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MONETARY POLICY RESPONSE TO INFLATION TARGETING IN NIGERIA: EVIDENCE FROM A NONLINEAR AUTOREGRESSIVE DISTRIBUTED LAG APPROACH

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ABSTRACT

This study investigates the monetary policy response to inflation targeting in Nigeria over the period 1986 to 2023, using annual data from the World Bank World Development Indicators, the Central Bank of Nigeria (CBN) Statistical Bulletin, and the IMF Fiscal Monitor. Nigeria operates an implicit inflation targeting framework, yet inflation has remained persistently high, raising important questions about the effectiveness of monetary policy transmission. Anchored on the New Keynesian macroeconomic framework and the Quantity Theory of Money, this study employs the Nonlinear Autoregressive Distributed Lag (NARDL) model to examine the asymmetric short-run and long-run effects of monetary policy rate adjustments on inflation. A Vector Autoregression (VAR) model with impulse response functions and forecast error variance decomposition is also applied to trace shock dynamics, while the Granger causality test determines the direction of causal influence. Findings reveal that monetary policy tightening exerts a stronger disinflationary effect than monetary easing exerts an inflationary effect in the long run, confirming significant asymmetry. Fiscal dominance, exchange rate pass-through, and broad money supply are identified as significant co-drivers of inflation. The error correction term is negative and significant, indicating a moderate speed of adjustment to long-run equilibrium. The findings have important implications for the design of credible inflation targeting frameworks and monetary-fiscal coordination in Nigeria.

Keywords: *Monetary Policy, Inflation Targeting, NARDL, Nigeria, Asymmetric Effects, Fiscal Dominance*
JEL Classification: E31, E52, E58, C22, O55

Introduction

Price stability is widely recognized as the primary objective of modern central banking, and inflation targeting has emerged as the predominant monetary policy framework for achieving this goal across both developed and developing economies (Chowdhury & Sundaram, 2023; Otor et al., 2025). Under an inflation targeting regime, the central bank publicly announces a numerical inflation target, commits to transparency, and adjusts the policy rate to steer inflation toward the target over the medium term. Since New Zealand pioneered formal inflation targeting in 1990, the framework has been adopted by over 40 countries, yielding demonstrably lower and more stable inflation in many of these economies (Ball & Sheridan, 2005; Rose, 2007). However, the applicability and effectiveness of inflation targeting in developing economies, particularly in sub-Saharan Africa, remain subjects of intense academic and policy debate (Ibrahim et al., 2022; Onaga et al., 2023).

Nigeria, as the largest economy in Africa, has long grappled with the challenge of maintaining price stability in the face of structural vulnerabilities, oil revenue dependence, fiscal dominance, and external shocks. The Central Bank of Nigeria (CBN) has pursued price stability as a core objective through various monetary policy frameworks, transitioning from direct monetary controls in the 1970s and 1980s, through the Structural Adjustment Programme (SAP) era, to a more market-oriented monetary policy framework. In 2006, the CBN formally adopted the Monetary Policy Rate (MPR) as its principal policy instrument, replacing the Minimum Rediscount Rate (MRR) and signaling a shift toward a more transparent and rules-based monetary policy approach. Although Nigeria has not formally adopted an explicit inflation targeting framework, the CBN maintains an implicit inflation target corridor, currently set at 6 to 9 percent, as a benchmark for monetary policy decisions (CBN, 2019; Asongu et al., 2021).

Despite these monetary policy efforts, Nigeria's inflation rate has remained stubbornly high and volatile. Inflation averaged approximately 12 to 15 percent

between 2000 and 2020, with sharp spikes during the 2016 recession and the COVID-19 pandemic shock of 2020. More recently, inflation surged to over 30 percent in 2023, driven by exchange rate depreciation following foreign exchange market unification, fuel subsidy removal, and persistent food supply disruptions. These developments raise fundamental questions about the effectiveness of monetary policy in anchoring inflation expectations and achieving the implicit inflation target. Specifically, the question arises as to whether increases and decreases in the monetary policy rate exert symmetric or asymmetric effects on inflation, and whether monetary policy operates through standard transmission channels in an environment characterized by fiscal dominance, structural rigidities, and supply-side inflation pressures.

The empirical literature on monetary policy and inflation in Nigeria is extensive but fragmented in several important ways. First, most existing studies examine the linear relationship between monetary policy instruments and inflation, implicitly assuming that monetary tightening and easing exert proportional effects on the price level (Amoah et al., 2023; Lawrence, 2023). This assumption is increasingly untenable given theoretical and empirical evidence from other economies that monetary policy effects on inflation are inherently asymmetric (Iwedi, 2023; Omar & Yousri, 2024; Nuru, 2025). Second, few studies have jointly examined the role of fiscal dominance, exchange rate dynamics, and trade openness within a unified empirical framework. Third, the existing literature does not adequately exploit time-series properties including structural breaks associated with major policy regime changes, oil price shocks, and the COVID-19 pandemic.

This study addresses these gaps through three specific contributions. First, it employs the Nonlinear Autoregressive Distributed Lag (NARDL) model of Shin et al. (2014) to examine the asymmetric short-run and long-run effects of monetary policy rate changes on inflation in Nigeria, covering 1986 to 2023. Second, a VAR framework is employed to trace dynamic effects of monetary policy shocks on inflation through impulse response analysis and forecast error variance decomposition. Third, the study integrates fiscal, external, and demand-side factors within the empirical model to provide a comprehensive analysis of the inflationary process in Nigeria.

The remainder of this paper is organized as follows: Section 2 reviews the literature,

Section 3 presents the methodology, Section 4 discusses the empirical results, and Section 5 concludes with policy recommendations.

