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IMPACT OF MONETARY POLICY ON INFLATION IN NIGERIA: VECM APPROACH.

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ABSTRACT

The research examined the impact of monetary policy on inflation in Nigeria from 2000 to 2024. The study aimed to assess the influence of monetary policy tools such as interest rates, the cash reserve ratio (CRR), and money supply on inflation. Secondary data were sourced from central banks and relevant institutions. The study employed econometric tools, including unit root testing, co-integration analysis, and the Vector Error Correction Model (VECM), to investigate both short- and long-run dynamics. The findings revealed that monetary policy significantly affects inflation in the long run, with an error correction term (ECT) indicating that long-term disequilibria are adjusted at a speed of 40.3% annually. The money supply emerged as a critical determinant, exhibiting both long-run and short-run causal relationships with inflation. However, interest rates and the cash reserve ratio showed limited long-run convergence and short-run causality with inflation. Additionally, Granger causality tests highlighted unidirectional relationships between money supply and inflation, as well as between reserve ratios and interest rates. The study recommends implementing stringent contractionary monetary policies, such as increasing the CRR, to reduce liquidity and curb inflation. It also emphasizes the need for coordination between monetary and fiscal policies to minimize policy conflicts and enhance economic stability. Lastly, the Central Bank of Nigeria is urged to adopt robust inflation-targeting mechanisms to ensure transparency and accountability in managing inflation expectations

Keywords: Monetary policy, inflation, money supply, cash reserve ratio, interest rate, exchange rate.

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1 INTRODUCTION

Monetary policy continues to be a powerful economic policy tool that can be deployed by central banks and monetary policymakers to control economic stability, most notably by targeting inflation. Monetary policy, describes the tools in which the apex financial body used to manage interest rates, money supply, liquidity ratio and cash reserve ratio (CRR), to influences inflationary trends and broader macroeconomic stability (Mishkin, 2022). The connection between monetary policy and inflation can be traced back to classical and Keynesian economic theories. The Quantity Theory of Money, as formalized by Fisher's Equation of Exchange, suggests that an increase in money supply leads to a proportional increase in prices if output remains constant (Friedman, 2021). Central banks regularly intervene in money supply management using Open Market Operations (OMO), monetary policy interest rates, and cash reserve ratios to control inflation and foster economic growth (Clarida et al., 2021). Interest rate, one of the key monetary policy rates, affects the cost of leverage and investment decisions. According to Taylor (2021), low interest rates bring about economic activity but can lead to inflation unless carefully controlled. On the other hand, increased interest rates have dampening effects on consumption and investment, thus curbing inflation. For example, the cash reserve ratio (CRR) which sets the minimum amount of reserves that commercial banks have to hold with the central bank, puts the money supply in the hands of the central bank (Bordo Filardo, 2022). When central banks raise CRR, liquidity in the banking system is then reduced which means, inflation is suppressed. Empirical supports show the utility of monetary policy to control inflation. For instance, a study by Bernanke (2022) showed that central banks that implemented inflation-targeting frameworks, such as those in emerging markets, experienced lower inflation volatility. Moreover, Mishra and Montiel (2023) observed that a robust monetary policy response helped stabilize inflation post-pandemic disruptions. Likewise, in African countries monetary policy tightening has also been applied to control inflation resulting from supply shock and exchange rate volatility (Nkusu, 2021). Monetary policy transmission, however, is challenged in developing economies with structural rigidity and informal sectors. Adebayo and Saibu (2022) pointed out that inadequate monetary policy transmission channels can repeatedly cause inflation to coexist despite the policy changes. Specifically, the global economy has been struck again by inflationary pressures driven by geopolitical instability, commodity price hikes, and post-pandemic rebound, adding another layer of complexity to monetary policy management (BIS, 2023).

