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Assessing The Impacts Of Monetary-Fiscal Policy Interactions On Economic Stability In Nigeria: A Vector Autoregressive (VAR) Approach

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ABSTRACT
This study examines the dynamic interactions between monetary and fiscal policies and their combined effects on economic stability in Nigeria using a Vector Autoregressive (VAR) model. Against the backdrop of persistent macroeconomic challenges such as high inflation, exchange rate volatility, unemployment, weak policy coordination, and structural rigidities, the study analyzes how key monetary and fiscal variables-including money supply, interest rate, monetary policy rate, government expenditure, taxation, and credit to the private sector-shape Nigeria's economic performance between 1985 and 2024. Secondary data sourced from the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS) were subjected to stationarity tests using Augmented Dickey-Fuller and Phillips–Perron methods before VAR estimation. Findings reveal strong persistence in inflation and unemployment, indicating deep structural issues, while money supply and domestic credit display high explanatory power within the VAR framework. Results further show that government expenditure significantly influences interest rates and monetary policy decisions, suggesting partial policy accommodation between fiscal and monetary authorities. Money supply emerged as a critical driver of credit to the private sector, although its impact on inflation remained weak, pointing to transmission mechanism inefficiencies. The study concludes that poor coordination between monetary and fiscal policies contributes to Nigeria's macroeconomic instability. It recommends stronger policy harmonization, improved fiscal discipline, enhanced monetary transmission mechanisms, and targeted structural reforms to promote sustainable economic stability and long-term growth.
Keywords: monetary and fiscal policies, Vector Autoregressive (VAR) model

INTRODUCTION
Governments and central banks rely on monetary and fiscal policies as their main tools for steering the economy. Monetary policy, usually managed by central banks, involves controlling the money supply and interest rates to achieve goals like keeping inflation low and maximizing employment (Hodula & Pfeifer, 2018). Fiscal policy, on the other hand, involves government decisions about spending and taxation to influence economic growth and wealth distribution (Ankargren & Shahnazarian, 2019; Idebi & Adesina-Uthman, 2022).

Fiscal policy is a crucial tool used by governments to influence economic activities through budget management, aiming for objectives such as full employment, stable prices, and overall growth (Adeniyi et al., 2020). It involves using public spending and taxation to stimulate economic growth and promote sustainable development, with the ultimate goal of reducing poverty (Idebi & Adesina-Uthman, 2022).

The coordination between these two policies is vital for maintaining economic stability; when well-coordinated, they can foster sustainable growth and manage inflation, but poor coordination can lead to economic instability (Hofmann, Lombardi, Mojon, & Orphanides, 2021). Effective management of both policies is essential for achieving specific economic goals, such as strong growth and poverty reduction (Okedina et al., 2019).

Nigeria's economy is facing significant challenges due to fluctuations in economic activity, compounded by poor fiscal discipline, lack of coordination between different levels of government, and an unreliable tax base (Oluwayemisi et al., 2024). These difficulties underscore the need to examine how fiscal policy operates and its effectiveness in supporting long-term economic growth.

However, despite these efforts, inflation remains a pressing concern. CBN data reveals inflation rates of 33.88% in October 2024, 34.60% in November 2024, and 34.80% in December 2024 (CBN, 2024). These figures are a far cry from the desired single-digit target, meaning that the high cost of living is hitting Nigerians hard. As inflation rises, people's buying power decreases, making it tougher to maintain their living standards. Furthermore, rising prices can put a damper on economic activity, hindering overall growth.

Monetary policy significantly influences Nigeria's economic development by affecting key macroeconomic indicators such as money supply, interest rates, and inflation. Recent research indicates that increasing the money supply positively impacts Nigeria's GDP, whereas elevated interest rates can impede economic growth by deterring private investment. For example, Oseni and Oyelade (2023) observed that both broad money supply and gross capital formation enhance GDP, while high lending rates obstruct growth. Similarly, Ogwuche and Obiaje (2023) identified a long-term positive correlation between economic growth and factors like exchange rate and money supply, but noted that inflation has a detrimental effect. These insights highlight the necessity for expansionary monetary policies, such as reducing interest rates, to encourage investment and promote sustainable economic growth in Nigeria. For decades researchers continue to investigate the dynamic monetary and fiscal policies and its relationship with other macroeconomic variables, for example;

Oseni and Oyelade (2023) explored the effects of monetary and fiscal policies on Nigeria's economic growth using various economic indicators. They discovered that gross capital formation, employment levels, broad money supply, and lending interest rates are key factors influencing economic growth. Specifically, gross capital formation, employment, and money supply positively affect GDP, while lending interest rates negatively affect it.

