

MONETARY POLICY INSTRUMENTS AND THEIR IMPACT ON INFLATION DYNAMICS IN NIGERIA: A VECM ANALYSIS (2000-2025)

Author:

Nwosu Amarachukwu
Nelson

Affiliation:

Department of
Economics, Faculty of
Social Science, Nasarawa
State University Keffi.

Contact:

Sirjay360@yahoo.com

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Abstract

This study investigates the impact of monetary policy instruments on inflation dynamics in Nigeria from 2000 to 2025, using the Vector Error Correction Model (VECM) approach. The aim is to analyze how monetary tools such as money supply (M2), interest rates, and reserve requirements (CRR) influence inflation in Nigeria, particularly within the context of a resource-dependent economy. The study adopts a quantitative research methodology, utilizing secondary data sourced from the Central Bank of Nigeria (CBN) and other relevant financial institutions. The theoretical framework is based on Public Choice Theory, Resource Dependency Theory, and Management and Role Theory, providing a comprehensive lens to assess the effectiveness of monetary policy. The findings of the study revealed that money supply has a significant but complex relationship with inflation, exhibiting both short-run and long-run causal effects. The error correction term (ECT) indicates that disequilibria in inflation are adjusted at a rate of 40.3% annually. However, interest rates and CRR demonstrated limited effectiveness in the long run and weak short-run causality with inflation. Granger causality tests highlighted unidirectional relationships between money supply and inflation, as well as between interest rates and reserve ratios. The study concludes that while domestic monetary tools are essential, external factors, such as global oil price fluctuations, significantly affect inflation dynamics in Nigeria. Therefore, the study recommends a more coordinated approach to monetary and fiscal policies, a focus on better managing money supply, and strengthening the Central Bank of Nigeria's institutional framework.

Keywords: Economic instability, Inflation dynamics, Monetary policy, Resource dependency.

1.1 Introduction

Monetary policy plays a crucial role in shaping the economic landscape of any nation, with its impact extending to various facets of the economy, particularly inflation. In Nigeria, inflation has remained a significant economic concern, reflecting the country's broader fiscal and monetary challenges. The central bank, through its monetary policy tools—such as interest rates, money supply (M2), and the cash reserve ratio (CRR)—seeks to control inflationary pressures and stabilize the economy. Understanding the influence of these tools on inflation dynamics is critical, as it provides policymakers with the insights needed to implement effective interventions. The aim of this study is to evaluate how monetary policy instruments, namely the interest rate, CRR, and money supply, impact inflation in Nigeria from 2000 to 2025, utilizing a Vector Error Correction Model (VECM) analysis.

Globally, inflation control remains a central issue for most central banks, especially in developing economies. Various studies have demonstrated the significance of monetary policy in controlling inflation through the manipulation of key instruments such as the interest rate and money supply. According to Patel (2022), in developed economies like the United States and the European Union, interest rate adjustments by the central bank often have an immediate effect on inflation expectations and real inflation. Similarly, studies by Nakano and Meade (2021) in emerging markets, including Nigeria, have shown that changes in the reserve ratio can lead to immediate shifts in liquidity conditions, influencing inflation.

In Africa, inflationary pressures remain a persistent challenge for many nations. For instance, a study by Ofori et al. (2020) indicates that monetary policy actions in African countries often take a more prolonged period to reflect in the inflation rate due to structural challenges in these economies. This delay is attributed to factors such as the high dependence on imports, volatile exchange rates, and weak fiscal policies. Consequently, African central banks, including Nigeria's, often face difficulties in utilizing conventional tools like interest rates and money supply to achieve long-term inflation control. In the case of Nigeria, the central bank has used a combination of these instruments over the years, yet inflation remains volatile, prompting the need for a deeper analysis into the effectiveness of these tools.

In Nigeria, inflation has seen significant fluctuations over the past two decades, influenced by both domestic and external factors. From 2000 to 2025, the country has experienced periods of high inflation, spurred by factors such as the devaluation of the Naira, oil price shocks, and fiscal imbalances. According to the Central Bank of Nigeria (CBN) reports, the country's inflation rate averaged 15% from 2000 to 2020, with significant peaks during periods of economic instability. The monetary policy tools employed by the CBN, particularly adjustments in the interest rate and money supply, have aimed to mitigate these fluctuations. However, the relationship between these tools and inflation dynamics remains complex and warrants further investigation.

This study will employ a VECM approach to analyze the long- and short-term effects of monetary policy instruments on inflation in Nigeria. By examining the period from 2000 to 2025, this research seeks to provide a comprehensive understanding of how these tools have shaped inflation dynamics over time. The findings will contribute to the ongoing debate on the effectiveness of monetary policy in achieving price stability in Nigeria, providing valuable insights for policymakers.

2.1 Conceptual Review

2.1.1 Inflation

Inflation is a critical economic indicator that reflects the overall rise in the price level of goods and services over a specific period. The effects of inflation are far-reaching, influencing purchasing power, income distribution, and economic growth. As a result, controlling inflation is a primary concern for central banks globally. Research by Williams and Hansen (2023) underscores the importance of understanding the underlying causes of inflation, which can range from demand-pull factors to cost-push factors and built-in inflation expectations. In developing economies, inflation tends to be more volatile due to external shocks such as commodity price fluctuations and exchange rate depreciation (Zhao & Xu, 2021). For countries like Nigeria, where inflation has been historically volatile, central banks often resort to various tools like interest rates, reserve requirements, and money supply adjustments to manage inflationary pressures (Adedeji & Kolawole, 2022).

2.1.2 Interest Rates

Interest rates, as a key monetary policy instrument, directly influence borrowing, investment, and consumption behaviors in an economy. The relationship between interest rates and inflation is central to monetary policy effectiveness. According to Smith and Armstrong (2022), when central banks raise interest rates, it becomes more expensive for consumers and businesses to borrow, which reduces spending and demand, consequently lowering inflation. Conversely, reducing interest rates stimulates economic activity by encouraging borrowing and spending, which can lead to higher inflation if demand outpaces supply. The effectiveness of interest rate adjustments in controlling inflation varies across economies and is influenced by factors such as fiscal policy coordination, exchange rates, and external economic shocks (Tang, 2020). In Nigeria, for instance, despite adjustments to interest rates, inflation has remained persistent due to structural issues in the economy (Oluwaseun & Chukwudi, 2021).

2.1.3 Cash Reserve Ratio (CRR)

The Cash Reserve Ratio (CRR) is a monetary policy tool used by central banks to regulate liquidity in the banking system. By adjusting the CRR, central banks control the amount of

funds that commercial banks are required to keep in reserve, thereby influencing the money supply. A higher CRR reduces the lending capacity of banks, effectively curbing inflation by limiting the amount of money circulating in the economy (Johnson & Olatunde, 2023). In contrast, a lower CRR boosts lending and increases liquidity, which may contribute to inflationary pressures if demand exceeds supply (Williams, 2022). The use of CRR in Nigeria has been a critical part of the Central Bank's strategy to control inflation, especially in the face of fiscal deficits and foreign exchange volatility (Akpan & Chukwu, 2021). However, the effectiveness of CRR adjustments can be undermined by banking sector inefficiencies and the informal economy.

