM Test:** | | | |
|---|---|---|---|
| **F-statistic** | 0.998234 | Prob. F(2,28) | 0.3813 |
| **Obs*R-squared** | 2.329486 | Prob. Chi-Square(2) | 0.3120 |

Source: Author's Compilation, (2025).
Looking at table 4.9, the F-statistic p-value (0.998234), F-test (0.3813) and Chi-square (0.3120) are greater than 5%, it means that we fail to reject the null hypothesis, implying no serial correlation in the residuals.

**Table 4.10: Breusch-Pagan-Godfrey Heteroskedasticity Test**

| **Heteroskedasticity Test: Breusch-Pagan-Godfrey** | | | |
|---|---|---|---|
| **F-statistic** | 1.076265 | Prob. F(4,30) | 0.3857 |
| **Obs*R-squared** | 4.392270 | Prob. Chi-Square(4) | 0.3555 |
| **Scaled explained SS** | 22.11288 | Prob. Chi-Square(4) | 0.0002 |

Source: Author's Compilation, (2025).

As shown in Table 4.10, the Breusch-Pagan-Godfrey test confirms homoskedasticity, implying constant residual variance across the model. With all p-values exceeding the 5% significance threshold, the null hypothesis ($H_0$) of homoskedasticity cannot be rejected. This indicates no statistical evidence of heteroskedasticity, validating the assumption of stable residual variance. Consequently, the reliability of standard errors and hypothesis test outcomes in the model is upheld, ensuring robust statistical inferences.

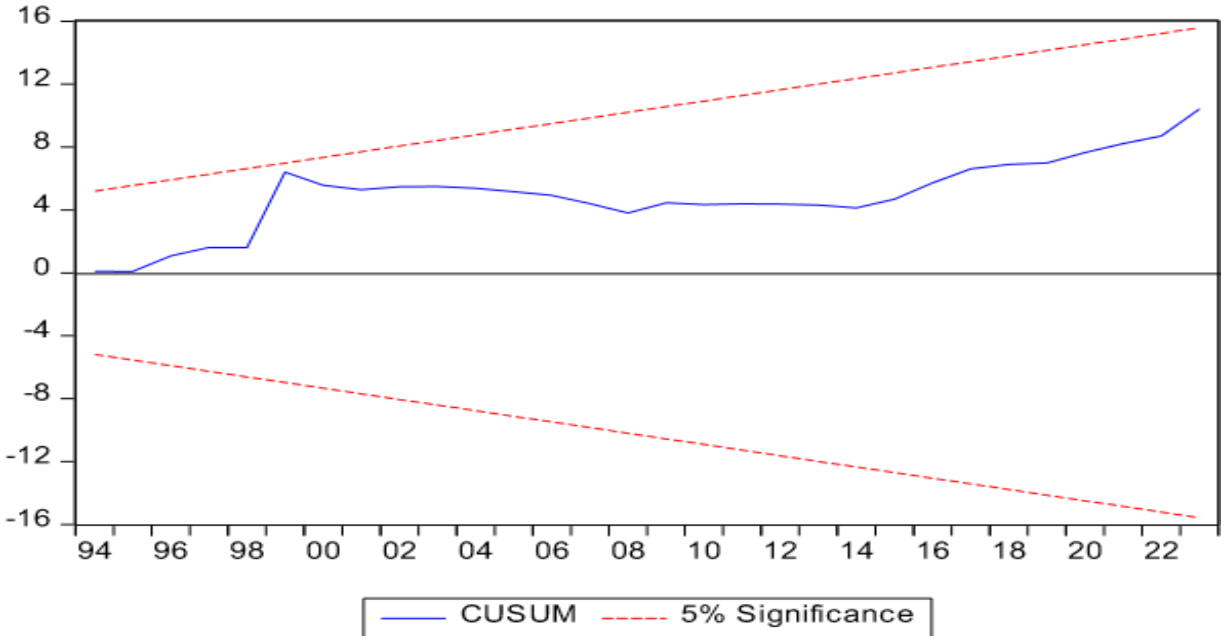


Figure 4.3: CUSUM Graph
Source: Author's Compilation, (2025).

Since the CUSUM line on figure 4.3 remains within the 5% significance bounds throughout the sample period, it means that the regression model is structurally stable, there is no evidence of structural breaks or parameter instability in the model and the estimated relationships among variables are consistent over time.