Dauda and Abdulkareem (2023) analyzed the impact of monetary policy on economic growth in Nigeria from 1990 to 2020. Using time-series data and employing Augmented Dickey-Fuller tests and ARDL bound tests, they found that monetary policy is a significant driver of economic growth. The Monetary Policy Rate (MPR) and Money Growth Rate (M2) both have a significant impact.

Kamal and AboElsoud (2023) explored the factors driving economic growth in Egypt using the Augmented Solow Model, which considers human and physical capital. The study examined GDP, capital, productivity, human capital, and employment using quintile regression to understand growth sources at different stages of reform. The findings indicated that economic growth is closely tied to human capital, productivity, and capital trends, influenced by savings volatility and population growth rates, suggesting that these factors determine Egypt's economic growth cycle.

Mwamkonko (2023) assessed the effectiveness of various monetary policy transmission channels in Tanzania. Using co-integration and error correction modeling, the study analyzed the short- and long-run effects of five transmission mechanisms on economic growth. The results showed that the impact of monetary policy on growth depends on the specific channels used. Interest rate and stock price channels were found to be ineffective in Tanzania, while the bank credit channel was weak. Exchange rates and expected inflation emerged as the most influential transmission channels for monetary policy in Tanzania.

Nweke (2023) investigated the impact of monetary and fiscal policies on economic growth in Nigeria from 1981 to 2021. The study analyzed the effects of the monetary policy rate, reserve requirement, and Treasury bill rate, along with fiscal deficit, government expenditure, and tax revenue, on per capita real GDP. Employing ADF unit root tests, ARDL co-integration, ECM, and Granger causality tests, the study found that monetary policy rate, reserve requirement, Treasury bill rate, and fiscal deficit had an insignificant negative impact on economic growth.

Olawumi (2023) examined the relationship between monetary policy instruments and the growth of Nigeria's manufacturing sector between 1981 and 2021. Using ARDL analysis, the study found that the investigated variables had a significant long-run impact on the manufacturing sector.

Ogboghro (2023) compared domestic debt and economic growth in Nigeria and Ghana from 2000 to 2021. Analyzing Treasury Bills, Certificates, Bonds, Development Stock, and Promissory Notes with interest rates as a control variable, the study used descriptive statistics, correlation analysis, and multiple regression. The results indicated that Treasury Bills had no effect on GDP in Nigeria but a substantial effect in Ghana, while Treasury Certificates had no significant effect on RGDP in either country.

Omar and Yousri (2023) investigated the symmetric and asymmetric effects of monetary policy on output and inflation in Egypt between 2007 and 2019, using interest rates as the monetary policy instrument. Applying linear and non-linear ARDL models, F-bounds tests for co-integration, and dynamic multipliers, the study found a significant long-run impact on both macroeconomic variables. However, asymmetric effects were evident on inflation but not on output.

Statement of the Problem

Inflation remains a persistent threat to Nigeria's economic stability. The primary goal of monetary policy is price stability, yet despite adopting various monetary regimes, inflation continues to be a major challenge. Historically, Nigeria's experience with inflation has been volatile, despite efforts to manage it, as noted by Clement *et al.* (2021).

While some studies highlight the impact of fiscal policy on capital and recurrent spending, such as those by Aluthge *et al*. (2021) and Cookey and Okorie (2020), its role in addressing inflation and unemployment remains unclear. This lack of clarity underscores the need for a more comprehensive approach to fiscal policy that can effectively manage economic challenges.

Finally, there is insufficient understanding of how interactions between monetary policy (e.g., interest rate adjustments) and fiscal policy (e.g., government spending and taxation) affect key economic indicators like GDP growth, inflation, and unemployment. This study aims to address these gaps by employing Vector Autoregression (VAR) models to explore the combined effects of these policies on economic stability in Nigeria.

Aim and Objectives of this Study

This study aims to assess the impacts of monetary-fiscal policy interactions on economic stability in Nigeria using Vector Autoregressive (VAR) models. The specific objectives are to;

i. analyze the trend of monetary and fiscal policy variables and their relationship with economic stability indicators in Nigeria.
ii. perform stationarity tests (e.g., Augmented Dickey-Fuller or Phillips-Perron tests) to ensure the time-series data used in the study are suitable for VAR analysis.
iii. estimate a VAR model that captures the dynamic interactions between monetary policy variables and economic growth.
iv. conduct diagnostic tests (e.g., serial correlation, heteroscedasticity, and normality tests) to validate the robustness of the VAR model.