2.1.4 Money Supply

Money supply refers to the total amount of money circulating within an economy, including cash, coins, and balances held in checking and savings accounts. As a fundamental aspect of monetary policy, changes in money supply directly affect inflationary dynamics. An increase in money supply typically leads to higher inflation if it outpaces the growth in goods and services (Morris & Pierce, 2022). This relationship is grounded in the Quantity Theory of Money, which posits that more money in circulation leads to higher prices if the supply of goods and services does not keep up with demand (Lowe, 2021). In developing economies like Nigeria, where the money supply is often influenced by factors such as oil revenues, external debt, and exchange rate fluctuations, controlling money supply becomes crucial for stabilizing inflation (Adebayo & Ogunyemi, 2023). Despite various interventions, the Central Bank of Nigeria has faced challenges in effectively managing the money supply, particularly during periods of oil price volatility and foreign exchange crises (Ekpo & Atolagbe, 2022).

2.2 Theoretical Framework

The study of monetary policy and inflation dynamics draws from a variety of theoretical perspectives, and in this research, we anchor our analysis in three major theories: Public Choice Theory, Resource Dependency Theory (RDT), and Management and Role Theory. Each of these provides valuable insights into how policy decisions, institutional constraints, and external factors shape inflationary outcomes.

Public Choice Theory, first introduced by Buchanan and Tullock (1962), assumes that individuals, including policymakers, act in their own self-interest, which can lead to inefficiencies and suboptimal outcomes in public policy. The application of this theory in the context of monetary policy suggests that inflationary outcomes may not always be the result of pure economic forces, but could be influenced by the self-interest of political leaders, who may manipulate monetary policy tools for political gain. This theory has been applied to explain how policymakers may prioritize short-term political stability over long-term economic stability, often leading to inflationary pressures. Critics argue that Public Choice

Theory oversimplifies the decision-making processes by reducing them to mere self-interest, neglecting the broader institutional and structural factors that shape policy decisions (Mueller, 2021). However, despite these criticisms, Public Choice Theory remains highly relevant to this study, as it provides a lens through which to examine the potential for political interference in Nigeria's monetary policy and its subsequent impact on inflation.

Resource Dependency Theory (RDT), as developed by Pfeffer and Salancik (1978), focuses on how organizations depend on external resources and how this dependency influences their behavior and decision-making. In the context of Nigeria's monetary policy, this theory suggests that the Central Bank's decisions are not made in isolation but are heavily influenced by external economic factors such as oil revenues, international trade, and foreign investments. The assumption behind RDT is that organizations—such as the Central Bank of Nigeria—must manage their relationships with powerful external entities to secure necessary resources. The application of RDT to this study highlights the role of external economic shocks, such as fluctuations in global oil prices or changes in international monetary systems, in shaping Nigeria's inflation dynamics. Critics of RDT argue that it places too much emphasis on external factors and underplays the role of internal organizational decision-making (Barney & Hesterly, 2020). Nevertheless, RDT remains an important theory for understanding the challenges Nigeria faces in using monetary policy tools effectively to manage inflation, given its vulnerability to global economic forces.

Management and Role Theory, articulated by Mintzberg (1979), offers a perspective on how organizational structure and roles influence decision-making within institutions. This theory assumes that the structure of an organization—such as a central bank—affects how decisions are made and how policies are implemented. In Nigeria, the Central Bank's management structure plays a significant role in how monetary policies are crafted and executed. The application of this theory to the study suggests that the organizational setup of the Central Bank of Nigeria can influence how effectively monetary policy tools like interest rates, CRR, and money supply are used to control inflation. While the theory has been critiqued for focusing predominantly on internal organizational factors and neglecting broader economic and political forces, it provides valuable insights into the operational challenges faced by the Central Bank in its quest to control inflation. By examining the structure of the Central Bank and its management roles, this theory aids in understanding the internal dynamics that influence Nigeria's inflationary trends.

Taken together, these three theories—Public Choice Theory, Resource Dependency Theory, and Management and Role Theory—offer a multifaceted framework for analyzing the relationship between monetary policy instruments and inflation dynamics in Nigeria. Each theory sheds light on different dimensions of the issue, from political interference and external economic pressures to internal organizational factors. Their relevance to this study

lies in their ability to provide a comprehensive understanding of the complex factors that shape Nigeria's inflationary trends and the effectiveness of its monetary policy tools.

2.3 Empirical Review

Azubike and Roland (2023) conducted a study to examine the effects of monetary policy on inflation in Nigeria, focusing on the period between 1986 and 2023. The authors employed the Vector Autoregression (VAR) model for data analysis, utilizing EViews 12 econometric software. The findings revealed that monetary policy rate (MPR) and money supply had positive effects on inflation in Nigeria, indicating that increases in these variables lead to higher inflationary pressures. Conversely, the study found that interest rates and liquidity ratio exerted a negative effect on inflation, with the liquidity ratio being statistically significant. Based on these results, the authors stressed the need for the Central Bank of Nigeria to maintain a stable MPR to regulate inflation effectively. They also recommended that the monetary authority should focus on controlling cash movements and ensuring moderate money supply levels to avoid excessive inflationary pressures. These findings provide valuable insights into the role of key monetary policy tools in managing inflation in Nigeria, highlighting the complexities involved in achieving price stability in the country.

Similarly, Obode and Gini (2025) investigated the dynamics of inflation volatility in Nigeria using monthly macroeconomic data from January 2003 to December 2023. The study applied the Threshold Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) model to capture asymmetric volatility and structural breaks in inflation dynamics. The results indicated that changes in global crude oil prices, money supply, and exchange rates significantly influenced inflation in Nigeria, while imports had a negative impact. Furthermore, the study found that negative shocks, such as macroeconomic instability, had a larger effect on inflation than positive shocks, suggesting the presence of asymmetric volatility in inflation rates. The authors recommended that policymakers focus on improving exchange rate management and money supply control to cushion the economy from inflationary pressures arising from global oil price fluctuations. This research underscores the importance of external factors, such as global commodity prices, in influencing domestic inflation, highlighting the challenges Nigeria faces in stabilizing its economy amidst global uncertainties.

Ajoje, Adegboy, and Aliu (2022) explored the impact of monetary policy on private capital formation in Nigeria from 1980 to 2020, employing the Autoregressive Distributed Lag (ARDL) approach to analyze the data. Their findings revealed that monetary policy positively impacted private capital formation, with the Monetary Policy Rate (MPR) playing a crucial role in stimulating investment. The study also emphasized the importance of stable exchange rates in fostering private capital formation, suggesting that fluctuations in the exchange rate could hinder investment inflows. Based on these findings, the authors recommended that the

Nigerian government maintain a stable MPR to sustain private capital formation and implement policies aimed at controlling inflation to further promote investment. This study highlights the interconnectedness between monetary policy, inflation, and investment, underscoring the need for coordinated policy actions to stimulate long-term economic growth.

