

## Impact of monetary policy on price stability in Nigeria: An empirical assessment

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### Abstract

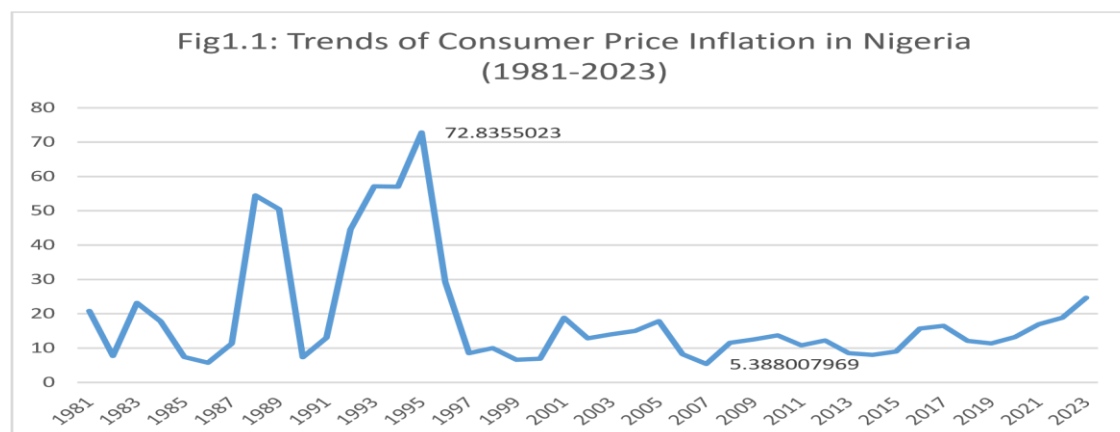
Price stability is crucial for economic growth, yet it has remained a challenge in Nigeria despite ongoing monetary policy interventions by the Central Bank of Nigeria. This study examines the short- and long-run effects of monetary policy on price stability in Nigeria from 1981 to 2023. Using the Consumer Price Index (CPI) as a proxy for price stability, the analysis incorporates broad money supply (% of GDP), real interest rate, real exchange rate, and crude oil price as a control variable. Augmented Dickey-Fuller tests indicated mixed-order integration, supporting the application of the Autoregressive Distributed Lag (ARDL) bounds testing approach. The ARDL model identified a significant long-run relationship, with an error correction term (-0.76), suggesting that 76% of deviations from long-term equilibrium are corrected annually. In the long run, broad money supply positively influences CPI, with a 1% increase in money supply raising CPI by 1.75%, while higher real interest rates and real exchange rate appreciation reduce CPI by 1.31% and 8.26%, respectively. Crude oil prices negatively impact CPI, with a 1% increase reducing consumer prices by 17.81%. Granger causality tests indicate unidirectional relationships from CPI to money supply, crude oil price to money supply, real interest rate to real exchange rate, and crude oil price to real interest rate. The findings suggest that while monetary policy instruments significantly affect price stability, high autonomous price levels indicate that monetary policy alone cannot sustain price stability. Coordinated monetary, fiscal, and structural policy interventions are recommended to achieve effective price stabilization in Nigeria.

**Keyword:** Monetary policy, Price Stability, Consumer Price Index, ARDL, Granger causality, Nigeria.

### 1. Introduction

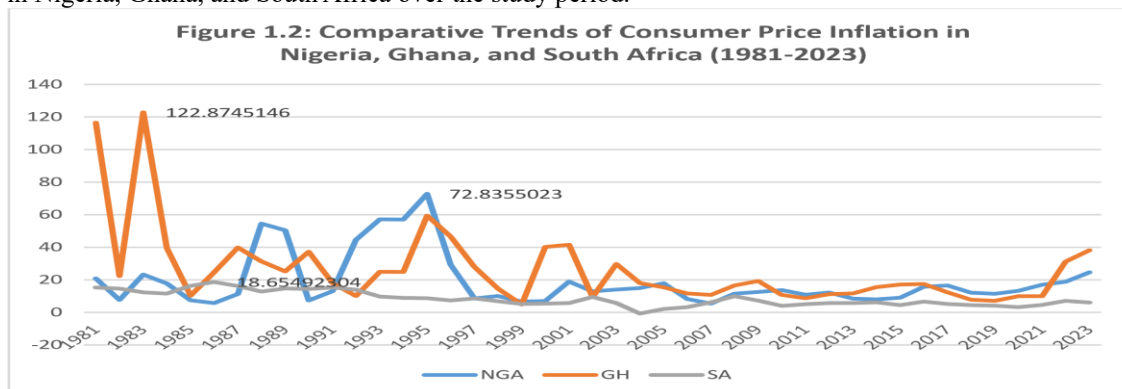
Price stability is a core objective of monetary policy because it underpins macroeconomic stability, preserves purchasing power, and supports sustainable economic growth. The capacity of a central bank to manage prices is therefore critical to a nation's economic well-being (Danson, 2012). In Nigeria, as in many emerging economies, price instability has remained a major concern due to its adverse effects on purchasing power, investment decisions, and overall economic performance. The importance of price stability has been widely acknowledged in monetary theory. Fischer (1996) argues that combating inflation is the central challenge for monetary authorities, best addressed through central bank independence and the adoption of low inflation targets with flexibility to accommodate short-run shocks. In line with this, the Central Bank of Nigeria (CBN) has relied on instruments such as interest rate policy, open market operations, and reserve requirements to control inflation. However, the effectiveness of these tools has been inconsistent across political regimes and economic cycles (Itodo, Akadiri & Ekundayo, 2017).