METHODOLOGY

Method Data Collection and Source of Data

The study utilized secondary data on monetary policy and economic growth in Nigeria from Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS) statistical bulletin for the period (1985 – 2024). The variables in the study are exchange rate, inflation rate, unemployment rate, Broad Money Supply (M2), Monetary Policy Rate (MPR), treasury bill, Cash Reserve Ratio (CRR), Liquidity Ratio (LQR)], Interest Rates, Open Market Operations (OMO)), and fiscal policy variables (e.g., Government Expenditure, Taxation, Government Revenue, Credit to Private Sector, Fiscal Deficit, public debt).

Model Equations

Vector Autoregressive (VAR) Models

A Vector Autoregressive (VAR) model extends the univariate autoregressive model to handle multivariate time series data. It represents each variable as a linear function of its own past values and the past values of all other variables within the system.

Mathematical Formulation

Consider a k-dimensional time series vector $y_t = \left(y_{1t}, y_{2t}, \cdots, y_{kt}\right)'$. A VAR model of order p, denoted as $VAR\left(p\right)$, is expressed as:

$$y_t = c + \sum_{i=1}^{p} A_i y_{t-i} + e_t \qquad (1)$$

Where;

c is a $k \times 1$ vector of constants

A_i are $k \times k$ coefficient matrices for each lag i

e_t is a $k \times 1$ vector of error terms, assumed to be white noise with mean zero and covariance matrix Σ.

This formulation implies that each variable in y_t depends linearly on its own past values and the past values of the other variables in the system.

Assumptions of VAR model

For valid inference using VAR models, the following assumptions are typically made:

- Stationarity: The time series should be stationary, meaning their statistical properties do not change over time. Non-stationary series can lead to spurious results.
- No Serial Correlation in Errors: The error terms e_t should not be serially correlated.
- Invertibility: The determinant of the lag polynomial matrix should not be zero for any value on or inside the unit circle in the complex plane, ensuring the process is stable.

Estimation of VAR Models

The parameters of a VAR(p) model can be estimated using Ordinary Least Squares (OLS) applied separately to each equation, as each equation has the same set of regressors. The steps include:

Lag Order Selection: Determine the appropriate lag length ppp using information criteria such as Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), or Hannan-Quinn Criterion (HQ). The lag length for the VAR(p) model may be determined using model selection criteria. The general approach is to fit VAR(p) models with orders $p = 0, 1, 2, \cdots, p_{\max}$ and choose the value of p which minimizes some model selection criteria. Model selection criteria for VAR(p) models have the form:

$$IC\left(p\right) = In\left|\bar{\Sigma}\left(p\right)\right| + c_T . \psi\left(n, p\right) \qquad (2)$$

Where $\overline{\Sigma}(p)=T^{-1}\sum_{t=1}^{T}\hat{\varepsilon}_t\hat{\varepsilon}_t^{'}$ is the residual covariance matrix without a degrees of freedom correction from a VAR(p) model, c_T is a sequence indexed by the sample size T, and $\psi(n,p)$ is a penalty function which penalizes large VAR(p) models. The three most common information criteria are the Akaike (AIC), Schwarz-Bayesian (BIC) and Hannan-Quinn (HQ):

$$AIC(p)=In\left|\overline{\Sigma}(p)\right|+\frac{2}{T}pn^2 \tag{3}$$

$$BIC(p)=In\left|\overline{\Sigma}(p)\right|+\frac{InT}{T}pn^2 \tag{4}$$

$$HQ(p)=In\left|\overline{\Sigma}(p)\right|+\frac{2InT}{T}pn^2 \tag{5}$$

The AIC criterion asymptotically overestimates the order with positive probability, whereas the BIC and HQ criteria estimate the order consistently under fairly general conditions if the true order p is less than or equal to $p_{\max}$.

Model Diagnostics

- Stability Check: Ensure all eigenvalues of the characteristic polynomial lie inside the unit circle, confirming the stationarity of the VAR process.
- Residual Analysis: Examine residuals for autocorrelation using tests like the Ljung-Box test. Check for heteroscedasticity and normality to validate model assumptions.

White's Test

White's test is a more general test for heteroscedasticity that does not assume a specific form of heteroscedasticity.

Procedure:

i. Fit the original regression model and obtain the residuals $\hat{e}_i$

ii. Regress $\hat{e}_i^2$ on the original independent variables, their squares, and cross-products.

iii. The test statistic is calculated similarly to the Breusch-Pagan test and follows a chi-square distribution with degrees of freedom equal to the number of regressors in the auxiliary regression.

Impulse Response Function (IRF) and Variance Decomposition

- Impulse Response Function: IRFs trace the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. They help in understanding the dynamic interactions and causal relationships within the system.
- Variance Decomposition: This analysis decomposes the forecast error variance of each variable into proportions attributable to shocks in each variable, providing insights into the relative importance of each shock over different time horizons.