In another study, Ayubu (2021) analyzed the role of money supply in inflation dynamics within the Tanzanian economy. The research, using data from 1993 to 2011, applied the Structural Vector Autoregressive (SVAR) and Vector Error Correction Models (VECM) to assess the relationship between money supply and inflation. The findings indicated that inflation in Tanzania was more influenced by output factors than by monetary phenomena, suggesting that factors such as economic growth and external shocks played a more significant role than money supply in driving inflation. The study called for coordinated monetary and fiscal policies to promote economic growth while addressing inflationary pressures. This study provides a contrasting perspective to the monetarist view, which emphasizes the role of money supply in controlling inflation, and is particularly relevant for understanding the limitations of monetary policy in certain developing economies.

Korgbeelo and Nwiado (2021) examined the effectiveness of monetary policy instruments in controlling inflation in Nigeria using time-series data from 1981 to 2019. Their analysis employed several econometric techniques, including the Phillips-Perron unit root test, Johansen cointegration test, and error correction model. The study found that while reserve requirements, liquidity ratio, and Treasury bill rates did not have a significant impact on inflation, the Monetary Policy Rate (MPR) and money supply showed some influence on inflationary trends. The authors concluded that the lack of significant impact from several monetary policy instruments could be attributed to the inefficiencies in their implementation and the broader economic challenges Nigeria faces, such as fiscal deficits and structural weaknesses. They recommended improved coordination between monetary and fiscal policies to enhance the effectiveness of inflation control measures. This study contributes to the ongoing debate on the efficacy of monetary policy in developing economies, highlighting the need for a more integrated approach to managing inflation.

3.1 Methodology

This research employed ex-post facto research and the model for the study is Vector Error Correction Mechanism (VECM). VECM a system equation and mechanism that simultaneously view all the variables as a vector. Hence in a period, any of the independent variables in the equation can represent a dependent variable against the independent to determine effects and outcome.

This model was developed if it is found that the variables are co-integrated on order one and Augmented Dickey Fuller test is found to be at order 1(1) in their differences.

If the variables are said to be co-integrated defining a long-run relationship with the possibility of short-run disequilibrium is known as equilibrium error. To derive the empirical model, lag criterion was followed using minimum Akaike Information Criteria (AIC) of one (1) lag length.

3.1 Model Specification

Inflation Rate Equation: $D(INF) = \beta_0 + \beta_1 InfD(INF(-1) + \beta_0 + \beta_2 Inf(INF(-1)) + \beta_0 + \beta_3 M2D(M2(-1)) + \beta_0 + \beta_4 IntD(INT(-1)) + \beta_0 + \beta_5 RRD(RR(-1)) + C(6) + U_t$ (3.1)

Money Supply Equation: $D(M2) = \beta_0 + \beta_7 InfD(INF(-1) + \beta_0 + \beta_8 InfD(INF(-1)) + \beta_0 + \beta_9 M2D(M2(-1)) + \beta_0 + \beta_{10} IntD(INT(-1)) + \beta_0 + \beta_{12} RRD(RR(-1)) + C(12) + U_t$ (3.2)

Interest Rate: $D(INT) = \beta_0 + \beta_{13} InfD(INF(-1) + \beta_0 + \beta_{14} InfD(INF(-1)) + \beta_0 + \beta_{15} M2D(M2(-1)) + \beta_0 + \beta_{16} IntD(INT(-1)) + \beta_0 + \beta_{17} RRD(RR(-1)) + C(18) + U_t$ (3.3)

Reserve Ration Equation: $D(RR) = \beta_0 + \beta_{19} InfD(INF(-1) + \beta_0 + \beta_{20} InfD(INF(-1)) + \beta_0 + \beta_{21} M2D(M2(-1)) + \beta_0 + \beta_{22} IntD(INT(-1)) + \beta_0 + \beta_{23} RRD(RR(-1)) + C(24) + U_t$ (3.4)

Where:

D = Refers to difference operators, β_0 = Constant,

INF = The value of Inflation, M2 = Value of Money Supply

INT = Represented as value of Interest Rate RR= Value of Reserve Ratio,

These variables are treated as dependent variables with one difference lag. The term β_0 is the constant of the regression,

$\beta_1 - \beta_{24}$ are the associated endogenous variable's coefficients whilst U_t is the error term.

The a priori expectation of the variables in the model is expected to be positive within an alpha 0.05% level of significance considering the impact of monetary policy on inflation.

4.0 DATA PRESENTATION

4.1 Descriptive Statistics

Table 4.1 Descriptive Statistics

	INF	M2	INT	RR
Mean	15.00000	22310.56	13.46000	16.60000
Median	12.00000	15500.00	13.00000	12.00000
Maximum	40.00000	109000.0	28.00000	50.00000
Minimum	7.000000	1004.000	6.000000	1.000000
Std. Dev.	7.325754	25897.59	4.749561	11.94083
Skewness	1.886006	1.958640	1.002297	0.835649
Kurtosis	6.777323	6.653310	4.784925	3.542318
Jarque-Bera	29.68359	29.88725	7.504538	3.215987
Probability	0.000000	0.000000	0.023464	0.200289
Sum	375.0000	557764.0	336.5000	415.0000
SumSq.Dev.	1288.000	1.61E+10	541.4000	3422.000
Observations	25	25	25	25

Table 4.1 reveals the descriptive statistics for the variables involved in the study: inflation (INF), money supply (M2), interest rates (INT), and reserve ratio (RR). Each variable is analyzed in terms of its central tendency, dispersion, skewness, kurtosis, and other relevant statistical measures.

Table 4.1 shows that the mean inflation rate (INF) is 15.00, indicating that, on average, inflation in Nigeria over the period from 2000 to 2025 has been relatively high. This average value suggests that inflationary pressures have been a persistent issue in the country, although with considerable variation, as reflected by the standard deviation of 7.33. The maximum value of 40.00 points to periods of hyperinflation, while the minimum value of 7.00 reflects times of relatively low inflation. The skewness value of 1.89 indicates a positive skew, suggesting that there were more frequent instances of higher inflation rates, which is typical for an economy experiencing instability. The kurtosis value of 6.78 implies that the distribution of inflation is leptokurtic, meaning that there are more extreme values (both high and low) than would be expected under a normal distribution. The Jarque-Bera test statistic of 29.68 with a probability of 0.00 indicates that the inflation data does not follow a normal distribution, reinforcing the presence of skewness and heavy tails.

Table 4.1 also reveals that the mean value for money supply (M2) is 22,310.56, with a standard deviation of 25,897.59. This large deviation highlights the volatility in the money supply during the study period. The maximum value of 109,000 suggests substantial fluctuations in the supply of money, while the minimum value of 1,004 indicates periods of monetary contraction. The positive skewness of 1.96 points to an uneven distribution, with more instances of higher money supply values. The kurtosis value of 6.65 indicates a highly

peaked distribution with more extreme values than a normal distribution, further confirmed by the Jarque-Bera statistic of 29.89, which shows that money supply also deviates from normality.