Nigeria has experienced recurrent episodes of high inflation, exchange rate depreciation, and interest rate volatility, which have weakened the achievement of price stability. Inflation rose sharply to 34.6% in November 2024 (NBS, 2024a; Trading Economics, 2024), reflecting severe domestic and external pressures. Although rising inflation is a global phenomenon partly driven by the Russia–Ukraine conflict, several countries have recorded extreme inflation rates, including Venezuela, Sudan, Lebanon, and others (Infoplease, 2023). Figure 1.1 illustrates Nigeria's inflation trends, measured by annual changes in the consumer price index (CPI), from 1981 to 2023.



Source: Authors' construct, using data from WDI (2023).

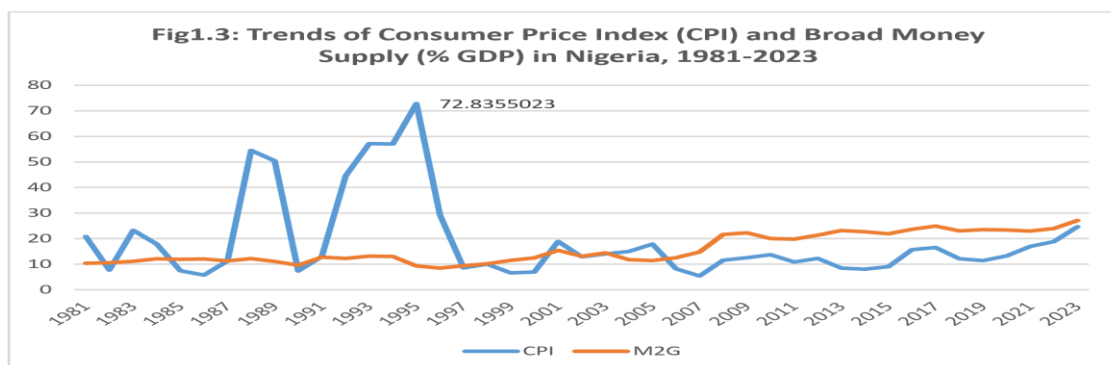
Inflation in Nigeria rose sharply between 1981 and 1995, reaching a peak of 72.8% in 1995, driven mainly by excessive monetization of oil revenues, large fiscal deficits, and the Structural Adjustment Programme (SAP). Although SAP policies were intended to correct macroeconomic imbalances, currency devaluation, rapid money supply growth, weak industrial and agricultural performance, and heavy import dependence intensified inflationary pressures and reduced purchasing power (Emery, 2006). While inflation was relatively low in some early years such as 1982 and 1985, it became highly volatile in the late 1980s and early 1990s, with peaks above 50% reflecting fiscal imbalances and policy mismanagement. Inflationary pressures resurfaced in the 2010s and early 2020s, influenced by the 2016 recession, the COVID-19 pandemic, fuel subsidy removal, and exchange rate distortions. Consequently, inflation rose from 15.7% in 2016 to 17% in 2021, and further to 24.66% in 2023, marking a sharp increase from 2022 (Macrotrends, 2025). Notably, inflation remained below 20% between 1997 and 2022 before surging in 2023 following the removal of crude oil subsidies. Figure 1.2 compares inflation trends in Nigeria, Ghana, and South Africa over the study period.



Source: Authors' construct, using data from World Development indicators (2023).

Inflation trends differ markedly across Nigeria, Ghana, and South Africa. Ghana has experienced extreme inflation volatility, recording 122.87% in 1983 and a renewed surge to 38.1% in 2023, driven by debt distress, political instability, the COVID-19 pandemic, global oil price shocks following the Russia–Ukraine war, currency depreciation, and macroeconomic factors such as money supply growth, exchange rate movements, interest rates, and fiscal deficits (Adu & Marbuah, 2011; Pieterse, 2023). Nigeria has similarly faced persistent inflationary pressures, as earlier noted. In contrast, South Africa has maintained relatively low and stable inflation, generally below 10%, with only moderate increases during global crises. Inflation declined significantly from the late 1980s through the 1990s due to conservative monetary policy, recession-induced restraint on inflation expectations, stable trading partners, and a more stable exchange rate (South African Reserve Bank, 1996; Akinboade & Siebrits, 2002). The country even recorded deflation of 0.69% in 2004, reflecting increased purchasing power (WDI, 2023). By 2023, inflation stood at 24.66% in Nigeria, 38.1% in Ghana, and 6.1% in South Africa, highlighting sharper volatility in Nigeria and Ghana compared to South Africa's more contained price dynamics.