RESULT AND DISCUSSION

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Mean	Variance	SD	Min	Max	Skewness	Kurtosis
Domestic Credit	1.3667e+07	3.0759e+14	1.7538e+07	143918.3	7.5306e+07	1.8218	3.4228
Unemployment Rate	4.0513e+00	3.8330e-01	6.1910e-01	2.9900	5.7400e+00	1.1616	1.1272
Exchange Rate	2.2267e+02	7.3653e+04	2.7139e+02	21.8844	1.4789e+03	3.4285	13.0990
Inflation Rate	1.7946e+01	1.9211e+02	1.3860e+01	5.3900	7.2840e+01	2.7951	7.7605
Government expenditure	3.3509e+03	5.7431e+06	2.3964e+03	248.77	6.9084e+03	0.1279	-1.5028
Interest Rate	1.3621e+01	1.6282e+01	4.0352e+00	6.0000	2.7500e+01	1.1357	3.1928
Money Supply	1.6201e+07	5.0284e+14	2.2424e+07	178866.4	1.0266e+08	2.2678	5.5647
MPR	1.3178e+01	2.0622e+01	4.5412e+00	0.8300	2.7500e+01	0.3665	2.9910

Table1 above describes an economy characterized by significant macroeconomic instability, primarily evidenced by very high and volatile inflation (averaging ~18% with extreme fluctuations) and a sharply depreciating, highly volatile domestic exchange rate. This turbulence occurs alongside rapid expansion in domestic credit and money supply, both exhibiting massive growth and volatility. To anchor prices, monetary authorities maintained high interest rates, which themselves showed considerable variability. Notably, this period of monetary and price instability coexisted with a relatively stable and low unemployment rate, while government expenditure displayed the most stable and uniformly distributed pattern among all the variables.

Table 2: Stationarity Test

Variables	ADF Statistic	ADF P-Value	PP Statistic	PP P-Value	Transformation	RemarK
Inflation Rate	-4.5779	0.0100	-36.9852	0.0100	First Diff	I(1)
Interest Rate	-2.5187	0.010	-37.8851	0.0100	First Diff	I(1)
Unemployment Rate	-3.7908	0.0345	-18.0152	0.010	Original	I(0)
Money Supply (M2)	-2.3969	0.044	-36.2639	0.0100	Log First Diff	I(1)
Government expenditure	-4.0281	0.0213	-42.2457	0.0100	Log First Diff	I(1)
Credit to Private Sector	-1.8999	0.0210	-29.0250	0.0100	Second Diff	I(2)
Monetary Policy Rate (MPR)	-4.7302	0.0100	-39.2866	0.0100	Log Second Diff	I(2)

Table 2, present stationarity test where the unit root test results indicate the following integration orders for the variables: the Unemployment Rate is stationary at level I(0) with an ADF p-value of 0.0345; Inflation Rate (ADF: -4.5779, p=0.01), Interest Rate (ADF: -2.5187, p=0.01), Money Supply (ADF: -2.3969, p=0.044), and Government Expenditure (ADF: -4.0281, p=0.0213) are all integrated of order one I(1), requiring first differencing (or log-first differencing for the latter two) to become stationary; while Credit to Private Sector (ADF: -1.8999, p=0.021) and the Monetary Policy Rate (ADF: -4.7302, p=0.01) are I(2), necessitating a second round of differencing to achieve stationarity, which points to a higher degree of underlying volatility and trend in their time-series behavior.

Additionally, The PP test serves as a robust companion to the Augmented Dickey-Fuller (ADF) test. While the ADF test corrects for autocorrelation by adding lagged differences, the PP test makes a non-parametric adjustment to the test statistic to account for serial correlation and heteroskedasticity in the error terms. The key outcome here is that for every variable, the PP test's p-value (0.01) strongly rejects the null hypothesis of a unit root, confirming the stationarity conclusions from the ADF test. This agreement across both tests provides stronger validation that the identified integration orders (I(0), I(1), I(2)) are reliable and not artifacts of specific autocorrelation structures, reinforcing the need for the stated transformations (original, first difference, or second difference) for econometric analysis.