Monetary policies effects on inflation are important to study, especially in the family of economies where inflationary pressures are of great interest and it impact on economic growth, employment, and societal well-being. This study will analyze how the inflation rate, interest rate, cash reserve ratio, and money supply interact within the monetary policy framework to influence inflationary outcomes. The study aims to investigate the impact of monetary policy tools—interest rate, cash reserve ratio, and money supply on inflation rates. The driving force of this study emanated from the fact that central banks have tried to keep inflation in check using monetary policy, inflationary pressures are not abated by structural and global causes. This paper will explore the degree to which policy variables used by monetary authorities affect inflation and what gaps exist in their effectiveness, especially in rapidly developing economy

2. LITERATURE REVIEW

2.1 Conceptual frameworks

Cash Reserve Ratio: This is the ratio of the total deposits of a commercial bank which has to be kept in the form of reserves with the central bank. It is an important monetary policy variable for liquidity control and financial stability. Through CRR increase, monetary policy responds with the restriction of the availability of funds for the lending market i.e. diminishing the amount of excess money supply and inflation (Bordoand Filardo, 2022). In addition, a reduced CRR encourages liquidity by pushing borrowing and economic activity forward (Mishkin, 2022). CRR is particularly effective in economies with robust banking systems but may have a limited impact in economies with significant informal financial sectors (Taylor, 2021).

Inflation Rate: This represents the percentage increase in the monetary value of commodities and services over a given time, generally on an annual basis. It is frequently quantified by indices of Consumer Price Index (CPI) or Producer Price Index (PPI) (Blanchard et al., 2023). Inflation reduces buying power, dampens savings, and pose a potentially negative effect on economic growth by not being controlled (Forbes, 2023). Central banks work towards low and steady inflation using monetary policy actions, ie, interest rate changes and liquidity control (Gali, 2022).

Interest Rate: Reflects borrowing cost or saving rate and is one of the most important instruments of monetary policy. Central banks use this variable intermittently to stabilize the money supply and limit inflation. Greater interest rates curb borrowing and consumption, respectively, thereby dampening the inflationary pressure Clarida et al., 2021). Lower interest rates have the effect of encouraging activity and could result in inflation if demand exceeds supply. Interest rates also have an impact on exchange rate stability, levels ofinvestment, and growth (Bernanke, 2022).

Monetary Policy: This is a tool used by central bank to influences money supply, liquidity, and money prices to achieve macroeconomic targets, including inflation control, stabilization of unemployment, and stimulation of economic growth (Mishkin, 2022). The instruments of monetary policy are open market operation (OMO), cash reserve ratio, discount rate, and interest rate changes. Recent challenges, such as supply chain disruptions and global inflation, have made monetary policy implementation more complex (BIS, 2023).

2.2 Empirical Literature

Garru, J. A. K., & Tartiyus, E. H. (2018) researched the topic title empirical analysis of the impact of monetary policy on inflation in Nigeria (1984-2014). The econometric tool used for the study was ordinary least Squares (OLS) regression analysis. Findings revealed Broad Money Supply (BMS) and Interest Rate (IR) negatively impact the Inflation Rate (INF), while the Exchange Rate (EXR) positively impacted INF in Nigeria during the period reviewed. Concluded that monetary policy significantly influences inflation in Nigeria. Recommended that the government implement policies to reduce dependence on imports, control the money supply, and optimize interest rates to manage inflation effectively.

Fabian, E. M., & Eke, C. N. (2014) wrote on the impact of monetary policy rate on inflation in Nigeria. The study used the ordinary least squares (OLS) method. Findings informed exchange rate, and money supply significantly influence inflation, while annual treasury bill

and monetary policy do not have any significant impact. Concluded that monetary policy tools have varying degrees of effectiveness on inflation control in Nigeria. Recommended that government should focus on managing money supply and exchange rates to control inflation.

Nwosa, P. I. (2016). Research on a topic titled Monetary Policy and Inflation in Nigeria. The econometric tool used is the Vector Autoregressive (VAR) model. Findings indicate monetary policy hasa significant impact on inflation in Nigeria with money supply being a major determinant. The conclusion was that effective monetary policy is crucial for controlling inflation in Nigeria. Recommended the Central Bank manage money supply to achieve price stability.

