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Monetary Policy Shocks and Economic Growth in Nigeria

[1] Babayo Abubakar, [2] Saad Buba, [3] Haruna U. Modibbo, [4] Mohammed S. Bello, & [5] Musa B. Ribah

[1-4]Department of Economics, Faculty of Arts & Social Sciences, Gombe State University, Gombe – Nigeria
[5]Department of Economics, Nigerian Army University Biu, Borno State – Nigeria

* Corresponding Author's; E – mail: bbyabubakar82@gmail.com

Abstract

Monetary policy remains one of the major stabilizing instruments used by various economies around the world to manage and control key economic outcomes with a view to achieving certain macroeconomic objective. This study investigates the impact of monetary policy shocks on the performance of economic growth of Nigeria using yearly time series data for the period 1986 – 2022. The data were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin 2022 and World Development Indicators (WDI) 2022. The study employed Structural Vector Autoregressive (S-VAR) model. The findings of the study showed that Exchange rate has negative impact on Real GDP in the short run, however, it has both positive and significant impact in long run, while Inflation rate exert negative impact. Also, Broad Money Supply (M2) exerts positive and significant impact on Real Gross Domestic Product (RGDP) respectively. Similarly, the results of the variance decomposition showed that Real GDP is largely influenced by internal and external dynamics. Therefore, the study recommends that, the Monetary Policy Authority should strategize and stabilize exchange rate to support economic growth and competitiveness in order to achieve long term impact on Nigerian economy.

Keywords: Monetary Policy Shocks, Exchange Rates, Economic Growth, S-VAR
JEL Classification:

1.0 Introduction

Monetary policy remains one of the major stabilizing instruments used by various economies around the world to manage and control key economic outcomes such as inflation, unemployment, exchange rate and gross domestic product with a view of achieving certain macroeconomic objective. The objective of any economy is to realize internal balance such as stable price, optimum employment level, sustained economic or output level and balance of payment equilibrium and maintaining macroeconomic stability (Afolabi & Okhiria, 2016; Nagao, et al. 2021). Similarly, monetary policy includes those measures intended to change the direction of real economic activity including interest rates, exchange rate and monetary aggregate (Balami, 2006; Jawadi, F. 2023). Also, the priority given to price stability in the conduct of monetary policy is to promote sustainable economic growth, create employment, stabilize exchange rate and increase the purchasing power of the local currency among others. Monetary shocks can transmit into real sector by resulting in unfavourable macroeconomic outcomes. Therefore, identification of monetary policy channel is important for monetary policy makers to tackle the adverse impact of the shocks on economic growth. Additionally, monetary policy shocks are unexpected change from a traditional pattern of fluctuation in interest rate or money supply as a result of domestic or external factors. In Nigeria monetary policy shocks can have an adverse impact on economic growth,

employment among others. Therefore, any effort geared towards achieving stability of prices and economic growth can be counterproductive due to the shocks (IMF, 2018). Also, Ndekwu (2013) noted the effects of unexpected changes in monetary policy shocks on macroeconomic variables have been a significant aspect of research and analysis for a longtime controversy, monetary policy transmission consists of five channels. This includes interest rate, asset price, credit, exchange rate, and expectations channels.

In Nigeria, CBN, being the apex bank in the country is mandated with the responsibility of manipulating the circulation of money, interest rate, exchange rate and other instruments to achieve productivity and development in the economy. Regardless of the growing importance of management of macroeconomic policy in Nigeria; and despite several efforts by the CBN over the years the problems attached to its economic performance and output growth still persist. The problems among others are increase in unemployment level, reduction in investment, and persistent increase in inflation, instability in foreign exchange and weak industrial output growth. These identified shortcomings are being considered to be responsible for rapid decrease in the Nigeria economic growth (Folawewo & Osinubi 2006; Nwoko & Anumadu, 2016).

The post-structural adjustment period (SAP) is regarded as the most significant era for monetary policy operations, despite the substantial evolution in the liberalization, application and implementation of monetary instruments over the years. But, due to underdevelopment of the financial sector, direct control mechanisms were deployed. For instance, selective credit control, administered interest and exchange rate and credit ceiling were used in order to control inflation; promote investment and productivity in the economy. Similarly, monetary policy championed by Central Bank of Nigeria has provided a number of monetary measures to adjust and influence money supply to achieve sustainable economic growth (Fasanya, et al. 2013; Ifediba, 2019). Nigeria has experienced various regimes of monetary policy at times it is tight and other time loose based on the circulation of money, interest rate, exchange rate and several other measures. There are diverse findings in the literature. Findings from the studies indicated that monetary policy actions have contributed to sustainable economic growth in Nigeria (Anowor & Okorie, 2016; Ufoeze, 2018). In contrast, findings of Fasanya (2013) and Udude (2014) discovered negative nexus on the adverse impact of monetary policy on economic growth in Nigeria. Therefore, it becomes imperative to re-examine the impact and dynamics of monetary policy shocks on the growth of Nigerian economy.