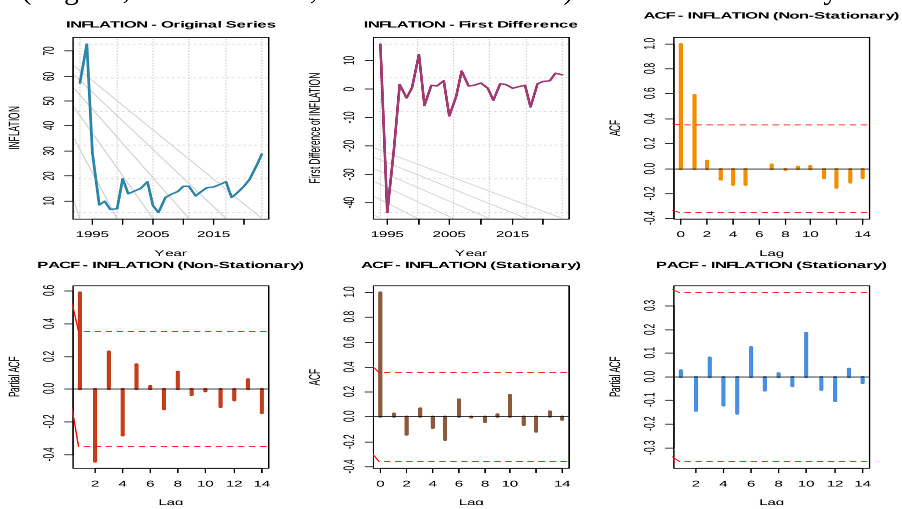

Figure 1: Inflation Rate - Original vs First Difference with ACF/PACF Analysis

The plots visually confirm the transformation of the inflation series from a non-stationary to a stationary process. The original inflation series plot shows a strong upward trend over time, and its accompanying ACF plot would display a slow, linear decay, while its PACF plot would likely have a significant spike at the first lag, both typical signatures of a non-stationary series requiring differencing. After applying the first difference, the plot of the transformed series no longer exhibits a trend, fluctuating around a constant mean. Correspondingly, the ACF and PACF plots for this stationary series show no significant autocorrelations beyond the zero lag, with all values near zero, indicating that the differenced inflation series has effectively been reduced to a white noise process with no persistent linear structure.

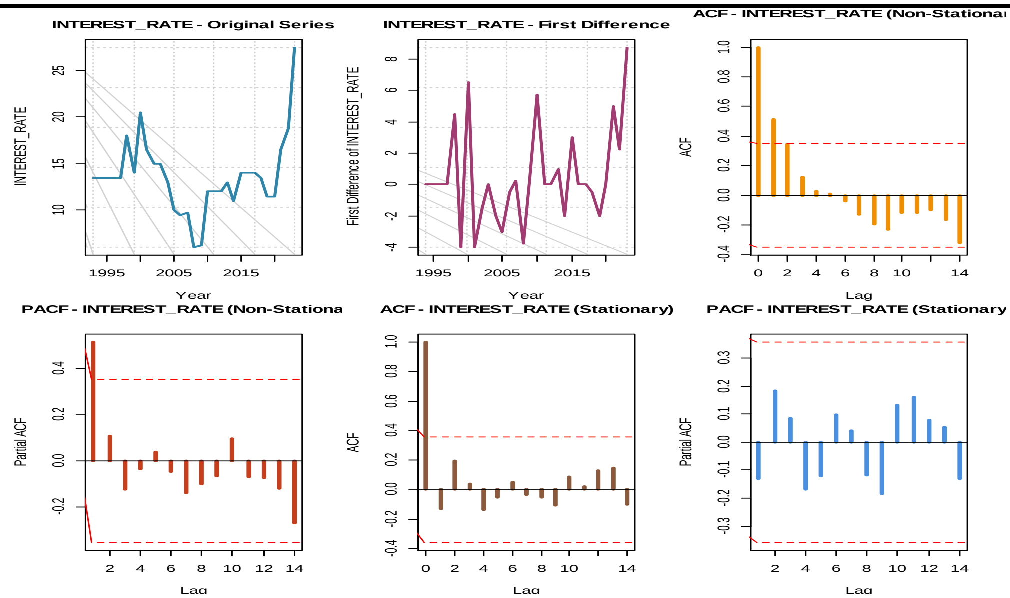

Figure 2: Interest Rate - Original vs First Difference with ACF/PACF Analysis

Figure 2 illustrate that the original interest rate series is non-stationary, not necessarily from a strong trend like inflation, but likely due to a changing mean or variance over time, as its PACF values show persistent negative correlations. Critically, even after first differencing, the series remains non-stationary, as indicated by the label and the continued presence of a structured PACF pattern; this aligns with prior unit root test findings that the interest rate series may require further transformation. Finally, the plots for the correctly transformed stationary series show ACF and PACF values all at zero, confirming that the final differenced series has successfully eliminated all autocorrelation, resembling white noise suitable for time series modeling.