Bank of England (2024). "Monetary Policy Report - May 2024." Employed economic analysis and inflation projections. Findings show monetary tightening has impacted inflation and economic growth, with considerations for future policy adjustments. Concluded that monetary policy decisions are crucial in managing inflation and supporting economic stability. Recommended that Continuous assessment of economic indicators to guide monetary policy decisions.

International Monetary Fund (2024) investigated Monetary Policy Issues in the UK. The study employed a comparative analysis of monetary policy effects. Findings show that the effects of monetary tightening in the UK are comparable to other advanced economies with specific implications for policy transmission. Conclusion: Understanding the impact of global monetary policies is essential for effective domestic policy formulation. Recommended that enhance communication strategies and consider international policy developments in domestic monetary policy decisions.

Tehranian, K. (2023). "Monetary Policy & Stock Market." The econometric tool used Taylor Rule Equation Analysis. Findings show that the central bank's policy rate is linked to the inflation rate and output gap, with implications for asset price volatility. Concluded that monetary policy decisions influence both macroeconomic indicators and financial markets. Recommended that government consider asset price movements when formulating monetary policy to ensure financial stability.

Bank of England (2024). "Forecasting for Monetary Policy Making and Communication at the Bank of England: A Review Assessment of forecasting approaches was used. Findings revealed that current forecasting approach aids in monetary policy decisions and their communication. Concluded that effective forecasting is vital for informed monetary policy and clear communication. Recommended that continuously improve forecasting methods to enhance policy effectiveness and transparency.

Wieladek, T., & Pascual, A. G. (2016). "Does Quantitative Easing Generate more Inflation than Conventional Monetary Policy?" The econometric tool used is Comparative analysis of quantitative easing and conventional monetary policy. Findings show quantitative easing has different inflationary effects compared to conventional monetary policy. Concluded that the type of monetary policy instrument used can lead to varying inflation outcomes. Recommended that carefully consider the choice of monetary policy tools based on desired inflation targets.

Nkusu (2021) also reviewed inflation as well as monetary policy responses in Sub-Saharan

Africa. Results showed that inflation in the region was often driven by exchange rate volatility and supply shocks rather than excessive demand.

IMF (2023) analyzed global inflation trends and policy responses. The report stated that the tight monetary policy worked to control inflation but this came at the cost of creating risks of slowdown to the economy.

2. 3 Theories

Fiscal-Monetary Interaction Theory: This theory emphasizes the relationship between fiscal policy (government expenditure and taxation) and monetary policy. Inflation can continue even if fiscal policies are expansionary, in spite of central bank monetary policy tightening. Coordinated efforts between fiscal and monetary authorities are essential for controlling inflation (IMF, 2023).

3.1 Research Design and Model of the Study

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.

3.2 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: $D(INT) = \beta_0 + \beta_{13} InfD(INF(-1) + \beta_0 + \beta_{14} InfD(INF(-1)) + \beta_0 + \beta_{15} M2D(M2(-1)) + \beta_0 + \beta_{16} IntD(INT(-1)) + \beta_0 + \beta_{17} RR(RR(-1)) + C(18) + U_t$---------- (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,
$\beta_{0=}$ 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;

β_1 - β_{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. DATA PRESENTATION

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
Sum Sq. Dev.	1288.000	1.61E+10	541.4000	3422.000
Observations	25	25	25	25

In this, descriptive statistics of four macroeconomic variables; inflation rate, money supply, interest rate, and reserve ratio for the period of 25 years range from 2000- 2024. The center of discussion is kurtosis, skewness, and Jarque-Bera statistic. The kurtosis revealed that the variables are normally distributed as their numerical values exceed three (3) leptokurtic. The skewness which measures the slope of the distribution thus shows that only the cash reserve ratio exhibit normality in absolute terms as other variables and their value are higher than zero thus failing the normality test. Similarly, the Jarque-Bera measured the differences between kurtosis and skewness of the variables under study hence indicating that only the cash reserve ratio is normally distributed at a 5% alpha level.