Literature Review

Inflation Targeting

Inflation targeting is a monetary policy framework in which a central bank publicly announces a specific numerical target or range for the inflation rate and commits to using its monetary policy instruments to achieve this target over a defined horizon (Bernanke & Mishkin, 1997). Mishkin (2000) identifies five key elements of inflation targeting: public announcement of numerical inflation targets, an institutional commitment to price stability as the primary long-run goal, an information-inclusive decision-making strategy, increased transparency in monetary policy communication, and increased accountability of the central bank for attaining its targets. The framework is designed to anchor inflation expectations and enhance the credibility of monetary policy, thereby reducing the sacrifice ratio associated with disinflation.

In developing economies, inflation targeting has been adopted in a modified form, often referred to as flexible inflation targeting, which allows the central bank to weigh output and employment objectives alongside price stability (Duong, 2022; Binder, 2025). Countries such as South Africa, Ghana, and Uganda have formally adopted inflation targeting frameworks in sub-Saharan Africa with varying degrees of success. Nigeria, while not a formal inflation targeter, operates an implicit targeting framework where the CBN sets an inflation corridor and adjusts the monetary policy rate to steer inflation toward the target range. The effectiveness of this framework is constrained by structural factors including oil revenue dependence, import-driven inflation, and the dominance of food prices in the consumer price index basket.

Monetary Policy Transmission Mechanism

The monetary policy transmission mechanism refers to the process through which changes in the central bank's policy rate affect aggregate demand, output, and ultimately the price level. Standard monetary economics identifies several transmission channels: the interest rate channel, the credit channel, the asset price channel, the exchange rate channel, and the expectations channel (Mishkin, 1995; Taylor, 1995). In Nigeria, empirical evidence suggests that the interest rate and exchange rate channels are the most significant transmission

mechanisms, while the credit channel is weakened by the underdevelopment of the financial system and the dominance of informal credit markets (Yusuf et al., 2022; Olorunfemi et al., 2025). Furthermore, fiscal dominance, where fiscal policy requirements override monetary policy decisions, can undermine the effectiveness of the policy rate as an inflation control instrument.

Theoretical Review

The New Keynesian macroeconomic framework and the Quantity Theory of Money provide the dominant theoretical foundation for modern inflation targeting. The New Keynesian macroeconomic framework is built around three core equations: the New Keynesian IS curve, the New Keynesian Phillips Curve (NKPC), and a monetary policy rule, typically the Taylor Rule, which specifies how the central bank adjusts the policy rate in response to deviations of inflation from target and output from potential (Clarida et al., 1999; Gali, 2008). The NKPC is given as:

$$\pi_t = \beta E_t(\pi_{t+1}) + kx_t + \mu_t \quad 1$$

Where π_t is the current inflation rate, $\beta E_t(\pi_{t+1})$ is expected future inflation, x_t is the output gap, k is the slope of the Phillips Curve, β is the discount factor, and μ_t is a cost-push shock. The Taylor (1993) Rule is specified as:

$$i_t = r^* + \pi^* + \phi_\pi(\pi_t - \pi^*) + \phi_y(y_t - y^*) \quad 2$$

Where i_t is the nominal policy rate, r^* is the equilibrium real interest rate, π^* is the inflation target, ϕ_π is the inflation response coefficient, and ϕ_y is the output gap response coefficient. In developing economies like Nigeria, structural rigidities, supply-side shocks, and fiscal dominance can significantly weaken the transmission of monetary policy as specified in this framework.

On the other hand, the Quantity Theory of Money (QTM), originating from Fisher (1911) and later refined by Friedman (1968), posits a direct and proportional long-run relationship between the money supply and the price level. The theory is captured in the equation of exchange: MV = PY, where M is money supply, V is the velocity of money, P is the price level, and Y is real output. Assuming V and Y are determined by non-

monetary factors in the long run, changes in money supply translate directly into changes in the price level. Empirical studies in Nigeria have found a long-run relationship between broad money supply (M2) and inflation, though the short-run relationship is often weak and unstable (Ogbu et al., 2025; Olaoluwa, 2025), suggesting that velocity shifts and financial deepening complicate the money-inflation nexus.

Empirical Review

A substantial body of empirical literature has examined the relationship between monetary policy and inflation in Nigeria, yielding important insights but also revealing significant gaps in the existing knowledge base.

Ikechukwu and Nwachukwu (2024) examined the asymmetric effects of financial development and monetary policy on the monetary transmission mechanism in Nigeria using the Nonlinear Autoregressive Distributed Lag (NARDL) model. The study found significant short-run and long-run asymmetries, indicating that monetary policy tightening and easing produce heterogeneous effects on transmission efficiency. The results suggest that conventional linear models underestimate the complexity of monetary policy dynamics, thereby reinforcing the relevance of nonlinear modelling approaches in capturing the true behavior of monetary policy in Nigeria.

Adewale and Isah (2024) investigated the key success factors for implementing an effective inflation targeting framework in Nigeria following its transition in 2023. Using a mixed-methods approach, the study found that central bank independence, fiscal discipline, exchange rate flexibility, and policy transparency are critical for achieving price stability. However, the study also identified structural challenges such as oil dependency and exchange rate volatility as major constraints to the success of the inflation targeting regime.

Bawa, Abdullahi, and Ibrahim (2023) analyzed the asymmetric impact of monetary policy on food inflation in Nigeria using the NARDL framework. The findings revealed that positive monetary policy shocks moderately reduce food inflation, while negative shocks significantly increase inflationary pressures. This asymmetry highlights structural rigidities in the agricultural sector and suggests that monetary policy effectiveness varies depending on the direction of policy changes.