Figure 1.3 highlights significant volatility in Nigeria's inflation and money supply between 1981 and 2023. Consumer price inflation averaged 19.08% over the period, peaking at 72.8% in 1995 and falling to a low of 5.39% in 2007. In comparison, broad money supply as a share of GDP averaged 15.89%, with a minimum of 8.46% in 1996 and a maximum of 27.09% in 2023. Despite successive monetary policy reforms, inflation has frequently exceeded the CBN's target range, largely due to supply-side bottlenecks, exchange rate instability, and food price shocks (Appah & Tebepah, 2023). These persistent inflationary pressures have raised doubts about the effectiveness of monetary policy in ensuring price stability in Nigeria.



Source: Authors' construct using data from CBN (2023); WDI (2023).

Price stability is crucial for economic growth, yet it has remained a challenge in Nigeria despite ongoing monetary policy interventions by the Central Bank of Nigeria (CBN). Persistent inflation above the CBN's target has been driven by supply-side constraints, exchange rate volatility, food price shocks, and sensitivity to external factors such as global oil price fluctuations. While monetary policy tools interest rates, money supply, and reserve requirements are intended to stabilize prices, empirical evidence for Nigeria shows mixed results. Variables like money supply and exchange rate significantly affect inflation, whereas interest rate adjustments often yield limited impact. Structural inefficiencies, fiscal dominance, weak institutional capacity, policy lags, and external shocks have weakened the transmission of monetary policy. These challenges underscore the need to examine the effectiveness of monetary policy in achieving price stability in Nigeria. This study aims to empirically examine the impact of monetary policy on price stability in Nigeria from 1981 to 2023. Specifically, it investigates the effects of money supply, interest rates, exchange rates, and crude oil prices on price stability in both the short and long run, while also exploring the causal relationships among these variables.

## Literature review and theoretical framework

### Conceptual review

Monetary policy entails deliberate actions by a central bank to regulate money supply, cost, and availability to achieve macroeconomic objectives, particularly price stability (Friedman, 1968; Lindsey & Wallich, 1991). It influences economic activity through adjustments in money supply, credit conditions, and interest rates (Cioran, 2014). In Nigeria, the Central Bank defines money supply as narrow money (M1) and broad money (M2), with excess liquidity often leading to inflation (CBN, 2021). Key monetary policy instruments in Nigeria include interest rates—particularly the Monetary Policy Rate (MPR) which regulate borrowing costs and influence inflation, output, and employment (Ajayi & Odeniran, 2012; Adeniran & Olugbenga, 2018). Money supply control via open market operations manages liquidity and stabilizes prices (Ajayi & Odeniran, 2012; Study.com, 2025), while exchange rate interventions and reserve requirements further influence money supply, import prices, and overall economic activity (Ajayi & Odeniran, 2012; Adeniran & Olugbenga, 2018).

Price stability on the other hand, means a situation where the overall average of prices is stable even though prices of individual goods and services may rise or fall. Price stability occurs when the aggregate price in a given economy has no or small change significantly over a period of time. Price stability also refers to a state of the economy in which money maintains its purchasing power and in which economic agents such as households and businesses need not account for changes in the general level of prices when making decisions on consumption and investment. Where there is price stability, inflation is moderate and predictable (Bank of Finland, 2025). Price stability remains a primary goal globally, with its effectiveness closely linked to exchange rate flexibility (Krugman, Obstfeld & Melitz, 2022). Achieving price stability is one of the main goals of monetary policy (Gordon & Grimsley, 2023).

### Theoretical framework

Irving Fisher (1911) developed the Quantity Theory of Money to explain inflation as a direct outcome of changes in the money supply, arguing that increases in money supply led to proportional rises in prices, while reductions generate deflationary pressures. The theory assumes that at full employment, output and the velocity of money remain relatively stable (Adenuga *et al.*, 2000), making money supply the primary driver of price changes. Empirical studies have reinforced the relevance of this theory, particularly in developing economies. In Nigeria, Ayodele *et al.* (2018) found that variations in money supply significantly influence inflation, confirming the applicability of the Quantity Theory in explaining price movements and stability. Beyond the Nigerian context, the theory provides a foundational framework for understanding inflation, emphasizing the central role of monetary policy in price stability and macroeconomic management. Consequently, the Quantity Theory of Money remains a key pillar of monetary economics, shaping policy formulation and inflation control across economies (Christiano, 2013).

According to the European Central Bank (2025), price stability is important because of the following benefits: i). It allows us to avoid the inefficiency costs arising from the presence of nominal rigidities. ii). It reduces the inefficiency costs created by inflation being a tax on money balances. iii). It avoids adverse redistributive effects of inflation. iv). It avoids adverse interactions of inflation with taxation. v) It decreases the volatility of inflation, which in turn lowers uncertainty and market interest rates and this motivates people to invest. vi). It contributes to a more stable financial system. vii). It helps to maintain social cohesion and stability.

### Empirical literature

Price instability remains a major economic challenge that distorts economic activities. Empirical studies on the relationship between monetary policy and price stability in Nigeria have produced mixed results. Nyeche, Odungweru, and Wokekoro (2025) found that changes in narrow, broad, and quasi-money supply significantly affect the consumer price index, with about 50% of CPI variations explained by disaggregated money supply. They recommended reforms to reduce the informal financial sector's influence. Otor, Henry, and Ajekwe (2024)

observed that cash reserve ratio significantly stabilizes prices, while liquidity and money supply had insignificant effects, suggesting moderation of these tools by the CBN. Ihugba and Adefabi (2025) highlighted the asymmetric effects of oil price shocks on inflation, emphasizing the role of reserves, money supply, and MPR, and recommended targeted monetary policies and economic diversification.