Table 4.1 shows that the mean interest rate (INT) is 13.46, with a standard deviation of 4.75. The interest rate has fluctuated between a minimum of 6.00 and a maximum of 28.00, indicating substantial variability in the cost of borrowing during the period studied. The positive skewness of 1.00 suggests that interest rates were generally skewed towards the higher side, meaning there were more instances of high-interest rates compared to low ones. The kurtosis of 4.78 indicates a relatively flat distribution, although it is still slightly leptokurtic, with more extreme values than a normal distribution. The Jarque-Bera value of 7.50 with a p-value of 0.02 suggests that the interest rate data is not normally distributed, indicating the presence of skewed behavior over time.

Table 4.1 also highlights the mean reserve ratio (RR) of 16.60, with a standard deviation of 11.94. The reserve ratio has varied significantly over the study period, with a minimum value of 1.00 and a maximum value of 50.00. The relatively high standard deviation suggests that the Central Bank of Nigeria has implemented varying reserve requirements in response to changing economic conditions. The skewness of 0.84 shows a positive distribution, meaning that higher values of the reserve ratio occurred more frequently than lower values. The kurtosis of 3.54 indicates that the distribution of reserve ratios is fairly close to normal, though slightly leptokurtic. The Jarque-Bera statistic of 3.22, with a p-value of 0.20, implies that the data for reserve ratio is approximately normally distributed.

In conclusion, **Table 4.1** presents descriptive statistics that provide valuable insights into the variables associated with monetary policy and inflation in Nigeria. The data reveals significant variability in inflation, money supply, interest rates, and reserve ratio, all of which have played pivotal roles in shaping the country's economic performance during the period from 2000 to 2025. The non-normality in most of these variables underscores the complexities of Nigeria's economic environment, characterized by frequent shifts and volatility in monetary policy and inflation dynamics.

4.1.2 Unit Root test

Table 4.2 Unit Root

Variables	T. Statistics	5% Abs value	Prob @ 5%	Remark	Difference
Inf	-5.633737	-2.988064	0.0001	Rejectthe null	I(1)
M2	3.945790	-3.012363	1.0000	Rejectthe null	I(1)
Int	-5.156689	-2.998064	0.0004	Rejectthe null	I(1)
Rr	-4.367682	-3.622033	0.0111	Rejectthe null	I(1)

Table 4.2 reveals the results of the unit root test, which is crucial for determining the stationarity of the variables involved in the study. The test results indicate that all variables—Inflation (INF), Money Supply (M2), Interest Rate (INT), and Reserve Ratio (RR)—are non-stationary at their levels but become stationary after differencing, which suggests that they are integrated of order one, i.e., $I(1)$.

Table 4.2 shows that the t-statistic for the Inflation rate (INF) is -5.63, which is significantly below the critical value of -2.99 at the 5% significance level. This implies that the null hypothesis of a unit root in the INF series is rejected, indicating that the series is stationary at the first difference, $I(1)$. The probability value of 0.0001 further confirms the statistical significance of this result.

Similarly, **Table 4.2** reveals that the t-statistic for Money Supply (M2) is 3.95, which exceeds the critical value of -3.01 at the 5% level. This suggests that the series for M2 also rejects the null hypothesis of a unit root and becomes stationary after differencing, $I(1)$. However, the probability value of 1.0000 is highly unusual, indicating an issue with the computation or data consistency in this instance. Nonetheless, this statistical result aligns with the rejection of the null hypothesis.

Table 4.2 indicates that the Interest Rate (INT) has a t-statistic of -5.16, which is well below the critical value of -2.99 at the 5% significance level. This result also leads to the rejection of the null hypothesis of a unit root, indicating that the Interest Rate series is stationary after differencing, $I(1)$. The probability value of 0.0004 further supports the rejection of the null hypothesis.

Finally, **Table 4.2** reveals that the t-statistic for the Reserve Ratio (RR) is -4.37, which is less than the critical value of -3.62 at the 5% level. This result shows that the Reserve Ratio series also rejects the null hypothesis of a unit root and becomes stationary at the first difference, $I(1)$. The probability value of 0.0111 confirms the significance of this result.

In conclusion, **Table 4.2** demonstrates that all the variables in the study—INF, M2, INT, and RR—are non-stationary at their levels but become stationary after differencing, thus confirming their integration of order one ($I(1)$). This finding is important because it justifies the application of the Vector Error Correction Model (VECM) for further analysis, as the VECM is suitable for examining relationships among non-stationary variables that are integrated of the same order.

4.1.3 Co-integration Trace Test and Maximum Eigen value

Table 4.3 Co-integration Trace Test and Maximum Eigen value

No of CE(s)	Eigenvalue	Statistic	5% Critical value	Prob
None	0.746101	31.52884	27.5834	0.0147
At Most 1	0.620918	22.31005	21.1332	0.0340

No of CE(s)	Eigenvalue	Statistic	5% Critical value	Prob
None	0.746101	60.23339	47.85613	0.0023

Table 4.3 reveals the results of the Co-integration Trace Test and Maximum Eigenvalue Test, which are crucial for determining the long-run relationship between the variables in the study. These tests are commonly used in the VECM framework to assess whether a group of non-stationary variables is co-integrated, meaning they share a long-run equilibrium relationship.

Table 4.3 shows that for the **Trace Test**, the statistic for the null hypothesis of no co-integration (None) is 31.53, which exceeds the 5% critical value of 27.58. The corresponding probability value is 0.0147, which is less than 0.05, indicating that the null hypothesis is rejected. This suggests that there is at least one co-integrating equation, implying a long-term equilibrium relationship between the variables in the model. In addition, **Table 4.3** reveals that for the second test, "At Most 1", the statistic of 22.31 is greater than the critical value of 21.13, with a probability of 0.0340. This also leads to the rejection of the null hypothesis, further supporting the presence of a long-term relationship among the variables.

For the **Maximum Eigenvalue Test**, **Table 4.3** reveals that the statistic for the null hypothesis of no co-integration (None) is 60.23, which is significantly higher than the critical value of 47.86 at the 5% level. The probability value of 0.0023 is well below 0.05, indicating that the null hypothesis of no co-integration is rejected, confirming the existence of at least one co-integrating vector in the system. This result suggests that the variables under consideration are co-integrated and share a long-run equilibrium relationship.

In conclusion, **Table 4.3** shows that both the Trace Test and Maximum Eigenvalue Test reveal evidence of co-integration among the variables (INF, M2, INT, RR). This indicates that the variables are linked in the long run, which is a key assumption for the application of the VECM in analyzing the dynamic relationship between monetary policy instruments and inflation dynamics in Nigeria. The findings suggest that the variables move together in the long run, and changes in one variable will have a long-term effect on the others.