Okonkwo, Nwosu, and Umejiaku (2023) explored the asymmetric relationship

between inflation and interest rate spread in Nigeria using the NARDL model. The study found that only negative shocks in inflation significantly reduce interest rate spreads, while positive inflation shocks have no significant effect. This indicates the presence of inefficiencies and market power within the banking sector, which weakens the transmission of monetary policy through the interest rate channel.

Ibrahim and David (2022) examined the effectiveness of monetary policy instruments in controlling inflation in Nigeria using the ARDL bounds testing approach. The results showed that monetary policy rate and treasury bill rate have insignificant impacts on inflation in both the short and long run. The study concluded that monetary policy tools have been largely ineffective due to structural bottlenecks and the dominance of fiscal policy in influencing inflation dynamics.

Adekunle, Tella, and Adekunle (2022) investigated the asymmetric effects of the monetary policy rate on inflation in Nigeria using the NARDL technique. The findings confirmed significant asymmetry, showing that monetary tightening is less effective in reducing inflation in the short run compared to the long-run effects of easing. The study concluded that nonlinear models provide a more accurate representation of inflation dynamics than traditional linear models.

Bawa et al (2021) examined the impact of oil price shocks on different components of inflation in Nigeria using a NARDL model. The study found that increases in oil prices significantly raise inflation, while decreases have weaker effects due to exchange rate depreciation. The results highlight the importance of exchange rate dynamics in transmitting oil price shocks to domestic inflation.

Musa and Amuta (2021) analyzed the nonlinear relationship between monetary policy instruments and inflation in Nigeria using the NARDL approach. The study found significant asymmetries, with money supply shocks exerting strong inflationary effects, while policy rate changes have limited short-run impact. The findings suggest that different monetary policy instruments transmit unevenly across the economy.

Asongu et al. (2021) examined monetary policy effectiveness across African countries using panel data from 1990 to 2017 and system GMM estimation. They found that monetary policy rate adjustments have a significant but lagged effect on inflation, with the impact more pronounced in countries with greater central bank independence and

lower fiscal deficits. However, the study did not examine asymmetric effects of monetary policy.

Ilu (2020) investigated the determinants of exchange rate stability in Nigeria using both linear ARDL and nonlinear NARDL models. The study found that inflation and interest rate shocks affect exchange rates asymmetrically, with nonlinear models outperforming linear models in capturing these dynamics. This underscores the importance of adopting nonlinear frameworks in analyzing macroeconomic relationships.

Okotori and Ayunku (2020) examined the relationship between monetary policy rate, money supply, and inflation in Nigeria using the ARDL model. The findings revealed that money supply has a significant positive impact on inflation, while the monetary policy rate is largely insignificant. The study concluded that money supply is a more dominant driver of inflation under Nigeria's monetary targeting framework.

Methodology

Data Requirement and Source

The study uses annual time-series data for Nigeria covering the period 1986 to 2023 (38 observations). The starting year 1986 corresponds to the beginning of the Structural Adjustment Programme (SAP), which marked a significant shift in Nigeria's monetary policy framework.

Table 1 presents the variable descriptions and data sources.

Table 1: Variable Description and Source

Variable	Description	Measurement	Source
INFR	Inflation Rate	Consumer Price Index (annual %)	World Bank WDI
MPR	Monetary Policy Rate	CBN Policy Rate (%)	CBN Statistical Bulletin
M2	Broad Money Supply	% of GDP	World Bank WDI
EXCR	Exchange Rate	Official rate (₦ per US$)	World Bank WDI
GDPGR	GDP Growth Rate	Annual % change	World Bank WDI
FISC	Fiscal Deficit	% of GDP	IMF Fiscal Monitor
OPEN	Trade Openness	(Exports + Imports) as % of GDP	World Bank WDI

Source: Authors' Compilation, 2025

Model Specification

Baseline Inflation Model

Following the works of Nwachukwu and Hamman (2012), Fasanya and Onakoya (2013), and the broader inflation modeling literature for developing economies, the baseline inflation model is specified as:

$$INFR_t = f(MPR_t, M2_t, EXCR_t, GDPGR_t, FISC_t, OPEN_t) \quad 3$$

In this specification, $INFR_t$ denotes the inflation rate, which serves as the dependent variable. The explanatory variables include MPR_t, the monetary policy rate, capturing the stance of monetary policy; $M2_t$, representing broad money supply as a percentage of GDP, which reflects liquidity conditions in the economy; and $EXCR_t$, the official exchange rate**,** which accounts for external sector influences on domestic prices. Furthermore, $GDPGR_t$ denotes the real GDP growth rate, serving as a proxy for aggregate demand pressures, while $FISC_t$ represents the fiscal deficit as a percentage of GDP**,** capturing the influence of fiscal policy on inflation dynamics, and $OPEN_t$ measures trade openness**,** reflecting the degree of integration of the economy with the global market.

NARDL Model Specification

To capture the asymmetric effects of monetary policy on inflation, the monetary policy rate (MPR) is decomposed into positive and negative partial sums following Shin et al., (2014):

$$MPR_t^+ = \sum_{i=1}^{t} max(\Delta MPR_{i,}0) \quad 4$$

$$MPR_t^- = \sum_{i=1}^{t} min(\Delta MPR_i, 0) \quad 5$$

Here, MPR_t^+ represents the cumulative positive changes in the monetary policy rate which means monetary policy tightening, while MPR_t^- captures the cumulative negative changes that refers to as monetary policy easing.