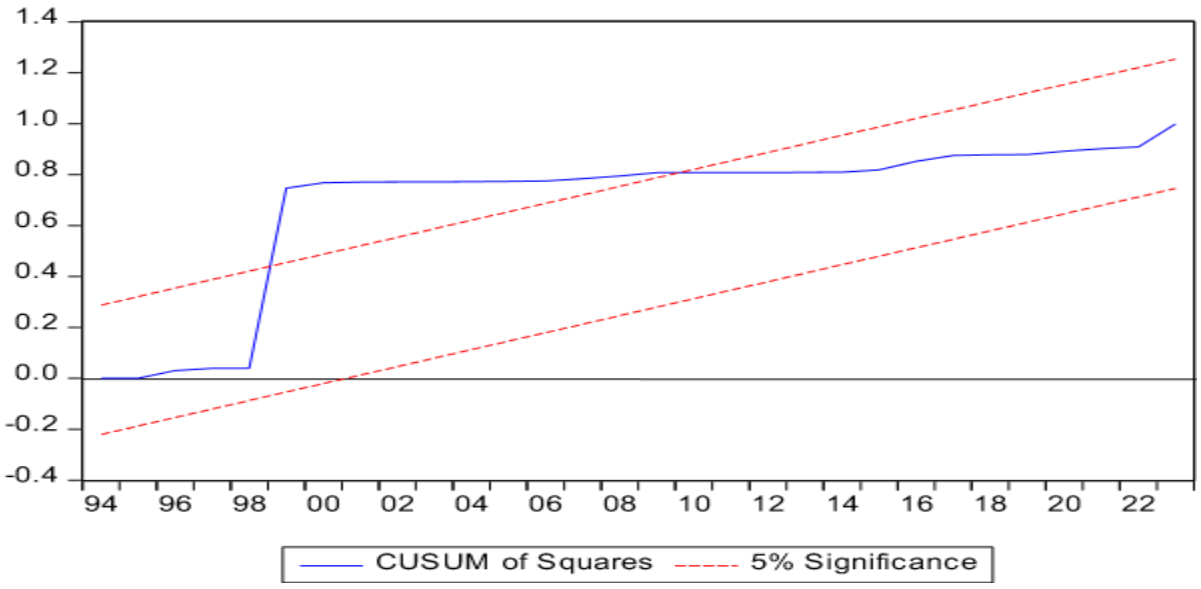


Figure 4.4: CUSUM of Squares Graph
Source: Author's Compilation, (2025).

From figure 4.4, the CUSUMSQ line does not cross the red lines, we fail to reject the null hypothesis of parameter stability meaning that there is no structural break or instability in the

variance of the residuals over the sample period. The model's parameters appear to be stable and consistent from 1989 to 2023.

## DISCUSSIONS OF FINDINGS

The findings of this study reveal important dynamics between inflation, money supply growth and exchange rate stability in Nigeria. Specifically, the Granger causality test shows that inflation significantly predicts exchange rate stability, aligning with Akanni and Adegbite (2022), who found that inflationary pressures undermine currency stability in developing economies. The result also indicates that exchange rate stability Granger-causes money supply growth, suggesting that monetary authorities respond to exchange rate fluctuations which is a pattern consistent with findings by Olayemi and Nwachukwu (2023), who reported reactive monetary policies in fluctuating exchange rate regimes. The absence of a long-run cointegrating relationship among the variables supports the findings of Musa and Lawal (2024), who concluded that inflation, exchange rate, and money supply interactions in Nigeria are primarily short-run in nature. Despite the lack of long-run association, the ARDL model is robust, with over 96% explanatory power and stable parameters confirmed by CUSUM tests. This reinforces the conclusion of Okafor and Ibe (2025) that short-term adjustments, rather than long-run convergence, drive macroeconomic policy effectiveness in Nigeria. These findings underline the importance of coordinated short-term policy interventions rather than long-term assumptions in managing inflation and exchange rate fluctuations.

## CONCLUSION AND RECOMMENDATIONS

This study examined the dynamic interactions among exchange rate stability (LERS), inflation rate (IR), and money supply growth (MSG) in Nigeria using ARDL and Granger causality approaches. Key findings reveal bidirectional causal relationships: IR Granger-causes LERS, indicating inflationary pressures undermine exchange rate stability, while LERS Grangercauses MSG, suggesting monetary policy reacts to exchange rate fluctuations. Despite a high model fit ($R^2 = 0.96$), the absence of long-run cointegration implies these relationships are transient, contrasting with broader regional studies but underscoring Nigeria's unique policy environment. The error correction term (-0.1165) highlights a sluggish adjustment to equilibrium, reflecting structural inefficiencies. Diagnostic tests confirm model robustness, with stable parameters and homoskedastic residuals. The findings emphasise Nigeria's vulnerability to short-term inflationary shocks and reactive monetary dynamics. Policymakers should prioritise proactive inflation targeting and exchange rate management to mitigate fluctuations. These insights contribute to understanding Nigeria's macroeconomic landscape, advocating for reforms to enhance monetary policy consistency and long-term stability.
The following recommendations are inferred from the conclusion;

i. There is a need for implementation of proactive inflation targeting frameworks anchored on forward-looking indicators such as core inflation and inflation expectations. Strengthen monetary policy tools to curb supply-side drivers of inflation, including agricultural subsidies to reduce food price volatility and infrastructure investments to ease production bottlenecks.

ii. Adopting a rules-based approach to monetary policy to reduce reactive adjustments to exchange rate fluctuations. Enhancing coordination between fiscal and monetary authorities to align money supply growth with long-term economic stability goals, avoiding short-term expansions driven by exchange rate pressures. This includes transparent communication strategies to manage market expectations and mitigate speculative behaviors.

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