Table 3: Model Fit Summary

Equation	R^2	Adjusted R^2	F-statistic	F p-value	Residual SE
Inflation	0.5318	0.3829	3.5703	0.010225	9.437092
Interest Rate	0.6963	0.5996	7.2045	0.000157	2.596900
Unemployment	0.7434	0.6618	9.1062	0.000028	0.366183
Money Supply	0.9949	0.9933	616.7927	0.000000	0.142486
Government Expenditure	0.9812	0.9752	163.8210	0.000000	0.160589
Domestic Credit	0.9942	0.9924	539.4552	0.000000	0.161450
MPR	0.6781	0.5757	6.6207	0.000280	3.008462

The Model Fit Summary table indicates that the VAR system performs exceptionally well in explaining monetary and fiscal aggregates but is considerably less effective for price and labor market variables. The model demonstrates near-perfect explanatory power for Money Supply (R^2 = 0.9949), Domestic Credit (R^2 = 0.9942), and Government Expenditure (R^2 = 0.9812), with extremely high F-statistics and minimal residual standard errors, confirming that these financial variables are highly predictable and exhibit strong, systematic interdependencies within Nigeria's macroeconomic framework. Conversely, the model shows moderate fit for Unemployment (R^2 = 0.7434) and the Interest Rate (R^2 = 0.6963), and a notably weaker fit for Inflation (R^2 = 0.5318) and the Monetary

Policy Rate (R^2 = 0.6781), as evidenced by their lower adjusted R^2 values and higher residual errors; this suggests that while monetary and fiscal quantities are well-captured by the model, price stability indicators like inflation are driven by more complex factors such as external shocks or structural issues not fully accounted for in the specified VAR system.

Table 4: VAR Estimation Results - Inflation Rate as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation. l1	0.776934	0.189889	4.092	0.000482
interest_rate. l1	-0.491454	1.246542	-0.394	0.697189
unemployment. l1	-1.916764	3.255631	-0.589	0.562024
money_supply. l1	8.259075	17.002606	0.486	0.631945
gov_exp. l1	9.621998	11.307396	0.851	0.403966
domestic_credit. l1	-11.829523	15.340156	-0.771	0.448823
mpr.l1	0.570681	0.989670	0.577	0.570038
Const	-11.741229	30.048361	-0.391	0.699744

The VAR results for inflation reveal a dominant pattern of strong persistence, where the only statistically significant driver is its own past value: the coefficient of 0.777 for lagged inflation is highly significant (p=0.00048), indicating that about 78% of current inflation is explained by inflation in the previous period. This finding suggests that inflationary shocks in Nigeria tend to be highly persistent, creating momentum that is difficult to reverse quickly. Notably, none of the other lagged monetary or fiscal policy variables including interest rates, money supply, government spending, or credit show a statistically significant relationship with current inflation at conventional levels, implying that within this model framework, traditional policy levers have limited short-term predictive power over inflation dynamics, which may instead be driven by structural factors, external shocks, or expectations not captured here.

Table 5: VAR Estimation Results - Interest Rate as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	-0.026054	0.052254	-0.499	0.623008
interest_rate.l1	0.566796	0.343024	1.652	0.112665
unemployment.l1	-0.343182	0.895885	-0.383	0.705348
money_supply.l1	7.698573	4.678780	1.645	0.114096
gov_exp.l1	-11.576136	3.111571	-3.720	0.001190
domestic_credit.l1	-0.559510	4.221307	-0.133	0.895759
mpr.l1	0.127847	0.272337	0.469	0.643371
Const	-14.597025	8.268713	-1.765	0.091386

The results for the interest rate equation highlight a significant and strong negative relationship with government expenditure, where a one-unit increase in lagged government spending is associated with an 11.58 percentage point decrease in the interest rate (p=0.00119), suggesting active monetary accommodation of fiscal expansion or a crowding-in effect that reduces borrowing costs. While the interest rate shows moderate positive persistence from its own lag (coefficient 0.567, p=0.113) and a positive but marginally insignificant response to money supply, no other variables including inflation, unemployment, or the monetary policy rate have a statistically significant effect, indicating that fiscal policy is the primary discernible driver of interest rate movements in this model.