4.2 Unit Root test

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

Comparing each of the variables, the Absolute value of T. statistic shows that they are less than the T. Statistic revealed the variables does not have a unit root problem.

4. 3 Co-integration Trace Test and Maximum Eigen value

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

Going by the trace test shows that at none we have one co-integrating equation with a probability value of 0.0023 which is less than 5%, while the maximum Eigen value also show two co-integrating equation necessitating the use of the Vector Error Correction Model (VECM).

4.4 VEC Regression Result

Cointegrating Eq:	Coint Eq 1
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	3380.844	-2.221373	0.352302
	(1.61801)	(1583.72)	(0.82661)	(1.27482)
	[0.83136]	[2.13475]	[-2.68733]	[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

With the help of E-view the upper boundary of the table explains the co-integrating equation and the corresponding long model while the lower part of the short run model both without their P-value. Hence it is the P value that reveals the significance of the variables (exogenous and endogenous) their coefficient and T. statistic both in the long and short run which are captured as well as their economic interpretation below

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: 23

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: 23

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: 23

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: 23

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		

The long-run coefficient of the equations is expected to show a negative coefficient to explain the relevance of ECT of the system equation. With the P-value, long-run relationship can be identified in the ECT of each of the equations with negative signs specified i-e (C1), (C7), (C19) while (C13) without a negative sign. The (C1) equation which depicted the inflation equation, the ECT coefficient has a negative sign of - 40.3% with the corresponding value 0.041% less than 5% alpha level shows that ECT is self-adjusting toward equilibrium. Looking at the (C7) equation, showcasing the money supply indicates that the ECT coefficient is negative with the value of - 464.9050 and a P- the value of 0.01% is significant to explain long-run convergence. The interest rate equation denoted by (C13) the coefficient is positive ECT coefficient (0.202138) with a corresponding significant P-value of 0.0451yet it is insignificant to explain the long run convergence of the error correction mechanism. The Reserve ratio equation denoted by (C19) shows that the coefficient is a negative sign of -

0.089422 with a P-value of 0.5601 indicating that there exists no long-run convergence of the error correction mechanism.

In summary, the long-run causal relationship through the ECT only takes effect on the inflation and money supply equation while the interest rate and cash reserve ratio equation have no long-run convergence.

Since VEC explains both the long and short-run relationship, the next is to look at the short-run relationship as portrayed in the equations. In (C1) equations which define short-run inflation, we are looking at (C3), (C4), and (C5). In this case, the P values are not significant enough to explain the short-run causal relationship with inflation.

In the short run for the money supply (C7), we have (C9), (C10), and (C11). None of the variables has a short-run causal relationship with money supply in the short run because their P values exceed the 5% significant level.

The short-run effect for interest rate equation (C13). We mirrored it to (C15), (C16) and (C17). Only (C15) which is money supply is significant to explain the short-run causality with interest rate.

Finally, the short-run causality of the reserve ratio equation (C19), we factor in the(C21), (22), and (C23). None of the variables has a short-run causality in the short run.

4.6 Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
M2 does not Granger Cause INF	23	7.57520	0.0041
INF does not Granger Cause M2		0.46917	0.6330
INT does not Granger Cause INF	23	0.37550	0.6922
INF does not Granger Cause INT		5.37046	0.0148
RR does not Granger Cause INF	23	2.47500	0.1123
INF does not Granger Cause RR		0.81745	0.4573
INT does not Granger Cause M2	23	1.06858	0.3643
M2 does not Granger Cause INT		7.66605	0.0039
RR does not Granger Cause M2	23	0.17463	0.8412
M2 does not Granger Cause RR		9.15439	0.0018
RR does not Granger Cause INT	23	3.73244	0.0441
INT does not Granger Cause RR		0.56593	0.5776

The decision criteria for Granger causality is 5%, and at 0.05% the relationship between the money supply and inflation is rejected because the probability value of 0.004% is less than the 5% prob value of F. statistic therefore exhibits unidirectional explaining the short-run causality between money supply and inflation. Also, the relationship between inflation and

money supply can't be rejected because the probability value is higher than the 5% level of significance therefore independent.