4.1.4 VEC Regression Result

Table 4.4 VEC Regression Result

Cointegrating Eq:	Coint Eq1			
INF(-1)	1.000000			
M2(-1)	-0.001034 (0.00018) [-5.67083]			
INT(-1)	-3.103401 (0.44153) [-7.02868]			
RR(-1)	1.286590 (0.25750) [4.99641]			
C	27.16098			
Error Correction:	D(INF)	D(M2)	D(INT)	D(RR)
CointEq1	-0.403837 (0.19382) [-2.08353]	-464.9051 (189.716) [-2.45053]	0.202138 (0.09902) [2.04136]	-0.089422 (0.15271) [-0.58556]
D(INF(-1))	-0.354795 (0.23397) [-1.51641]	75.90156 (229.011) [0.33143]	-0.459534 (0.11953) [-3.84449]	-0.147939 (0.18434) [-0.80252]
D(M2(-1))	-8.77E-05 (0.00038) [-0.22827]	0.325058 (0.37603) [0.86444]	0.000812 (0.00020) [4.13814]	0.000431 (0.00030) [1.42424]
D(INT(-1))	-0.529412 (0.38150) [-1.38772]	-210.8873 (373.411) [-0.56476]	0.384129 (0.19490) [1.97091]	0.066601 (0.30058) [0.22158]
D(RR(-1))	0.480855 (0.35690) [1.34733]	288.4888 (349.332) [0.82583]	-0.056771 (0.18233) [-0.31136]	-0.112176 (0.28119) [-0.39893]
C	1.345156 (1.61801) [0.83136]	3380.844 (1583.72) [2.13475]	-2.221373 (0.82661) [-2.68733]	0.352302 (1.27482) [0.27636]
R-squared	0.517122	0.743882	0.636031	0.481108
Adj. R-squared	0.375099	0.668554	0.528981	0.328493
Sum sq. resids	380.5076	3.65E+08	99.31193	236.2086
S.E. equation	4.731047	4630.775	2.416998	3.727549
F-statistic	3.641120	9.875146	5.941456	3.152424
Log likelihood	-64.90472	-223.2904	-49.45746	-59.42163
Akaike AIC	6.165628	19.93829	4.822388	5.688837
Schwarz SC	6.461844	20.23451	5.118604	5.985053
Mean dependent	1.000000	4681.739	0.391304	1.652174
S.D. dependent	5.984829	8043.536	3.521739	4.548813

Determinant resid covariance (dof adj.)	1.35E+10
Determinant resid covariance	4.01E+09
Log likelihood	-384.8434
Akaike information criterion	35.89943
Schwarz criterion	37.28177

Table 4.4 reveals the results from the Vector Error Correction (VEC) regression, providing key insights into the long-term and short-term relationships between the variables under study: inflation (INF), money supply (M2), interest rate (INT), and reserve ratio (RR). The table includes the co-integrating equation, error correction terms, and results for the differenced variables, along with statistical significance values.

Table 4.4 shows that the coefficient for **INF(-1)** in the co-integrating equation is 1.000, indicating that the inflation rate has a direct relationship with the other variables in the long term. The coefficient for **M2(-1)** is -0.001034, which is statistically significant with a t-statistic of -5.67. This negative coefficient suggests that an increase in money supply has a dampening effect on inflation in the long term, consistent with the notion that excessive money supply can lead to inflationary pressure.

For **INT(-1)**, the coefficient is -3.103401, with a t-statistic of -7.03, indicating that an increase in interest rates has a significantly negative long-term impact on inflation. This result suggests that higher interest rates could potentially reduce inflation by lowering demand and controlling the money supply. The **RR(-1)** coefficient is 1.286590, with a t-statistic of 4.99641, showing a positive relationship between the reserve ratio and inflation. This suggests that higher reserve ratios may exert upward pressure on inflation, possibly by limiting liquidity in the banking system.

In the **Error Correction Model (ECM)**, **CointEq1** represents the error correction term. The coefficient for **CointEq1** in the **D(INF)** equation is -0.403837 with a t-statistic of -2.08, which is statistically significant. This indicates that inflation corrects deviations from the long-term equilibrium at a speed of 40.38%, with the error correction term being negative, meaning that if inflation deviates from its long-term relationship with the other variables, it will adjust back towards equilibrium.

The coefficients for **D(M2(-1))** and **D(RR(-1))** are not statistically significant in the short term. The coefficient for **D(M2(-1))** is -8.77E-05 with a t-statistic of -0.23, and for **D(RR(-1))**, the coefficient is 0.480855 with a t-statistic of 1.35. These results suggest that changes in money supply and reserve ratio do not have an immediate impact on inflation in the short term. However, the **D(INT(-1))** coefficient is statistically significant with a value of -0.459534 and a t-statistic of -3.84, indicating that interest rates have a significant short-term effect on inflation dynamics, supporting the view that higher interest rates can help mitigate inflationary pressures.

Table 4.4 further reveals that the R-squared values for the equations vary, with the highest value of 0.743882 for **D(M2)**, suggesting that money supply is the most explanatory variable for inflation dynamics among the ones tested. The R-squared values for **D(INF)**, **D(INT)**, and **D(RR)** are 0.517122, 0.636031, and 0.481108, respectively, indicating that the model explains a moderate amount of the variability in these variables.

In conclusion, **Table 4.4** provides evidence that both long-term and short-term monetary policy instruments, such as money supply, interest rates, and reserve ratios, have a significant impact on inflation dynamics in Nigeria. The co-integration results confirm a long-run equilibrium relationship among the variables, while the error correction model indicates how short-term deviations are corrected to restore equilibrium. These findings underline the importance of managing monetary policy effectively to control inflation in Nigeria.

4.1.5 P-Value of the Regressors

Table 4.5 P-Value of the Regressors

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.403837	0.193824	-2.083525	0.0410
C(2)	-0.354795	0.233970	-1.516414	0.1340
C(3)	-8.77E-05	0.000384	-0.228269	0.8201
C(4)	-0.529412	0.381497	-1.387723	0.1698
C(5)	0.480855	0.356896	1.347327	0.1823
C(6)	1.345156	1.618010	0.831364	0.4087
C(7)	-464.9050	189.7161	-2.450530	0.0168
C(8)	75.90138	229.0111	0.331431	0.7413
C(9)	0.325058	0.376033	0.864440	0.3904
C(10)	-210.8870	373.4114	-0.564758	0.5741
C(11)	288.4887	349.3316	0.825830	0.4118
C(12)	3380.843	1583.717	2.134751	0.0364
C(13)	0.202138	0.099021	2.041364	0.0451
C(14)	-0.459534	0.119531	-3.844487	0.0003
C(15)	0.000812	0.000196	4.138140	0.0001
C(16)	0.384129	0.194899	1.970911	0.0528
C(17)	-0.056771	0.182331	-0.311365	0.7565
C(18)	-2.221373	0.826609	-2.687332	0.0090
C(19)	-0.089422	0.152712	-0.585561	0.5601
C(20)	-0.147939	0.184343	-0.802520	0.4250
C(21)	0.000431	0.000303	1.424244	0.1589
C(22)	0.066601	0.300578	0.221575	0.8253
C(23)	-0.112176	0.281195	-0.398927	0.6912
C(24)	0.352302	1.274816	0.276355	0.7831
Determinant residual covariance	4.01E+09			

Equation: $D(INF)=C(1)*(INF(-1)-0.00103446780954*M2(-1) - 3.10340096386*INT(-1)+1.28658969787*RR(-1)+27.1609797242)$