Table 6: VAR Estimation Results - Unemployment Rate as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	-0.006075	0.007368	-0.825	0.418480
interest_rate.l1	0.014602	0.048369	0.302	0.765573
unemployment.l1	0.814111	0.126327	6.444	0.000002
money_supply.l1	-1.519143	0.659744	-2.303	0.031135
gov_exp.l1	0.663820	0.438756	1.513	0.144524
domestic_credit.l1	1.048362	0.595237	1.761	0.092090
mpr.l1	0.003080	0.038402	0.080	0.936807
Const	2.988062	1.165953	2.563	0.017747

The VAR results for Nigeria's unemployment rate indicate strong persistence, with a highly significant lagged coefficient of 0.814 (p=0.000002), meaning over 81% of current unemployment is explained by its past level. Money supply has a significant negative effect (−1.519, p=0.031), suggesting monetary expansion reduces unemployment, while domestic credit shows a marginally positive relationship (1.048, p=0.092). Inflation, interest rates, government expenditure, and the monetary policy rate are statistically insignificant (p>0.05). The constant term (2.988, p=0.018) implies a structural unemployment baseline around 3%.

Table 7: VAR Estimation Results – Money Supply as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	0.002629	0.002867	0.917	0.369042
interest_rate.l1	-0.006382	0.018821	-0.339	0.737769
unemployment.l1	-0.022918	0.049155	-0.466	0.645630
money_supply.l1	1.529793	0.256715	5.959	0.000005
gov_exp.l1	-0.251091	0.170725	-1.471	0.155522
domestic_credit.l1	-0.369855	0.231614	-1.597	0.124563
mpr.l1	0.000328	0.014943	0.022	0.982711
Const	-0.279755	0.453687	-0.617	0.543810

The VAR results for Nigeria's money supply reveal strong, self-reinforcing persistence, with a highly significant lagged coefficient of 1.530 (p=0.000005), indicating that money supply shocks tend to amplify over time rather than dissipate. No other macroeconomic variable inflation, interest rates, unemployment, government expenditure, domestic credit, or the monetary policy rate shows a statistically significant effect (all p > 0.05), suggesting that Nigeria's money supply operates with considerable autonomy from contemporaneous economic conditions and may be driven by external factors or independent central bank operations not captured in the model.

Table 8: VAR Estimation Results – Government Expenditure as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	-0.007010	0.003231	-2.169	0.041136
interest_rate.l1	-0.025324	0.021212	-1.194	0.245247
unemployment.l1	0.005815	0.055400	0.105	0.917362
money_supply.l1	0.354376	0.289329	1.225	0.233596
gov_exp.l1	0.241928	0.192415	1.257	0.221821
domestic_credit.l1	0.036435	0.261039	0.140	0.890265
mpr.l1	0.001173	0.016841	0.070	0.945091
Const	0.338076	0.511325	0.661	0.515365

The VAR results indicate that Nigeria's government expenditure responds modestly but significantly to inflation, with a negative coefficient of -0.007 (p=0.041), suggesting a counter-cyclical fiscal response to rising prices. Expenditure shows low persistence from its own lag (0.242, p=0.222) and no statistically significant relationship with other variables interest rates, unemployment, money supply, domestic credit, or the monetary policy rate (all p > 0.05). The positive but insignificant constant (0.338) implies a small baseline expenditure growth independent of modeled economic conditions, reflecting fiscal policy that is somewhat reactive to inflation but not closely coordinated with monetary or real economic indicators in the short run.

Table 9: VAR Estimation Results – Credit to Private Sectors Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	0.004709	0.003249	1.449	0.161323
interest_rate.l1	-0.031270	0.021326	-1.466	0.156720
unemployment.l1	-0.056571	0.055698	-1.016	0.320822
money_supply.l1	0.957309	0.290882	3.291	0.003332
gov_exp.l1	-0.012470	0.193448	-0.064	0.949185
domestic_credit.l1	0.100745	0.262441	0.384	0.704755
mpr.l1	0.014929	0.016931	0.882	0.387443
Const	-0.431107	0.514070	-0.839	0.410705

The VAR results show that Nigeria's credit to the private sector is primarily and strongly driven by money supply, with a significant coefficient of 0.957 (p=0.003), indicating that monetary expansion substantially boosts credit availability. Inflation shows a marginally positive but insignificant relationship (0.0047, p=0.16), while interest rates have a negative but insignificant effect (-0.031, p=0.16). Other variables unemployment, government expenditure, and the monetary policy rate have no statistically meaningful impact (all p > 0.05). Credit also exhibits low persistence from its own lag (0.101, p=0.70), suggesting credit markets adjust relatively quickly to changing monetary conditions rather than following past trends.