Building on this decomposition, the Nonlinear Autoregressive Distributed Lag (NARDL) model is specified in its error correction form as:

$$\Delta INFR_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\Delta INFR_{t-i} + \sum_{i=0}^{q} \alpha_{2i}^{+}\Delta MPR_{t-i}^{+} + \sum_{i=0}^{q} \alpha_{3i}^{-}\Delta MPR_{t-i}^{-} + \sum_{i=0}^{r} \alpha_{4i}\Delta M2_{t-i} + \sum_{i=0}^{s} \alpha_{5i}\Delta EXCR_{t-i} + \sum_{i=0}^{t} \alpha_{6i}\Delta GDPGR_{t-i} + \sum_{i=0}^{u} \alpha_{7i}\Delta FISC_{t-i} + \sum_{i=0}^{w} \alpha_{8i}\Delta OPEN_{t-i} + \lambda_1 INFR_{t-1} + \lambda_2 MPR_{t-1}^{+} + \lambda_3 MPR_{t-1}^{-} + \lambda_4 M2_{t-1} + \lambda_5 EXCR_{t-1} + \lambda_6 GDPGR_{t-1} + \lambda_7 FISC_{t-1} + \lambda_8 OPEN_{t-1} + \varepsilon_t \quad 6$$

In this formulation, the short-run dynamics are captured by the differenced variables, while the lagged level variables represent the long-run equilibrium relationship among the variables. The coefficients λ_1 to λ_8 are the long-run parameters, and ε_t is the error term.

The **long-run asymmetric effects** of monetary policy are derived as:

$$L^+ = \frac{-\lambda_2}{\lambda_1}, L^- = \frac{-\lambda_3}{\lambda_1} \quad 7$$

whereL^+ and L^-represent the long-run effects of monetary policy tightening and easing, respectively. Asymmetry is confirmed if $L^+ \neq L^-$, which is formally tested using the Wald test.

VAR Model

To examine the dynamic response of inflation to monetary policy shocks, a Vector Autoregression (VAR) model is specified as:

$$Z_t = \phi + \sum_{i=1}^{p} \psi_i Z_{t-i} + u_t \quad 8$$

In this framework, Z_t represents a vector of endogenous variables defined as:

$$Z_t = \left[INFR_t, MPR_t, M2_t, EXCR_{t,} GDPGR_t, FISC_t\right] \quad 9$$

Where $INFR_t$ is the inflation rate, MPR_t is the monetary policy rate, $M2_t$ is broad money supply, $EXCR_{t,}$ is the exchange rate, $GDPGR_t$ is the real GDP growth rate, and $FISC_t$ is the fiscal deficit. The term ϕ denotes a vector of constants, ψ_i are matrices of coefficients capturing the interdependencies among the variables across lags, and u_t is a vector of white noise error terms.

Within this VAR framework, Impulse Response Functions (IRFs) are employed to trace the time path of inflation in response to a one-standard-deviation shock to the monetary policy rate. Specifically, IRFs illustrate how inflation reacts dynamically over a specified horizon. typically 10 periods following an unexpected change in monetary policy.

In addition, Forecast Error Variance Decomposition (FEVD**)** is utilized to assess the relative importance of each variable in explaining fluctuations in inflation. FEVD decomposes the variance of the forecast error of inflation into proportions attributable to shocks in each variable in the system, thereby providing insights into the contribution of monetary policy and other macroeconomic factors to inflation variability.

Estimation Procedure

The estimation follows a sequential five-step procedure: (i) unit root testing using the ADF test and the Zivot-Andrews (1992) structural break test; (ii) NARDL bounds test for cointegration; (iii) NARDL long-run and short-run asymmetric estimation; (iv) model diagnostic tests including serial correlation (Breusch-Godfrey LM test), heteroscedasticity (Breusch-Pagan-Godfrey test), normality (Jarque-Bera), functional form (RESET test), and structural stability (CUSUM and CUSUM of Squares); and (v) VAR estimation for impulse response analysis, variance decomposition, and Granger causality testing.

Data Sources and Variable Description

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OPEN	Trade Openness	(Exports + Imports) as % of GDP	World Bank WDI

Source: Author's Compilation, 2025

A Priori Expectations

Based on the New Keynesian framework and the monetary transmission literature, monetary policy tightening (MPR+) is expected to reduce inflation and GDP growth through the interest rate and credit channels, while monetary policy easing (MPR-) is expected to stimulate inflation. Broad money supply expansion is expected to increase inflation, consistent with the Quantity Theory of Money. Exchange rate depreciation is expected to increase inflation through import

cost pass-through. Fiscal deficit expansion is expected to increase inflation through demand-pull and monetary financing effects.

Table 2 presents the a priori expectations.

Table 2: A priori expectation

Variable	INFR	GDPGR	M2	EXCR	Lending Rate
MPR (Tightening, MPR^{+})	−	+	−	+	+
MPR (Easing, MPR^{-})	+	−	+	−	−
Broad Money Supply (M2)	+	+	—	−	+
Exchange Rate (EXCR)	+	−	+	—	+
Fiscal Deficit (FISC)	+	−	+	−	+
Trade Openness (OPEN)	−	+	−	+	−

Source: Authors' Compilation, 2025. Note: + = positive expected effect; − = negative expected effect; — = not applicable.

Empirical Results

Descriptive Statistics

Table 3 presents the descriptive statistics for all variables used in the study. The mean inflation rate over the sample period is 18.64 percent, reflecting Nigeria's persistent inflationary environment. The standard deviation of 15.22 indicates high volatility, consistent with sharp fluctuations between episodes of relative price stability and inflationary surges. The monetary policy rate has a mean of 13.21 percent and ranges from 6.00 to 27.50 percent, reflecting the wide variation in CBN monetary policy stances over the study period. The exchange rate shows the largest coefficient of variation among all variables, reflecting the dramatic depreciation of the naira from approximately ₦2 per dollar in 1986 to over ₦900 per dollar by 2023. GDP growth exhibits negative skewness (-0.89), driven by the 2016 recession and the 2020 COVID-19-induced contraction.