Several studies confirmed the varying effectiveness of monetary policy instruments. Tonye and Gbarawae (2023), Bank-Ola *et al.* (2022), and Onehi *et al.* (2022) found that broad money supply, exchange rates, and MPR have mixed effects on price stability, with cash reserve ratio often showing significant impact. Similarly, Ogbonnaya *et al.* (2022) and Babatunde and Kehinde (2016) reported that exchange rate and money supply influence both short- and long-term price stability, while the informal sector limits the effectiveness of money supply controls (Itodo *et al.*, 2017; Adigwe *et al.*, 2015). Empirical evidence also underscores the importance of exchange rate management. Studies by Ogbonna and Nwani (2015) reveal that exchange rate fluctuations and volatility significantly impact inflation, suggesting that stable exchange rates are crucial for effective price stabilization. In Ghana, Variance Decomposition analysis by Osei-Dwomoh *et al.* (2025) showed that the exchange rate and money supply account for over 60% of changes in the Consumer Price Index (CPI) over a 10-period horizon.

Oil prices have been identified as another key determinant of inflation. Adebayo (2020), Mukhtarov *et al.* (2019), Choi *et al.* (2018), and Sek *et al.* (2015) found that oil price shocks influence domestic inflation, often transmitted through exchange rates or production costs, highlighting the need for monetary policy to mitigate these external effects. In West Africa and other developing economies, studies (Isaac & Akutson, 2023; Kirevew, n.d.) demonstrate that money supply, domestic credit, fiscal deficits, and interest rates collectively influence inflation, with the effectiveness of monetary policy contingent upon broader structural and institutional factors. Successful inflation targeting requires coordination between monetary and fiscal policies and management of inflation expectations.

It is evident in the above review, that empirical and theoretical findings on the impact of monetary policy on price stability remain conflicting, largely due to differences in analytical methods and data periods. Some studies, such as Henry & Sabo (2020), used monetary policy rate (MPR) data before its introduction in 2007, potentially producing biased or spurious results. Additionally, earlier studies often lacked justification for methodological choices, such as log-transforming inflation rates. Another research, like Ngerebo (2016), included numerous variables over a limited sample period (1985-2012), reducing degrees of freedom and leaving results less robust. Many studies also rely on outdated data, failing to capture recent economic developments. These are the lacunae which the present study attempts to bridge.

## Data and Methodology

The study used an ex-post facto research and quantitative research design to achieve the objective of the study. Time series data used in the study were sourced from the CBN and World Bank databanks. Methods of data analyses include descriptive, correlational, cointegration, and Granger causality test.

## Model Specification

This study is grounded in the Irving Fisher's Quantity Theory of Money (QTM), which posits a direct link between money supply changes and price levels. An increase in money supply generally raises prices, while a decrease exerts deflationary pressures, assuming constant or slowly changing velocity and full employment. Algebraically, QTM is expressed as  $P = MV/Y$ , or in growth rates,  $p = m + v - y$ , indicating that changes in money growth translate directly into inflation. This study adopts a modified version of models employed by Takon and Ita (2020) and Tonye and Gbarawae (2023), combining their specifications:  $INF = f(MS, ER, IR)$  and  $IFR = f(RIR, MS, TBR, EXR, GCF)$ , where IFR is inflation, MS is money supply, ER is exchange rate, IR is interest rate, TBR is Treasury Bill Rate, and GCF is Gross Capital Formation. These models are adapted to suit the present study.

$$CPI = f(M2G, RIR, RER, OLP) \quad (3.1)$$

The econometric form of the equation is given as:

$$CPI_t = \varphi_0 + \beta_1 M2G_t + \beta_2 RIR_t + \beta_3 RER_t + \beta_4 OLP_t + \varepsilon_t \quad (3.2)$$

Where;

$CPI_t$  = Consumer price index at time t (proxy for price stability),

$M2G_t$  = Broad money supply as percentage of GDP at time t;

$RIR_t$  = Real interest rate at time t;

$RER_t$  = Real exchange rate at time t,

$OLP_t$  = The average Brent crude oil prices at time t (control variable).

$\varphi_0$  is the intercept term,  $\beta_1, \dots, \beta_4$  are the respective parameters of the explanatory variables included in the model.,

$\varepsilon_t$  is the error term.

### Estimation Techniques

The model specified for this study was estimated using Auto- Regressive Distributed Lag (ARDL) approach developed by Pesaran *et al.* (2001). Therefore, based on the ARDL approach, equation 3.2 is expressed as follows:

$$\begin{aligned} \Delta CPI_t = & \alpha_0 + \sum_{i=1}^{\omega} \alpha_1 \Delta(CPI)_{t-i} + \sum_{i=0}^{\pi_1} \alpha_2 \Delta(M2G)_{t-i} + \sum_{i=0}^{\pi_2} \alpha_3 \Delta(RIR)_{t-i} + \sum_{i=0}^{\pi_3} \alpha_4 \Delta \text{Log}(RER)_{t-i} \\ & + \sum_{i=0}^{\pi_4} \alpha_5 \Delta \text{Log}(OLP)_{t-i} + \varphi_1 (M2G)_{t-1} + \varphi_2 (RIR)_{t-1} + \varphi_3 \text{Log}(RER)_{t-1} \\ & + \varphi_4 \text{Log}(OLP)_{t-1} + \varepsilon_t \end{aligned} \quad (3.3)$$