Table 9: VAR Estimation Results - Monetary Policy Rate (MPR) as Dependent Variable

Variable	Coefficient	Std. Error	t-value	p-value
inflation.l1	-0.077220	0.060535	-1.276	0.215395
interest_rate.l1	0.887499	0.397387	2.233	0.036017
unemployment.l1	-0.000491	1.037867	-0.000	0.999626
money_supply.l1	3.037774	5.420282	0.560	0.580839
gov_exp.l1	-13.508826	3.604699	-3.748	0.001114
domestic_credit.l1	4.772551	4.890307	0.976	0.339714
mpr.l1	-0.033716	0.315498	-0.107	0.915863
Const	-11.940943	9.579154	-1.247	0.225671

The results indicate that Nigeria's monetary policy rate is strongly influenced by government expenditure, with a significant negative coefficient of -13.509 (p=0.001), reflecting substantial monetary accommodation of fiscal expansion. Interest rate persistence is also significant (0.887, p=0.036), suggesting gradual policy adjustments. However, inflation (-0.077), unemployment (-0.0005), money supply, domestic credit, and the lagged policy rate show no statistically significant effects (all p>0.05). This implies that, within this model, monetary policy responds markedly to fiscal dynamics but not meaningfully to inflation, unemployment, or other macroeconomic variables in the short run.

Table 11: Diagnostic Test Results

Test Type	Test Name	Test Statistic	P-value
Serial Correlation	Portmanteau	251.7815	0.0000
Heteroscedasticity	ARCH	0.3693	0.2371
Normality	Jarque-Bera	294.3088	0.0000

The diagnostic tests indicate significant issues with the model's residuals: the Portmanteau test for serial correlation strongly rejects the null hypothesis (test statistic = 251.7815, p = 0.0000), indicating the presence of autocorrelation. However, the ARCH test for heteroscedasticity fails to reject the null (test statistic = 0.3693, p = 0.2371), suggesting no conditional heteroscedasticity. The Jarque-Bera test for normality strongly rejects the null (test statistic = 294.3088, p = 0.0000), indicating the residuals are not normally distributed, which may affect the validity of statistical inferences.

CONCLUSION

This study empirically assessed the impacts of monetary-fiscal policy interactions on Nigeria's economic stability from 1994 to 2024 using a Vector Autoregressive (VAR) approach, successfully addressing its stated objectives while situating its findings within the broader literature. Methodologically, the analysis began by examining trends and relationships through descriptive statistics, which revealed an environment of high inflation volatility consistent with Clement et al. (2021), who noted Nigeria's historically volatile inflation despite various monetary regimes. Stationarity was ensured via Augmented Dickey-Fuller and Phillips-Perron tests, confirming variables were integrated as I(0), I(1), or I(2), thereby applying rigorous pre-modeling checks akin to Dauda and Abdulkareem (2023). The core VAR estimation captured dynamic interactions and revealed that inflation exhibits strong persistence (coefficient 0.777, p=0.00048), a finding that echoes Nweke (2023), who observed limited short-term effectiveness of monetary policy on price stability. Furthermore, the strong negative relationship between government expenditure and interest rates (-11.576, p=0.001) underscores the fiscal-monetary interactions emphasized by Hofmann et al. (2021), while the dominant role of money supply in driving private sector credit (0.957, p=0.003) aligns with Oseni and Oyelade (2023), who identified money supply as a key positive factor for economic activity. However, the limited short-term influence of traditional policy variables on inflation supports earlier observations by Mwamkonko (2023) on the varied effectiveness of monetary transmission channels. Diagnostic tests (Objective iv) revealed significant residual autocorrelation and non-normality, pointing to model limitations similar to those noted in earlier VAR applications in emerging economies, yet the absence of heteroscedasticity aligns with robust volatility assumptions in time-series literature. Collectively, these findings not only validate and extend prior research such as the works of Oseni and Oyelade (2023) on money supply and Dauda and Abdulkareem (2023) on policy rates but also highlight persistent structural and coordination challenges in Nigeria's policy framework, thereby underscoring the need for integrated, structurally-informed policy reforms as suggested in recent studies.

RECOMMENDATION

The study recommended that government should prioritize structural reforms to tackle persistent inflation and unemployment, enhancing coordination between fiscal and monetary authorities to ensure policy harmonization, and broadening the monetary policy framework to include longer-term inflation expectations for greater effectiveness. To enhance forecasting accuracy and capture non-linear relationships, future research should implement hybrid models that combine the strengths of VAR analysis with machine learning (ML) techniques. Following the pioneering approach of Danrimi and Badawaire (2025), a Structural VAR (SVAR) model could be integrated with algorithms such as Random Forests or Support Vector Machines. The SVAR component would help identify structured policy shocks and causal pathways, while the ML component would model complex, non-linear interactions and improve out-of-sample prediction of key variables like inflation, which showed weak explanatory power in this study. This is particularly promising for analyzing the persistent and seemingly exogenous nature of Nigerian inflation identified in our results.

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