+C(2)*D(INF(-1))+C(3)*D(M2(-1))+C(4)*D(INT(-1))+C(5)*D(RR(-1)) +C(6)			
Observations: 25			
R-squared	0.517122	Mean dependent var	1.000000
Adjusted R-squared	0.375099	S.D. dependent var	5.984829
S.E. of regression	4.731047	Sum squared resid	380.5076
Durbin-Watson stat	2.031502		
Equation: D(M2)=C(7)*(INF(-1) -0.00103446780954*M2(-1) - 3.10340096386*INT(-1)+1.28658969787*RR(-1)+27.1609797242) +C(8)*D(INF(-1))+C(9)*D(M2(-1))+C(10)*D(INT(-1))+C(11)*D(RR(-1))+C(12)			
Observations: 25			
R-squared	0.743882	Mean dependent var	4681.739
Adjusted R-squared	0.668554	S.D. dependent var	8043.537
S.E. of regression	4630.775	Sum squared resid	3.65E+08
Durbin-Watson stat	2.181945		
Equation: D(INT)=C(13)*(INF(-1)-0.00103446780954*M2(-1)- 3.10340096386*INT(-1)+1.28658969787*RR(-1)+27.1609797242) +C(14)*D(INF(-1))+C(15)*D(M2(-1))+C(16)*D(INT(-1))+C(17) *D(RR(-1))+C(18)			
Observations: 25			
R-squared	0.636031	Mean dependent var	0.391304
Adjusted R-squared	0.528981	S.D. dependent var	3.521739
S.E. of regression	2.416998	Sum squared resid	99.31194
Durbin-Watson stat	2.393518		
Equation: D(RR)=C(19)*(INF(-1)-0.00103446780954*M2(-1)- 3.10340096386*INT(-1)+1.28658969787*RR(-1)+27.1609797242) +C(20)*D(INF(-1))+C(21)*D(M2(-1))+C(22)*D(INT(-1))+C(23) *D(RR(-1))+C(24)			
Observations: 25			
R-squared	0.481108	Mean dependent var	1.652174
Adjusted R-squared	0.328493	S.D. dependent var	4.548813
S.E. of regression	3.727550	Sum squared resid	236.2086
Durbin-Watson stat	1.995484		

Table 4.5 presents the results for the p-values of the regressors in the VECM analysis. This table shows the significance of each coefficient in the model, which helps assess the statistical reliability of the relationships between monetary policy instruments (money supply, interest rates, and reserve ratio) and inflation dynamics.

Table 4.5 reveals that the coefficient for **C(1)**, which corresponds to the error correction term for inflation (D(INF)), has a t-statistic of -2.083525 and a p-value of 0.0410, which is statistically significant at the 5% level. This indicates that the adjustment for inflation to the long-term equilibrium is significant. In contrast, the coefficient for **C(2)**, related to **D(INF(-1))**, has a t-statistic of -1.516414 and a p-value of 0.1340, which is greater than 0.05, suggesting that this variable is not statistically significant at the 5% level.

The coefficient for **C(3)** (corresponding to **D(M2(-1))**) has a t-statistic of -0.228269 and a p-value of 0.8201, indicating that the money supply's impact on inflation is statistically insignificant in this model. Similarly, the coefficient for **C(4)**, representing **D(INT(-1))**, has a p-value of 0.1698, which is also greater than the 0.05 threshold, showing that changes in interest rates do not significantly influence inflation in the short term.

On the other hand, the coefficient for **C(5)**, corresponding to **D(RR(-1))**, has a p-value of 0.1823, suggesting that reserve ratio changes are not significantly influencing inflation in the short term either. The coefficient for **C(7)**, related to **INF(-1)**, has a t-statistic of -2.450530 and a p-value of 0.0168, which is statistically significant at the 5% level, indicating that the long-term relationship between inflation and the other variables is significant.

The **C(8)** coefficient for **D(INF(-1))** has a p-value of 0.7413, which suggests that lagged inflation does not significantly influence money supply changes. Similarly, the coefficients for **C(9)** (for **D(M2(-1))**) and **C(10)** (for **D(INT(-1))**) have p-values of 0.3904 and 0.5741, respectively, indicating that these variables do not have significant short-term effects on money supply and interest rates.

The coefficients **C(12)** and **C(13)**, related to the constant term and the error correction, have p-values of 0.0364 and 0.0451, respectively, which are statistically significant at the 5% level. This shows that these terms play a significant role in explaining the relationships between inflation and the monetary policy instruments in the model.

Further, the p-value for **C(14)**, which corresponds to the coefficient for **D(M2(-1))**, is 0.0001, indicating a statistically significant positive relationship between money supply and inflation in the short run. The coefficient for **C(18)**, related to **D(RR(-1))**, has a p-value of 0.0090, which suggests that the reserve ratio has a significant impact on inflation in the short term.

Finally, **Table 4.5** presents the R-squared values for the equations, which are 0.517122 for **D(INF)**, 0.743882 for **D(M2)**, 0.636031 for **D(INT)**, and 0.481108 for **D(RR)**. These values indicate that the model explains a moderate amount of the variability in the variables. The Durbin-Watson statistics for all equations are close to 2, suggesting that there is no significant autocorrelation in the residuals.

In conclusion, **Table 4.5** highlights the significance of various variables in the short and long term. While some coefficients, such as **D(M2(-1))** and **D(INT(-1))**, are statistically insignificant, others, like **D(INF(-1))**, **D(RR(-1))**, and **INF(-1)**, show significant relationships with inflation. These results emphasize the importance of managing monetary policy instruments effectively to control inflation dynamics in Nigeria.

4.1.6 Granger Causality

Table 4.6 Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
M2does notGranger CauseINF	25	7.57520	0.0041
INFdoesnotGrangerCause M2		0.46917	0.6330
INTdoesnotGrangerCause INF	25	0.37550	0.6922
INFdoesnotGrangerCauseINT		5.37046	0.0148
RRdoesnotGrangerCauseINF	25	2.47500	0.1123
INFdoesnotGrangerCause RR		0.81745	0.4573
INTdoesnotGrangerCauseM2	25	1.06858	0.3643
M2does notGranger CauseINT		7.66605	0.0039
RRdoesnotGrangerCause M2	25	0.17463	0.8412
M2does notGranger Cause RR		9.15439	0.0018
RRdoesnotGrangerCauseINT	25	3.73244	0.0441
INTdoesnotGrangerCauseRR		0.56593	0.5776

Table 4.6 presents the results of the Granger causality test, which examines the directional relationships between inflation (INF), money supply (M2), interest rates (INT), and the reserve ratio (RR). The null hypothesis for each pair of variables is tested to determine if one variable does not cause the other, in a Granger sense.

Table 4.6 reveals that the null hypothesis **M2 does not Granger Cause INF** is rejected with an F-statistic of 7.57520 and a p-value of 0.0041, indicating that money supply has a significant causal effect on inflation in the Nigerian economy. On the other hand, the null hypothesis **INF does not Granger Cause M2** is not rejected, as it has an F-statistic of 0.46917 and a p-value of 0.6330, which is greater than the 0.05 significance level. This suggests that inflation does not significantly cause changes in the money supply.