Where  $\Delta$  indicates first-difference operator,  $\varepsilon_t$  is the error or disturbance term with zero mean and constant variance-covariance. The optimal lag lengths ( $\omega$ ,  $\pi_i$ ) were selected either by the Hannan-Quinn information criterion (HQ). The parameters in the summation signs ( $\alpha_{is}$ ) are the short-run of coefficients of the ARDL model, while the long-run multipliers are represented by  $\gamma_{is}$  parameters. The unrestricted error correction version of the ARDL model concerning the variables is modelled as follows:

$$\begin{aligned} \Delta CPI_t = & \alpha_0 + \sum_{i=1}^{\omega} \alpha_1 \Delta(CPI)_{t-i} + \sum_{i=0}^{\pi_1} \alpha_2 \Delta(M2G)_{t-i} + \sum_{i=0}^{\pi_2} \alpha_3 \Delta(RIR)_{t-i} + \sum_{i=0}^{\pi_3} \alpha_4 \Delta \text{Log}(RER)_{t-i} \\ & + \sum_{i=0}^{\pi_4} \alpha_5 \Delta \text{Log}(OLP)_{t-i} + \Psi(ECT)_{t-1} \\ & + \varepsilon_t \end{aligned} \quad (3.4)$$

In equation (3.4),  $\Psi$  is the speed of adjustment, and is expected to be negative, less than one and significant. The critical values for the ARDL bounds test are available in the works of Pesaran, Shin, and Smith (2001) and Narayan (2005) and depend on factors such as the lag length, sample size, and the type of test (e.g., level or first-difference).

### Results and Discussions

The empirical results of the study are presented and analyzed in this section. The findings are discussed and compared with the a priori expectations and other similar studies.

#### Descriptive Statistics Analysis

Table 4.1 provides the characteristic insights into the dataset at a glance.

**Table 4.1:** Descriptive Statistics [Observations: 43]

|           | CPI      | M2G      | LOG(RER) | RIR       | LOG(OLP) |
|-----------|----------|----------|----------|-----------|----------|
| Mean      | 19.07948 | 15.89097 | 4.788904 | 0.482533  | 3.618924 |
| Median    | 13.00697 | 13.01977 | 4.619466 | 3.023542  | 3.496508 |
| Maximum   | 72.83550 | 27.09274 | 6.285832 | 18.18000  | 4.715190 |
| Minimum   | 5.388008 | 8.464230 | 3.907539 | -65.85715 | 2.549445 |
| Std. Dev. | 16.28122 | 5.661930 | 0.581983 | 13.91620  | 0.673182 |
| Skewness  | 1.867414 | 0.479426 | 1.039437 | -2.788874 | 0.170682 |
| Kurtosis  | 5.472970 | 1.599323 | 3.299722 | 13.56168  | 1.673443 |

Note: CPI = Consumer price index (Price stability); M2G = Broad money supply (%GDP); RIR = Real (lending) interest rate; RER = Real exchange rate; OLP = Brent crude oil price.

Source: Authors' computation, 2025, using EViews 10.0.

From 1981 to 2023, Nigeria's consumer price index (CPI) averaged 19.08%, peaking at 72.8% in 1995 and dropping to 5.39% in 2007. Broad money supply (% of GDP) averaged 15.89%, with a high of 27.09% in 2023 and a low of 8.46% in 1996. The real lending interest rate averaged 0.48%, ranging from -65.85% in 1981 to 18.18% in 2009. The naira/dollar real exchange rate averaged 4.79%, fluctuating between 3.9% and 6.28%, while crude oil price averaged 3.6%, peaking at 4.72% in 2012 and falling to 2.5% in 1998.

CPI and broad money supply had higher means and peaks compared to other variables. Standard deviation showed CPI was tightly clustered around its mean, whereas other variables were more volatile. Real interest rate was negatively skewed, suggesting potential immediate declines, while other variables were positively skewed. Kurtosis indicated that CPI, real interest rate, and real exchange rate distributions were leptokurtic (peaked).

#### Correlation analysis

The correlation matrix in Table 4.2 shows how the variables are correlated. It shows that, none of the independent variables are highly correlated with the dependent variable, so it can be stated that there is no

multicollinearity issue with the results. The table shows that the real interest rate (RIR) has a moderate negative correlation with consumer price index (CPI,  $r = -0.51$ ), while other independent variables (M2G, RER, OLP) have weak negative correlations with CPI (-0.16 to -0.40). Broad money supply (M2G) and oil price exhibit the highest positive correlation among independent variables (0.78). Overall, Pearson coefficients below 0.8 suggest low likelihood of collinearity, which was confirmed by the variance inflation factor (VIF) test.