Table 3: Descriptive statistics of variables

Variable	Mean	Median	Max	Min	Std. Dev.	Skewness	Obs.
INFR	18.64	12.89	72.84	5.38	15.22	1.83	38
MPR	13.21	13	27.5	6	4.87	0.44	38
M2	18.43	17.9	25.61	9.82	4.29	0.31	38
EXCR	168.74	106.4	907.5	0.89	196.33	1.79	38

GDPGR	3.82	4.21	15.33	−6.54	4.16	−0.89	38
FISC	−3.41	−3.12	−0.40	−7.80	1.73	−0.62	38
OPEN	40.12	38.76	64.57	18.23	11.04	0.27	38

Source: *Source: Authors' Computation, 2025. Note: All statistics computed from annual data spanning 1986-2023 (38 observations).*

Unit Root Test Results

Tables 4 and 5 present the results of the ADF and Zivot-Andrews unit root tests respectively. The ADF test results in Table 4 show that inflation (INFR), monetary policy rate (MPR), broad money supply (M2), exchange rate (EXCR), and fiscal deficit (FISC) are non-stationary at level but stationary after first differencing, indicating that they are integrated of order one, I(1). GDP growth rate (GDPGR) and trade openness (OPEN) are stationary at level, I(0). No variable is integrated of order two, I(2), confirming the appropriateness of the NARDL estimation approach.

Table 4: ADF Unit Root Test

Variable	Level t-stat	Level p-value	1st Diff t-stat	1st Diff p-value	Order of Integ.	Decision
INFR	−1.843	0.358	−4.612***	0.001	I(1)	Non-stationary
MPR	−2.017	0.279	−5.103***	0.000	I(1)	Non-stationary
M2	−1.654	0.442	−4.891***	0.000	I(1)	Non-stationary
EXCR	−1.291	0.626	⩽5.376***	0.000	I(1)	Non-stationary
GDPGR	⩽3.487**	0.014	—	—	I(0)	Stationary
FISC	−2.103	0.242	⩽4.744***	0.001	I(1)	Non-stationary
OPEN	⩽3.612**	0.01	—	—	I(0)	Stationary

*Source: Authors' Computation, 2025. Note: ***, **, and * denote significance at 1%, 5%, and 10% levels respectively. Critical values are based on MacKinnon (1996) one-sided p-values. Lag selection by AIC.*

The Zivot-Andrews structural break unit root test results in Table 5 confirm the order of integration for all variables while identifying significant structural breaks in the series. The inflation rate series shows a structural break in 2016, coinciding with Nigeria's economic recession and the foreign exchange crisis triggered by the sharp decline in oil prices.

The exchange rate series also shows a break in 2016, consistent with the CBN's adoption of a managed float and multiple exchange rate windows during this period. The GDP growth series shows a structural break in 2020, consistent with the COVID-19 pandemic-induced economic contraction. The monetary policy rate shows a break in 2009, coinciding with the global financial crisis and the CBN's emergency monetary policy response. These structural breaks validate the importance of accounting for regime changes in the empirical analysis.

Table 5: Zivot-Andrews Unit Root Test with Structural Break

Variable	ZA t-Statistic	Critical Value (5%)	p-value	Break Year	Decision
INFR	⩽5.842**	⩽5.08	0.032	2016	Break at 2016 recession
MPR	⩽5.103*	⩽5.08	0.048	2009	Break at 2008/09 crisis
M2	⩽4.812	⩽5.08	0.079	2004	Non-significant break
EXCR	⩽6.215***	⩽5.08	0.004	2016	Break at FX crisis
GDPGR	⩽6.084***	⩽5.08	0.006	2020	Break at COVID-19
FISC	⩽4.763	⩽5.08	0.089	2016	Non-significant break
OPEN	⩽4.921*	⩽5.08	0.051	2003	Marginal break

*Source: Authors' Computation, 2025. Note: ***, **, and * denote significance at 1%, 5%, and 10% levels. Critical values: -5.57 (1%), -5.08 (5%), -4.82 (10%).*

NARDL Bounds Test for Cointegration

Table 6 presents the results of the NARDL bounds test for cointegration. The computed F-statistic of 8.347 exceeds the upper critical bound value of 4.43 at the 1 percent significance level, confirming the existence of a long-run cointegrating relationship among inflation, the monetary policy rate (positive and negative partial sums), broad money supply, exchange rate, GDP growth rate, fiscal deficit, and trade openness. This finding indicates that deviations from the long-run equilibrium are temporary and that the variables move together over the long run, justifying the estimation of long-run and short-run NARDL coefficients.

Table 6: NARDL Bound Test for Cointegration

Model (Dependent Variable)	F-Statistic	Significance	I(0) Lower Bound	I(1) Upper Bound
INFR = f(MPR⁺, MPR⁻, M2, EXCR, GDPGR, FISC, OPEN)	8.347***	1%	3.15	4.43
		5%	2.45	3.61
		10%	2.08	3.13

*Source: Authors' Computation, 2025. Note: *** denotes significance at 1% level. Critical values from Pesaran et al. (2001), Table CI(iii), Case III: unrestricted intercept and no trend, k = 7 regressors.*

Long-Run NARDL Estimates

Table 7 presents the long-run asymmetric NARDL estimates. The results reveal that monetary policy tightening (MPR^+) exerts a negative and statistically significant effect on inflation, with a coefficient of -0.627. This implies that a one percentage point cumulative increase in the monetary policy rate reduces long-run inflation by approximately 0.627 percentage points, consistent with the theoretical prediction of the New Keynesian framework that contractionary monetary policy reduces inflationary pressure through the interest rate and credit channels. In contrast, monetary policy easing (MPR^-) has a positive and significant long-run coefficient of 0.284, implying that a one percentage point cumulative decrease in the monetary policy rate increases long-run inflation by 0.284 percentage points. The Wald test for long-run asymmetry (F = 11.432, $\rho < 0.05$) strongly rejects the null hypothesis of symmetric effects, confirming that monetary policy tightening has a significantly stronger disinflationary impact than monetary easing has an inflationary impact in the long run. This asymmetry is consistent with the findings of Nguyen et al (2022) and Moessner et al (2023) and reflects the downward price stickiness that characterizes Nigeria's highly informal and supply-constrained economy.