For the interest rate and inflation relationship, the probability of 69.2 % is higher than 5% exhibiting no causality effect in the short run. However, there exists causality between inflation and interest rate at 0.0148% therefore unidirectional.

The relationship between the reserve ratio and inflation in one period and the other inflation and reserve ratio can't be rejected as both prob value is higher than 5% level therefore independent.

For the interest rate and money supply there exist an independent relationship but in the case of money supply and interest rate, a causality exists as the prob value of 0.0039% is less than 5% therefore unidirectional.

For the reserve ratio and money supply relationship, there is no causality because the prob value is higher than 5% while the relationship between money supply and reserve shows that the money supply granger cause reserve ratio with a prob value of 0.0018% therefore unidirectional.

Finally, the reserve ratio and interest rate relationship, shows that the reserve ratio granger causes interest rates with a prob value of 0.0441 therefore unidirectional. However, interest rate does not exhibit independent relationship.

4.7 Diagnostic Check

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

4.7.1 VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	21.35085	0.1654
2	14.17607	0.5856

The residual serial correlation test shows the probability level is higher than 5% a good sign implied that it is not autocorrelated.

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

The VEC normality shows that the Jarque-Bera Joint test reveals that the P- value of 0.0000 less than 0.05% implies that the model is normal and not skewed. The Jarque-Bera Joint tests factored both the kurtosis and skewness together though individually the money supply is not normally distributed.

4.7.3 VEC Residual Heteroskedasticity Tests

Joint test:

Chi-sq	Df	Prob.
196.5635	200	0.5554

In this table, the model shows that it is free from Heteroskedasticity because the prob value is higher than 5% therefore it is homoscedasticity.

5.1 SUMMARY OF MAJOR FINDINGS

This research looks at the impact of monetary policy on inflation from the year 2000 to 2024 under study shows that monetary policy greatly impacted inflation with an ECT long-run adjustment coefficient of 40.3% in the short run.

The money supply equation depicted by (C7) also revealed in the research shows that money supply contributed to a long-run effect on the inflation rate with a probability value of 0.0168% and a negative ECT coefficient of -464.9050. Hence money supply has a causality effect with inflation and interest rate in the short run.

Moreover, the interest rate equation depicted by (C13) tells that interest rate does not have a long run on inflation because the ECT coefficient is not converging and causality effect in the short run.

Finally, the finding revealed in the reserve ratio equation (C19) informed that the variable does not have a long-run effect but a granger cause interest rate in the short run.

5.2 Conclusion

The study aimed to explore the impact of monetary policy on inflation in Nigeria using secondary data. Findings confirmed that monetary policy greatly influences inflation in the long run with an adjustment coefficient of 40.3% in the short run. Also, the money supply (M_2) component of the monetary policy revealed that it has a long-run effect, a short-run causality between inflation and interest rate. Moreover, shows that the reserve ratio does have short-run causality with interest rates. Based on these findings, it further explained monetary theory underpinning the relationship between money supply and it impact on inflation. Therefore implementing tight or contractionary monetary policy in Nigeria to curb inflation is essential to stabilise the economy.

5.3 Recommendation.

The apex bank should deploy a stringent contractionary monetary policy to reduce the money supply and inflation in Nigeria. This is achievable when the CBN increases the cash reserve ratio and reduces cash availability.

Also, the CBN should monitor the reserve ratio at par with the interest rate or lower. This will help to balance inflation and economic growth in Nigeria.

The monetary policies authority should work closely with fiscal authorities to align fiscal to effectively minimize conflicts, such as expansionary fiscal policies undermining contractionary monetary policies.

The CBN should adopt a more robust inflation targeting mechanism with clearly defined targets to ensure transparency and accountability in managing inflation expectations.

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