**Table 4.2: Correlation Matrix**

|     | CPI   | M2G   | RER   | RIR  | OLP  |
|-----|-------|-------|-------|------|------|
| CPI | 1.00  |       |       |      |      |
| M2G | -0.25 | 1.00  |       |      |      |
| RER | -0.16 | -0.18 | 1.00  |      |      |
| RIR | -0.51 | 0.37  | -0.19 | 1.00 |      |
| OLP | -0.43 | 0.78  | -0.07 | 0.23 | 1.00 |

Note: RER and OLP are log-transformed.

Multicollinearity, which occurs when independent variables are highly correlated with each other, can render significant variables statistically insignificant; a VIF > 10 or tolerance < 0.10 indicates its presence.

**Table 4.3. Multicollinearity test (variance inflation factor (VIF) values)**

| Variable | Coefficient<br>Variance | Uncentered<br>VIF | Centered<br>VIF |
|----------|-------------------------|-------------------|-----------------|
| CPI(-1)  | 0.0085                  | 3.9737            | 1.6851          |
| M2G      | 0.1232                  | 26.4863           | 2.8801          |
| RER)     | 17.7046                 | 304.3172          | 4.1658          |
| RER(-1)  | 18.1386                 | 315.2294          | 4.5858          |
| RIR      | 0.0216                  | 1.4581            | 1.3897          |
| OLP      | 8.7708                  | 88.6516           | 2.9666          |
| C        | 209.2797                | 156.2289          | NA              |

Source: Authors' computation, using EViews 10

The VIF values for all variables CPI (-1) [1.69], M2G [2.88], RER [4.17], RER(-1) [4.59], RIR [1.39], and OLP [2.97] are below 10, indicating low multicollinearity (see Table 4.3). This confirms that the predictor variables are not highly correlated, enhancing the reliability of the regression results and allowing the coefficients to be interpreted with confidence.

### Stationarity test

The ARDL method requires variables to be either I(0) or I(1), so a unit root test was conducted on all regressors using the ADF test with an intercept and optimal lag selected via the Akaike Information Criterion. A series is stationary if the test statistic is below the critical value and the p-value is < 0.05; otherwise, it is non-stationary. All tests were performed at a 5% significance level.

**Table 4.4: Augmented Dickey Fuller Test Result**

| Variables | ADF Stat  | Crit. Values (5%) | Prob. Values | Stationarity Level |
|-----------|-----------|-------------------|--------------|--------------------|
| CPI       | -3.728205 | -2.935001         | 0.0072       | I(0)               |
| M2G       | -5.706805 | -2.935001         | 0.0000       | I(1)               |
| RIR       | -7.670572 | -2.933158         | 0.0000       | I(0)               |
| RER       | -3.036268 | -2.935001         | 0.0398       | I(0)               |
| OLP       | -5.669904 | -2.936942         | 0.0000       | I(1)               |

Note: RER and OLP are log transformed

Source: Authors' Computation, 2025 using EViews 10.0

Table 4.4 shows that CPI, RIR, and RER are level-stationary (I(0)), while M2G and OLP are first-difference stationary (I(1)), with no variables being I(2). This confirms the suitability of the ARDL approach, which was then applied to examine the short-run and long-run relationships between the independent variables and price stability.

The lag order results indicate that all criteria selected an optimal lag length of one, based on AIC. The final ARDL specification was (1, 0, 1, 0, 0), with CPI and RER at lag 1, and M2G, RIR, and OLP at lag 0. The bounds test (Pesaran et al., 2001) shows an F-statistic of 19.55, exceeding the upper critical value at both 5% (3.49) and 1% (4.37) levels. This rejects the null hypothesis of no co-integration, confirming a long-run relationship between CPI (price stability) and the independent variables in the model.

### Diagnostic tests and stability tests

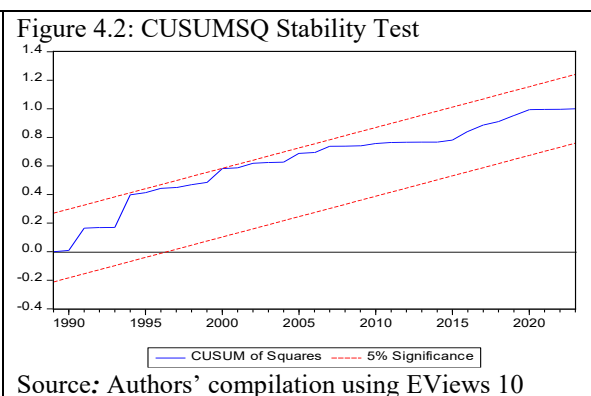
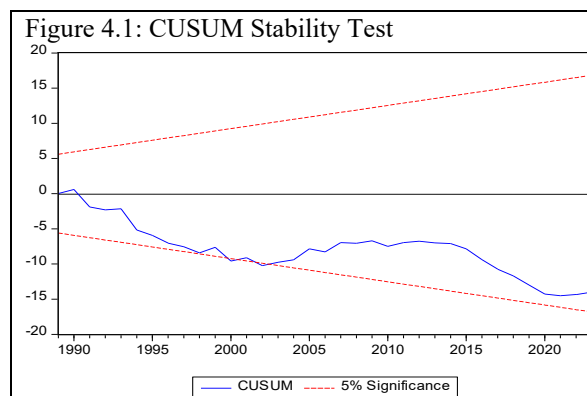
Table 4.5 presents the results of the diagnostic tests. In the Breusch–Godfrey serial correlation Lagrange multiplier (LM) test, the F-statistic and corresponding p-value (0.0353 [0.9654]) indicate that the null hypothesis of no serial correlation is accepted, and we can conclude that the model is free from serial correlation. The Breusch-Pagan-Godfrey test confirms homoskedasticity, implying constant residual variance across the model. With a p-value (0.1852) 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. The Jarque Berra statistics (4.2527) used to confirm the normality of the variables showed that the p-value (0.1192) was greater than 0.05 significant level, therefore the null hypothesis was rejected. This implies that the model's error term is normally distributed. The Ramsey reset test probability value of 0.0808 indicates that the functional form of the model is adequately specified, and there is no evidence of misspecification.