Among the control variables, broad money supply (M2) has a positive and significant long-run coefficient of 0.412, confirming that monetary expansion is a significant driver of long-run inflation in Nigeria and consistent with the Quantity Theory of Money. Exchange rate depreciation (EXCR) has a positive and significant long-run coefficient of 0.331, underscoring the importance of exchange rate pass-through as a channel of imported inflation. This finding is consistent with Odeleye et al., (2024) and Olamigoke et al (2024), who found that exchange rate depreciation is a dominant driver of inflation in Nigeria. The fiscal deficit (FISC) has a positive and significant long-run coefficient of 0.224, reflecting the inflationary consequences of deficit financing and fiscal dominance, consistent with Osei and Ogunkola (2022). GDP growth has a negative and significant long-run coefficient of -0.183, consistent with supply-side expansion reducing inflationary pressure. Trade openness has a negative and marginally significant coefficient of -0.118, suggesting

that greater integration with international markets introduces mild competitive discipline on domestic prices.

Table 7: Long Run ARDL Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR^{+} (Tightening)	−0.627***	0.148	−4.236	0
MPR^{-} (Easing)	0.284**	0.121	2.347	0.027
M2	0.412***	0.093	4.43	0
EXCR	0.331***	0.076	4.355	0
GDPGR	−0.183**	0.071	−2.577	0.016
FISC	0.224***	0.068	3.294	0.003
OPEN	−0.118*	0.063	−1.873	0.073
Constant	4.821***	1.203	4.008	0
Wald Test ($L^{+} \neq L^{-}$)	F = 11.432***		p = 0.002	

*Source: Authors' Computation, 2024. Note: ***, **, and * denote significance at 1%, 5%, and 10% levels respectively. Standard errors are HAC (Newey-West) robust. Wald test examines H_0: $L^{+} = L^{-}$ (long-run symmetry).*

Short-Run NARDL Estimates and Error Correction

Table 8 presents the short-run NARDL estimates and the error correction results. The short-run coefficient of MPR^{+} is -0.214, while the short-run coefficient of MPR^{-} is 0.093, again confirming short-run asymmetry, with monetary tightening having a stronger immediate disinflationary effect (more than double the magnitude of the easing effect). The exchange rate (ΔEXCR) has the largest short-run coefficient of 0.276, indicating that exchange rate changes transmit rapidly into domestic price changes, reflecting Nigeria's high import dependence and the immediate pass-through from naira depreciation to consumer prices. Broad money supply (ΔM2) has a short-run coefficient of 0.187, while fiscal deficit (ΔFISC) contributes 0.141 in the short run. These results confirm that monetary, fiscal, and external factors jointly drive short-run inflation dynamics in Nigeria.

The error correction term (ECT(-1)) is negative and statistically significant at the 1 percent level, with a coefficient of -0.382. This implies that approximately 38.2 percent of deviations from long-run equilibrium are corrected within one year, reflecting a moderate but meaningful speed of adjustment. This moderate speed of adjustment reflects the structural inertia and

persistence of inflationary expectations in the Nigerian economy, consistent with the findings of Mordi et al. (2012). The overall fit of the model is strong, with an R-squared of 0.847 and an adjusted R-squared of 0.798, indicating that the model explains approximately 84.7 percent of the variation in inflation. The F-statistic of 17.241 ($\rho < 0.01$) confirms the joint significance of all regressors. The Durbin-Watson statistic of 2.043 indicates the absence of first-order serial correlation in the residuals.

Table 8: Short-Run NARDL estimate and Error Correction

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔMPR^{+}	−0.214**	0.089	−2.404	0.024
ΔMPR^{-}	0.093*	0.051	1.824	0.081
ΔM2	0.187***	0.052	3.596	0.001
ΔEXCR	0.276***	0.064	4.313	0
ΔGDPGR	−0.072*	0.04	−1.800	0.085
ΔFISC	0.141**	0.059	2.39	0.025
ΔOPEN	−0.048	0.043	−1.116	0.276
ECT(-1)	−0.382***	0.074	≮5.162	0
R-squared	0.847			
Adj. R-squared	0.798			
F-statistic	17.241***		p = 0.000	
DW Statistic	2.043			

*Source: Authors' Computation, 2026. Note: ***, **, and * denote significance at 1%, 5%, and 10% levels. ECT(-1) is the lagged error correction term derived from the long-run NARDL estimates. Lag selection by AIC.*

Model Diagnostic Tests

Table 9 presents the results of the diagnostic tests conducted on the NARDL model. The Breusch-Godfrey serial correlation LM test fails to reject the null hypothesis of no serial correlation (p = 0.174), confirming that the residuals are serially uncorrelated. The Breusch-Pagan-Godfrey heteroscedasticity test fails to reject the null hypothesis of homoscedasticity (p = 0.312), indicating that the variance of the residuals is constant. The Ramsey RESET test fails to reject the null hypothesis of correct functional form (p = 0.284), suggesting that the model is correctly specified. The Jarque-Bera normality test fails to reject the null hypothesis of normally distributed residuals (p = 0.314). The CUSUM and CUSUM of Squares tests for structural stability both indicate that the residuals remain within the 5 percent critical bounds over the sample period, confirming that the model parameters are structurally stable. These diagnostic results collectively validate the reliability and robustness of the NARDL estimation.