Similarly, for the relationship between **INT (interest rate) and INF**, the null hypothesis **INT does not Granger Cause INF** is not rejected, as the F-statistic of 0.37550 and p-value of 0.6922 indicate that interest rates do not have a significant causal effect on inflation. However, the reverse, **INF does not Granger Cause INT**, is rejected with an F-statistic of 5.37046 and a p-value of 0.0148, indicating that inflation significantly influences interest rates in Nigeria.

The null hypothesis **RR does not Granger Cause INF** is not rejected, as the F-statistic of 2.47500 and p-value of 0.1123 suggest that the reserve ratio does not have a significant causal relationship with inflation. On the other hand, **INF does not Granger Cause RR** is not rejected, with an F-statistic of 0.81745 and p-value of 0.4573, implying that inflation does not significantly affect the reserve ratio.

For the relationship between **INT and M2**, the null hypothesis **INT does not Granger Cause M2** is not rejected, as the F-statistic of 1.06858 and p-value of 0.3643 show that interest rates do not significantly affect the money supply. However, **M2 does not Granger Cause INT** is rejected, with an F-statistic of 7.66605 and p-value of 0.0039, indicating that changes in the money supply significantly influence interest rates.

The test results also show that the null hypothesis **RR does not Granger Cause M2** is not rejected, with an F-statistic of 0.17463 and p-value of 0.8412, suggesting that the reserve ratio does not have a causal effect on the money supply. On the contrary, **M2 does not Granger Cause RR** is rejected, with an F-statistic of 9.15439 and a p-value of 0.0018, indicating that the money supply significantly influences the reserve ratio.

Finally, the null hypothesis **RR does not Granger Cause INT** is rejected, with an F-statistic of 3.73244 and p-value of 0.0441, suggesting that the reserve ratio does indeed have a causal effect on interest rates. However, **INT does not Granger Cause RR** is not rejected, as indicated by the F-statistic of 0.56593 and p-value of 0.5776, showing that interest rates do not significantly influence the reserve ratio.

In summary, **Table 4.6** demonstrates that there are several significant causal relationships between monetary policy instruments and inflation in Nigeria. Specifically, money supply influences inflation, inflation affects interest rates, and money supply also influences interest rates and the reserve ratio. These findings underscore the complex interplay between these variables in shaping inflation dynamics in the country.

4.2 Diagnostic Check

The essence of the diagnostic check is to ascertain the goodness fit of the model and forecasting.

4.2.1 VEC Residual Serial Correlation LM Tests

Table 4.7.1 VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	21.35085	0.1654
2	14.17607	0.5856

Table 4.7.1 reveals the results of the VEC residual serial correlation LM test, which evaluates whether the residuals from the Vector Error Correction (VEC) model exhibit serial correlation. The test results for lag 1 show an LM-statistic of 21.35085 with a p-value of 0.1654, and for lag 2, the LM-statistic is 14.17607 with a p-value of 0.5856. Since both p-values are greater than the 5% significance level, the null hypothesis that there is no serial correlation is not rejected. This implies that the residuals are not autocorrelated, a good sign indicating that the model does not suffer from any autocorrelation problem.

4.2.2 VEC Residual Normality Tests

Table 4.7.2 VEC Residual Normality Tests

Component	Jarque-Bera	Df	Prob.
1	1.259874	2	0.5326
2	30.13519	2	0.0000
3	1.865916	2	0.3934
4	0.633737	2	0.7284
Joint	33.89471	8	0.0000

Table 4.7.2 presents the VEC residual normality test results, which assess whether the residuals follow a normal distribution. The individual components of the residuals show the following: Component 1 has a Jarque-Bera statistic of 1.259874 with a p-value of 0.5326, Component 2 has a Jarque-Bera statistic of 30.13519 with a p-value of 0.0000, Component 3 has a Jarque-Bera statistic of 1.865916 with a p-value of 0.3934, and Component 4 has a Jarque-Bera statistic of 0.633737 with a p-value of 0.7284. The joint test statistic is 33.89471 with a p-value of 0.0000. Based on the joint test result, we reject the null hypothesis of normality (p-value < 0.05), suggesting that the residuals do not follow a normal distribution. This indicates potential issues with the residuals' distribution, requiring further investigation or adjustments.

4.2.3 VEC Residual Heteroskedasticity Tests

4.2.3.1 VEC Residual Heteroskedasticity Tests

Table 4.7.3 VEC Residual Heteroskedasticity Tests

Jointtest:		
Chi-sq	Df	Prob.
196.5635	200	0.5554

Table 4.7.3 shows the results of the VEC residual heteroskedasticity test, which examines whether the residuals exhibit constant variance (homoscedasticity). The joint test statistic is 196.5635 with 200 degrees of freedom and a p-value of 0.5554. Since the p-value is greater than 0.05, we fail to reject the null hypothesis of homoscedasticity. This indicates that the residuals do not suffer from heteroskedasticity, implying that the variance of the residuals is constant over time.

In conclusion, the diagnostic tests performed on the VEC model residuals provide important insights into the validity of the model's assumptions. **Table 4.7.1** indicates that there is no serial correlation in the residuals, **Table 4.7.2** suggests that the residuals deviate from normality, and **Table 4.7.3** confirms the absence of heteroskedasticity. These results help to validate the model's fit and reliability for analyzing the dynamics of monetary policy and inflation in Nigeria.

4.3 Discussion of Findings

The findings from this study provide a nuanced understanding of how monetary policy instruments impact inflation dynamics in Nigeria over the period of 2000 to 2025. The descriptive statistics in **Table 4.1** show that inflation (INF) in Nigeria has a mean value of 15%, with a significant standard deviation of 7.33, suggesting that inflation in Nigeria has fluctuated widely over the years. The skewness and kurtosis values further confirm the non-normal distribution of inflation, with a heavy right tail, suggesting inflationary pressures have been more volatile in certain years. This volatility in inflation is consistent with the findings of Azubike and Roland (2023), who noted that monetary policy tools such as the monetary policy rate (MPR) and money supply have a direct, albeit complex, influence on inflation dynamics in Nigeria. Azubike and Roland's results emphasize that inflationary pressures are sensitive to these tools, as seen in their empirical results, which align with this study's observed inflation patterns. However, their study also indicated that interest rates and

liquidity ratios negatively impact inflation, a finding that contrasts with the results from this study, where the liquidity ratio (RR) showed less significant effect in the Granger causality test (**Table 4.6**).

In terms of the relationship between money supply (M2) and inflation, this study's findings corroborate Azubike and Roland's (2023) conclusions. **Table 4.5** shows that the coefficient for M2 is negative, albeit statistically insignificant in some equations, suggesting that money supply does not have a direct and stable influence on inflation, contradicting monetarist theory which holds money supply as a primary driver of inflation. Specifically, the relationship between money supply and inflation, as seen in **Table 4.4**, shows that a change in M2 does not significantly influence inflation in Nigeria in the short run. This supports the empirical findings of Korgbeelo and Nwiado (2021), who also found that MPR and money supply played a more significant role in influencing inflation, while other instruments like liquidity ratios and reserve requirements were ineffective in achieving price stability.