**Table 4.5:** Diagnostics Test Results: Serial Correlation and Heteroskedasticity Tests

| <i>Breusch-Godfrey Serial Correlation LM Test:</i>    |        |                     |        |
|-------------------------------------------------------|--------|---------------------|--------|
| F-statistic                                           | 0.0353 | Prob. F(2,33)       | 0.9654 |
| Obs*R-squared                                         | 0.0896 | Prob. Chi-Square(2) | 0.9562 |
| <i>Heteroskedasticity Test: Breusch-Pagan-Godfrey</i> |        |                     |        |
| F-statistic                                           | 1.5698 | Prob. F(6,35)       | 0.1852 |
| Obs*R-squared                                         | 8.9057 | Prob. Chi-Square(6) | 0.1790 |
| Scaled explained SS                                   | 9.8970 | Prob. Chi-Square(6) | 0.1291 |
| <i>Normality Test:</i>                                |        |                     |        |
| Jarque Berra                                          | 4.2527 | NA                  | 0.1192 |
| <i>Ramsey reset test</i>                              |        |                     |        |
| F-statistic                                           | 3.2384 | Prob. F(1, 34)      | 0.0808 |

**Source:** Authors' Computation, 2024 using EViews 10.

The stability of the model is attested by the plots in Figures 4.1 and 4.2. The plots of the sum of the recursive residuals test (CUSUM) lie within the boundaries at the 5% level.



### Long-term impact of monetary policy on price stability

Following the establishment of cointegration relationship among the variables, and the passing of diagnostic tests, the long run and short run models in equation (3.3) and equation (3.4) were estimated to get the long run and short run coefficients as reported in Table 4.6.

Table 4.6: Long run coefficients for ARDL ((1, 0, 1, 0, 0))  
Dependent Variable = CPI

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| M2G      | 1.7528      | 0.5276     | 3.3222      | 0.0021 |
| LOG(RER) | -8.2587     | 2.9385     | -2.8105     | 0.0080 |
| RIR      | -1.3111     | 0.2168     | -6.0484     | 0.0000 |
| LOG(OLP) | -17.8122    | 4.0513     | -4.3966     | 0.0001 |
| C        | 97.8948     | 18.0276    | 5.4303      | 0.0000 |

Source: Authors' Computation using EViews 10.

The long-run ARDL results show that broad money supply (M2G) has a positive and significant impact on inflation, with a 1% increase in M2G raising CPI by 1.75%, consistent with the quantity theory of money. The finding corroborates Henry and Sabo (2020) as well as Babatunde and Kehinde (2016), who reported that broad money supply impact positively on price stability in Nigeria both in the long-run. The study's finding also corroborates Nawaz *et al.* (2017) who established a positive relation of inflation (INF) with money supply (MS) in Pakistan for the period, 1990-2012; but disagrees with Onehi *et al.* (2022) who found insignificant negative impact of money supply on price stability in Nigeria for the period, 1986-2020.

Real interest rates (RIR) negatively affect CPI, with a 1% increase reducing inflation by 1.31%. Theoretically, the relationship between real interest rates and price stability should be positive, meaning that higher real interest rates tend to contribute to greater price stability. However, the findings of this study partially align with the works of Sulaiman (2015), Ahmed and Ibitoye (2016) and others who found a significant relationship between interest rate on price stability. Nawaz *et al.* (2017) also found a negative relation between consumer price index and interest rate in Pakistan. The study's finding however contradicts the findings of Kromtit (2019), and Ejire (2020) where interest rate, together with trade openness, income level, exchange rate, had no significant impact on price changes in the long run.

Real exchange rate (RER) negatively impacts CPI, where a 1% appreciation reduces inflation by 8.26%, as stronger naira lowers import prices. This means that an appreciation of the naira real exchange rate (i.e., the naira becoming stronger relative to other currencies) is associated with lower inflation and greater price stability. This finding aligns with Chang and Obstfeld's 1998 paper which found that an appreciation of the real exchange rate is generally associated with lower inflation.