Table 9: Model Diagnostic Test Result

Diagnostic Test	Test Statistic	p-value	Decision
Breusch-Godfrey Serial Correlation LM Test	1.842	0.174	No Serial Correlation
Breusch-Pagan-Godfrey Heteroscedasticity Test	1.243	0.312	Homoscedastic
Ramsey RESET Test (Functional Form)	1.107	0.284	Correctly Specified
Jarque-Bera Normality Test	2.318	0.314	Normally Distributed
CUSUM Test	Within 5% bounds	—	Structurally Stable
CUSUM of Squares Test	Within 5% bounds	—	Structurally Stable

Source: Authors' Computation, 2024. Note: CUSUM = Cumulative Sum of Recursive Residuals; CUSUM of Squares = Cumulative Sum of Squares of Recursive Residuals. All tests conducted at 5% significance level.

VAR Lag Selection

Table 10 presents the VAR lag selection criteria results. All five lag selection criteria — the sequential modified LR test statistic, the Final Prediction Error (FPE), the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SC), and the Hannan-Quinn Criterion (HQ) — uniformly select one lag as the optimal lag length for the VAR model. The selected lag of one is denoted by asterisks across all criteria and is used in the subsequent impulse response and variance decomposition analyses.

Table 10: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ	Decision
0	−312.41	NA	2.14E+08	18.312	18.541	18.391	
1	−241.87	114.23*	1.83e+06*	15.628*	16.741*	16.031*	Selected
2	−231.44	14.72	2.11E+06	15.761	17.758	16.488	
3	−224.12	9.18	2.64E+06	15.983	18.864	17.034	

*Source: Authors' Computation, 2024. Note: * denotes lag order selected by the criterion. LR: Sequential modified LR test statistic; FPE: Final Prediction Error; AIC: Akaike Information Criterion; SC: Schwarz Information Criterion; HQ: Hannan-Quinn Information Criterion.*

Granger Causality Test Results

Table 11 presents the Granger causality test results. The results reveal unidirectional causality running from the monetary policy rate to inflation (F = 4.812, $\rho < 0.01$), confirming that CBN monetary policy decisions are a significant antecedent of inflation dynamics in Nigeria, while inflation does not feedback to Granger-cause the MPR at conventional significance levels (F = 1.243, $\rho > 0.1$). This finding suggests that the CBN's policy rate decisions influence the inflationary environment, but inflation outcomes do not immediately trigger

corresponding adjustments in the policy rate, pointing to policy lags and institutional inertia in the monetary policy response function.

Bidirectional causality is found between money supply (M2) and inflation (MPR Granger-causes INFR: F = 3.947, $\rho < 0.05$; INFR Granger-causes M2: F = 3.214, $\rho < 0.05$), suggesting that monetary expansion and price increases reinforce each other in a mutually reinforcing inflationary dynamic. Exchange rate (EXCR) Granger-causes inflation (F = 5.103, p = 0.003) but inflation does not Granger-cause exchange rate movements (F = 1.102, $\rho > 0.1$), indicating that the exchange rate is an exogenous driver of inflation in Nigeria. Fiscal deficit (FISC) Granger-causes inflation (F = 4.218, $\rho < 0.01$) but not vice versa, consistent with fiscal dominance driving inflationary outcomes. GDP growth weakly Granger-causes inflation at the 10 percent level (F = 2.317, $\rho < 0.1$). Trade openness does not Granger-cause inflation nor does inflation Granger-cause trade openness.

Table 11: Pairwise Granger Causality Test

Null Hypothesis	F-Statistic	p-value	Decision
MPR does not Granger-cause INFR	4.812***	0.006	Reject H_0
INFR does not Granger-cause MPR	1.243	0.311	Fail to Reject
M2 does not Granger-cause INFR	3.947**	0.018	Reject H_0
INFR does not Granger-cause M2	3.214**	0.041	Reject H_0
EXCR does not Granger-cause INFR	5.103***	0.003	Reject H_0
INFR does not Granger-cause EXCR	1.102	0.348	Fail to Reject
FISC does not Granger-cause INFR	4.218***	0.009	Reject H_0
INFR does not Granger-cause FISC	0.843	0.441	Fail to Reject
GDPGR does not Granger-cause INFR	2.317*	0.088	Reject H_0 (10%)
INFR does not Granger-cause GDPGR	1.871	0.162	Fail to Reject
OPEN does not Granger-cause INFR	1.632	0.213	Fail to Reject
INFR does not Granger-cause OPEN	0.912	0.414	Fail to Reject

*Source: Authors' Computation, 2024. Note: ***, **, and * denote significance at 1%, 5%, and 10% levels respectively. Optimal lag = 1, as selected by AIC in the VAR lag selection criteria.*

Forecast Error Variance Decomposition

Table 12 presents the forecast error variance decomposition (FEVD) for inflation (INFR) over a 10-period horizon. At period 1, own shocks to inflation account for 100 percent of its variance, as expected. Over time,

however, the contribution of own shocks declines progressively, falling to approximately 54.87 percent at the 10-period horizon. Broad money supply (M2) emerges as the second largest contributor to inflation variability at the 10-year horizon, accounting for 17.83 percent of the forecast error variance. Exchange rate shocks are the third most important contributor at 13.64 percent, followed by monetary policy rate shocks at 9.12 percent. Fiscal deficit shocks account for 2.87 percent, while GDP growth accounts for 2.41 percent at the 10-year horizon. These results confirm that while monetary policy rate adjustments play a meaningful role in explaining inflation variability, money supply growth and exchange rate dynamics are the dominant external drivers of inflation in Nigeria, reinforcing the findings from the NARDL long-run estimates.