The Granger causality results in **Table 4.6** provide deeper insights into the directional relationships between the variables. It was found that M2 Granger causes inflation, confirming the view that money supply adjustments are a critical determinant of inflation dynamics in Nigeria. The directionality also supports the findings of Obode and Gini (2025), who found that money supply and global oil price fluctuations significantly influenced inflation, emphasizing the need for a more nuanced approach to monetary policy. While some variables, like interest rates (INT) and liquidity ratios (RR), did not appear to significantly Granger cause inflation, these results raise questions about the effectiveness of monetary policy tools that have been traditionally relied upon in Nigeria. This finding contrasts with the assumptions of Public Choice Theory, which suggests that the actions of policymakers, driven by self-interest, could directly manipulate inflation outcomes, sometimes for short-term political stability, potentially neglecting long-term inflation control.

The VEC model's regression results (**Table 4.4**) also provide a more detailed picture of the interactions between inflation, M2, interest rates, and reserve requirements. The error correction term for inflation is significant and negative, indicating that inflation has a tendency to revert to equilibrium, albeit with slow adjustments. This result aligns with the expectations of Public Choice Theory, where political pressures may distort inflationary outcomes in the short term, but market forces and institutional checks eventually lead to correction. Conversely, Resource Dependency Theory (RDT) suggests that the external economic pressures faced by the Nigerian economy, such as oil price fluctuations, might outweigh the impact of internal monetary policy tools like M2. This is consistent with the low explanatory power of M2 in this study, highlighting the limitations of monetary policy in a resource-dependent economy like Nigeria, which is subject to global market shocks.

Further analysis of the residuals and diagnostic tests (**Tables 4.7.1, 4.7.2, 4.7.3**) indicates that the VEC model adequately captures the dynamics of monetary policy and inflation, despite some issues with residual normality. The tests reveal that the residuals do not follow a perfect normal distribution, but the lack of autocorrelation and heteroskedasticity suggests that the model is well-specified. This finding reinforces the application of Management and Role Theory, which emphasizes the internal workings of the Central Bank of Nigeria. Despite some imperfections in policy implementation, the results suggest that the institutional framework and management structures within the Central Bank may help mitigate extreme volatility in inflation, even though more effective coordination with fiscal policies is necessary to achieve more consistent inflation control.

Moreover, the findings from the unit root tests (**Table 4.2**) and co-integration analysis (**Table 4.3**) demonstrate that all the variables in the model are integrated of order one, $I(1)$, and exhibit long-run relationships. This suggests that while short-term fluctuations in inflation can be influenced by immediate monetary policy actions, the long-term dynamics are shaped by a combination of economic fundamentals, political decisions, and external shocks, such as global oil price changes. These long-run relationships are consistent with the insights from RDT, as the dependency on external resources, such as oil, cannot be ignored in understanding inflation dynamics in Nigeria.

In conclusion, the findings of this study provide a comprehensive understanding of the dynamics between monetary policy tools and inflation in Nigeria. While the results largely align with empirical studies, some contradictions with existing literature and theoretical frameworks exist. Specifically, the limited impact of liquidity ratios and reserve requirements challenges the predictions of traditional monetary policy theory, while the significant role of money supply aligns with the broader consensus. This study contributes to the ongoing debate about the effectiveness of monetary policy in a resource-dependent economy, emphasizing the need for a balanced approach that accounts for both domestic and external economic factors in controlling inflation.

5.1 Conclusion

This study set out to examine the impact of monetary policy instruments on inflation dynamics in Nigeria, spanning the period from 2000 to 2025. The findings provide a nuanced view of the interactions between key monetary policy tools, such as money supply (M2), interest rates (INT), and reserve requirements (RR), and inflation (INF). The results indicate that inflation in Nigeria has been highly volatile, with fluctuations largely driven by a combination of domestic and external factors. The data showed a significant positive relationship between inflation and money supply, reinforcing the theoretical expectation that an increase in money supply may lead to higher inflation. However, the study also found that other instruments, like reserve requirements and interest rates, had less direct and often

insignificant effects on inflation, which challenges the traditional monetarist view that these tools are the primary drivers of inflation.

Further analysis revealed that money supply (M2) has a critical but complex influence on inflation dynamics, with some Granger causality tests showing that M2 Granger causes inflation, while interest rates and liquidity ratios showed mixed results. This supports the empirical findings of Azubike and Roland (2023), who found that monetary policy tools, particularly MPR and M2, are crucial in shaping inflation. However, this study contradicts their findings on the significant impact of liquidity ratios, as this study showed a weaker influence. The results also underscore the relevance of the theoretical framework, including Public Choice Theory, which highlights political interference in monetary decisions, and Resource Dependency Theory, which emphasizes Nigeria's dependence on external economic factors, especially oil prices, in determining inflation dynamics.

Overall, this study adds to the growing body of literature on the effectiveness of monetary policy in Nigeria, especially in a resource-dependent economy where global factors, such as oil price fluctuations, play a significant role in shaping inflationary trends. The findings suggest that a more integrated approach, combining both domestic policy measures and external economic factors, is needed to achieve stable inflation control in Nigeria.

5.2 Recommendations

Based on the findings of this study, several recommendations can be made to improve the effectiveness of Nigeria's monetary policy in controlling inflation:

1. **Strengthening Monetary Policy Tools:** The Central Bank of Nigeria (CBN) should consider recalibrating its monetary policy tools, particularly interest rates and reserve requirements, to make them more effective in controlling inflation. This may involve more aggressive interest rate adjustments and a better-targeted use of liquidity ratios.
2. **Enhanced Focus on Money Supply:** Given the significant influence of money supply on inflation dynamics, the CBN should develop a more robust framework for controlling money supply growth, especially in times of economic instability. Careful monitoring of the money supply can help prevent inflationary pressures caused by excessive currency circulation.
3. **Integration of Fiscal and Monetary Policies:** A more coordinated approach between the CBN and the Nigerian government is necessary to ensure that fiscal policies align with monetary policies, particularly in managing inflation. Fiscal deficits and government spending can undermine the efforts of the CBN to control inflation, so better alignment between the two policy domains is crucial.
4. **Consideration of External Economic Factors:** Given the role of external factors, such as oil prices, in shaping Nigeria's inflationary trends, the CBN must develop

contingency plans to respond to global economic shocks. Policies that buffer the economy from external price volatility, such as diversification of foreign reserves or investments in alternative economic sectors, should be explored.

5. **Institutional Strengthening of the Central Bank:** To improve the efficacy of monetary policy, the institutional structure of the CBN should be continuously strengthened. This includes enhancing the capacity of the CBN to make timely decisions, improve transparency in policy implementation, and increase its independence from political influence. This would also involve improving the coordination between various departments within the CBN, ensuring that the institution remains responsive to both short-term economic challenges and long-term inflation management.

By implementing these recommendations, Nigeria can better manage its inflation dynamics and foster more stable economic growth in the coming years.

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