Crude oil price (OLP), used as a control variable, also has a significant negative effect; a 1% rise in OLP reduces CPI by 17.81%, reflecting Nigeria's status as an oil-exporting economy, where oil price fluctuations influence domestic inflation and economic stability. The finding of this study corroborates Choi *et al.* (2018) who found that a 10% increase in oil prices raised domestic inflation by 0.4 percentage points in 72 advanced and developing economies for 1970 to 2015. Our finding supports Ahmed *et al.* (2023), who noted that while higher oil prices boost government revenue, they often lead to inflationary pressures, driving up consumer prices and straining economic stability. The finding also accords with Oyeyemi (2013) and Omolade *et al.* (2019), who asserted that positive oil price shocks have the tendency to increase money supply in oil producing countries with profound implications on consumer prices. Previous studies have also highlighted the impact of oil price on inflation in Nigeria. For instance, a study by Abdullahi *et al.* (2024) found that a long run nexus existed between petroleum product prices and price level in Nigeria over the period 1990 – 2022. Bawa *et al.* (2020) showed that oil price increases led to increase in headline, core and food measures of inflation in Nigeria. Overall, these results highlight that price stability in Nigeria is influenced by money supply, interest rates, exchange rates, and oil prices, with both monetary and external factors playing critical roles.

### Short run effect of monetary policy on price stability

The short-run ARDL results (Table 4.7) indicate that only the real exchange rate (RER) significantly and positively affects CPI, while other variables show no short-run impact. The error correction term (ECM = -0.7613) indicates a high speed of adjustment about 76% of deviations from long-run equilibrium are corrected within a year. This confirms the presence of a long-run relationship between CPI and the explanatory variables, aligning with established econometric theory that a significant, negative ECM demonstrates convergence from short-run shocks to long-run equilibrium.

Table 4.7: Short run Effect of Monetary Policy on Price Stability  
Dependent Variable: D(CPI)

| Variable     | Coefficient | Std. Error | t-Statistic | Prob.  |
|--------------|-------------|------------|-------------|--------|
| DLOG(RER)    | 6.743918    | 3.335951   | 2.021588    | 0.0509 |
| CointEq(-1)* | -0.761341   | 0.065753   | -11.57883   | 0.0000 |

Note: \* p-value incompatible with t-Bounds distribution.

R-Sqd = 0.77; Adjusted R-Sqd = 0.76 ; Durbin-Watson stat = 1.92 ; AIC = 6.78; SC = 6.86 H-QC = 6.81

Source: Author's compilation using EViews 10.

The model explains about 77% of the variation in CPI ( $R^2 = 0.77$ ), with the remaining 23% attributed to other factors not included in the model. The Durbin Watson value of 1.92 suggests no significant serial correlation in the errors. The F-statistic (21.62) is highly significant at 1%, indicating that all explanatory variables (broad money supply, real interest rate, real exchange rate, and crude oil price) jointly have a significant effect on CPI.

### Analysis of Granger causality tests results

The Granger causality test indicates a unidirectional relationship from CPI to broad money supply (M2G) at the 5% significance level. This means changes in CPI help predict M2G, but not vice versa. The finding aligns with Isaac and Akutson (2023) who found that consumer price index granger causes money supply at a 5% level of significance without a feedback mechanism in at least one of the countries in the West African Monitoring Zones studied (Guinea, Liberia, Sierra Leone, The Gambia, Ghana, and Nigeria). The finding also corroborates Nawaz *et al.* (2017) who found a one-way causation between money supply and inflation (CPI) for Pakistan within the study period (1990-2012).

Table 4.8: Summary of Pairwise Granger Causality Tests (N = 41)

| Null Hypothesis:            | F-Statistic | Prob.    |
|-----------------------------|-------------|----------|
| CPI Granger Causes M2G      | 3.79173     | 0.0320** |
| LOG(OLP) Granger Causes M2G | 6.18915     | 0.0049** |
| RIR Granger Causes LOG(RER) | 5.22677     | 0.0102** |
| LOG(OLP) Granger Causes RIR | 3.22201     | 0.0516** |

Note: The asterisk (\*\*) denotes rejection of the null hypothesis at 5% level of significance.

Source: Author's computation using EViews 10.

Table 4.7 further shows a one-way causation running from crude oil price (OLP) to money supply (M2G); from RIR to RER; and from OLP to RIR at 5% levels of significance. However, there was no feedback causation among these pairs of variables.

### Conclusion and recommendations

This study investigated the short- and long-run impacts of monetary policy on price stability in Nigeria using annual time series data from 1981 to 2023. The findings indicate that Nigeria's monetary policy instruments (broad money supply, real interest rate, and real exchange rate) significantly influence price stability, while crude oil prices act as an important exogenous factor. However, the persistence of high autonomous price levels (74.53%) during the study period suggests that monetary policy alone cannot achieve sustainable price stability. Other exogenous factors, including fiscal policy and structural economic conditions, likely play critical roles. Consequently, effective stabilization of prices in Nigeria requires coordinated monetary, fiscal, and structural policy interventions. The following recommendations have been suggested based on the findings of the study:

- The Central Bank of Nigeria (CBN) should implement effective monetary policies, regularly adjusting interest rates to respond to price level trends.
- Enhanced coordination between monetary and fiscal authorities is essential, with joint committees and synchronized planning to minimize policy conflicts.
- Adoption of a formal and transparent inflation-targeting framework, with clear benchmarks and communication strategies, will improve policy credibility and stabilise public expectations.
- Policies to deepen financial markets through financial literacy, innovative instruments, and broader inclusion will strengthen monetary policy transmission.
- Formalization of informal sector activities via tax incentives, digital payments, and microfinance support will reduce unregulated money circulation, improving price stability.

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