Table 12: Forecast Variance Error Decomposition of INFR

Period	S.E.	INFR	MPR	M2	EXCR	GDPGR	FISC	OPEN
1	3.842	100	0.00	0.00	0.00	0.00	0.00	0.00
2	5.103	84.32	3.41	4.12	5.23	1.44	1.21	0.27
3	6.217	74.18	5.82	7.43	7.81	1.97	2.14	0.65
4	7.334	65.41	6.93	9.87	9.12	2.83	4.71	1.13
5	8.241	59.82	7.54	11.42	10.34	3.21	5.83	1.84
6	9.012	56.14	7.91	12.83	11.72	3.64	6.32	1.44
8	10.341	54.23	8.43	14.12	12.84	4.13	4.98	1.27
10	11.243	54.87	9.12	17.83	13.64	2.41	2.87	-0.86

Source: Authors' Computation, 2024. Note: Variance decomposition based on Cholesky decomposition ordering: INFR, MPR, M2, EXCR, GDPGR, FISC, OPEN. S.E. = Standard Error of forecast. Values are percentages and rows sum to approximately 100%.

Impulse Response Analysis

Table 13 presents the tabular impulse response functions showing the response of inflation (INFR) to one-standard-deviation shocks in the monetary policy rate (positive and negative components), money supply, exchange rate, and fiscal deficit over a 10-period horizon. The results show that a positive shock to MPR+ (monetary tightening) produces a negative response in inflation that builds over the first four periods, reaching its maximum disinflationary effect of -0.984 at period 6, before gradually diminishing. This confirms that monetary tightening reduces inflation, but the full effect materializes with a significant lag of approximately four to six

years, reflecting the weak and indirect nature of the interest rate channel in Nigeria.

In contrast, a positive shock to MPR- (monetary easing) produces a positive response in inflation, reaching its peak of 0.412 at period 4, and declining thereafter. The asymmetry between the tightening and easing responses is clearly visible: at the peak, tightening exerts a disinflationary effect that is more than twice as large in absolute terms as the inflationary effect of easing, consistent with the long-run NARDL asymmetry finding. A positive shock to money supply (M2) produces a positive and persistent inflationary response, peaking at 1.532 in period 3 and remaining elevated through period 10. Exchange rate shocks produce an immediate positive effect on inflation that peaks at period 4 (1.483) and gradually declines, reflecting the rapid but eventually fading pass-through from naira depreciation to consumer prices. Fiscal deficit shocks produce a moderate but persistent positive effect on inflation throughout the forecast horizon.

Table 13: Impulse Response of INFR to One-Standard-Deviation Shocks

Period	Response of INFR to MPR+	Response of INFR to MPR-	Response of INFR to M2	Response of INFR to EXCR	Response of INFR to FISC	Obs.
1	0	0	0.831	0.512	0.341	
2	−0.312	0.201	1.243	1.012	0.612	
3	−0.621	0.384	1.532	1.341	0.843	
4	−0.843	0.412	1.421	1.483	0.921	
5	−0.912	0.394	1.312	1.432	0.874	
6	≺0.984	0.341	1.142	1.312	0.812	
8	−0.876	0.283	0.943	1.132	0.712	
10	−0.743	0.212	0.812	0.943	0.614	

Source: Authors' Computation, 2024. Note: Responses based on Cholesky decomposition. MPR+ = positive monetary policy shock (tightening); MPR- = negative monetary policy shock (easing); M2 = money supply shock; EXCR = exchange rate shock; FISC = fiscal deficit shock. Values represent the response of INFR in percentage points.

Conclusion and Policy Recommendations

This study examined monetary policy responses to inflation targeting in Nigeria from 1986 to 2023, with a focus on asymmetric effects of monetary policy rate (MPR) adjustments using the NARDL model, VAR analysis, and Granger causality tests. The findings reveal that monetary policy tightening is significantly more effective in reducing inflation in the long run than easing is in increasing it, confirming the presence of a clear asymmetry in monetary

transmission. This suggests that the Central Bank of Nigeria (CBN) achieves stronger inflation control through decisive tightening actions than it does inflation stimulation through easing measures. In addition, the results show that fiscal deficits, exchange rate movements, and money supply growth are key structural drivers of inflation, with exchange rate pass-through and monetary expansion exerting particularly strong inflationary pressures. The error correction mechanism further indicates that adjustments to long-run equilibrium are relatively slow, implying that inflation persistence in Nigeria is high and policy adjustments take several years to fully transmit into price stability outcomes.

Based on these findings, several policy recommendations are proposed. First, the CBN should adopt a more proactive and pre-emptive tightening stance when inflationary pressures begin to build, as delayed responses are less effective and more costly in the long run. Second, monetary policy effectiveness should be strengthened through tighter coordination between monetary and fiscal authorities to reduce fiscal dominance, especially by limiting deficit monetization and ensuring sustainable public debt management. Third, exchange rate stability should be prioritized through a more consistent and rules-based foreign exchange management framework to reduce imported inflation shocks. Fourth, the CBN should enhance liquidity management by closely monitoring money supply growth and reinforcing monetary aggregates control alongside policy rate adjustments. Finally, strengthening the credibility and independence of the CBN is essential, including improved transparency, clearer inflation targets, and stronger communication strategies to anchor inflation expectations. Overall, achieving sustainable inflation control in Nigeria requires a coordinated, consistent, and institutionally strong policy framework rather than isolated monetary interventions.

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