Every economy covets and pursue stable macroeconomic environment in order to increase economic growth, stabilize price, exchange rate, and interest rate which has always been the objective of the Nigerian government. However, lack of sustainable economic growth has become a major problem among many developing countries including Nigeria in recent times. Like, the 2016 Nigeria economy recession and the one in 2020 due to the effect of the global pandemic (covid-19) which resulted to a decreased of GDP to 2.65% and -1.79% respectively (World Bank, 2022).

The Nigeria's central bank has been using different monetary policy regimes in order to attain macroeconomic goals include sustained economic expansion, achieving full employment, and maintaining price stability favourable balance of trade etc. but aggregate output in the economy has not been sustainable enough. Tunde and Juliana (2019) observed that despite efforts made towards attaining the required macroeconomics objectives via monetary policy, macroeconomic stability seems to have achieved little or no result in terms of economic. This necessitated an examination of the actual relationship between monetary policy shocks and economic growth in Nigeria. Similarly, there is serious need to find out the extend of monetary policy shocks on economic growth. Consequently, this study employed SVAR analysis to determine the effect of monetary policy shocks on the variables of the study.

2.0 Literature Review

2.1 Theoretical Review and Theoretical Framework

The theoretical foundation for this study is anchored on Keynesian theory which states that, the effect of monetary policy on economic growth is indirectly via macroeconomic variables known as monetary transmission mechanism channels (MTM). The main MTM channels are Interest rate, exchange rate, inflation and availability of a credit and it suitable for capturing the dynamics of macroeconomic variables, hence it adaptation for this research's framework (Olamide, et al. 2022). The demand for money theory is used as a systematic and structural model approach for a better understanding of channels via which monetary policy affects economic growth (Mishkin, 2017).

Diagrammatically, this is expressed as: -

[M] → [MTM] → [OUTPUT]

Where:

M = Monetary policy

MTM Channels = Monetary Transmission Mechanism (macroeconomic variables)

Output = Economic growth.

2.1.1 Monetarist View of Monetary Policy

Though, Friedman (1963) intensified the supply of money as the relevant factor influencing the welfare of the economy and also, considered the need for an efficient monetary policy in order to achieve steady growth rate, money supply should increase at a constant level, instead of being control. The Monetarists argued that the economy may not always be operating at the full employment rate of real GDP. Hence, in the short-run, expansionary monetary policies may rise the rate of real GDP by increasing total demand, while in the long-run, when the economy is at the level of full employment, the quantity theory is consider as a good estimate of the relationship between the money supply, level of price, and the real GDP.

In addition, the major argument of the classical economists' on monetary policy is primarily based on the quantity theory of money. The theory is normally explained in terms of fisherian equation of exchange, expressed as MV = PY. The expression of exchange is the identity which explains the present market value of all final goods and services (nominal GDP) must be the same with the money supply multiplied by the average number of period a currency is spent in transaction for a given year.

2.2 Empirical Literature Review

From the foregoing, it can be considered that there are studies conducted on the interplay between monetary policy shocks and Nigerian economic growth using different variables, data sets, and methodologies in both developed and developing countries. Here, we present some of the studies conducted so far. Moreover, Muhammed, Babawulle and Tahir (2021) re-examine the influence of monetary policy on the output growth of Nigeria was examined utilizing the ordinary least squares (OLS) analytical method. The research findings indicate that monetary policy, as measured by the money supply, has a positive impact on GDP growth while simultaneously exerting a negative effect on the inflation rate. In agreement with the above study, Onyeiwu (2012) examines the effect of monetary policy in Nigerian using data between 1981 and 2008; the research utilized the Ordinary Least Squares (OLS) method as its analytical framework. The findings indicate that the monetary policy, as represented by money supply, exerts a positive influence on both GDP growth and the Balance of Payments, while simultaneously having a detrimental impact on the inflation rate.

Also, Amassoma, Nwosa, and Olaiya (2011) identify the impact of monetary policy on output variables in Nigeria between 1986 - 2009 using an Ordinary Least Squared model. The study reveals that monetary policy has a significant impact on exchange rate and money supply while monetary policy was identified to exert an insignificant weight on unstable price.

In another study, Olamide and Maredza (2019) assess the indicators of monetary policy and output growth of South Africa Developing Countries by employing a dynamic regression panel approach. The study found that the rate of GDP Growth, Exchange rate, Inflation rate, money supply, oil and commodity prices exerts deep effect on monetary policy amongst SADC. It also showed that commodity price fluctuations are determine exogenously and the impact is transmitted through channel of exchange rate to macroeconomic of the region.

Additionally, Fadiran (2021) examines monetary transmission mechanism (MTM) of oil price shocks into economic growth of Nigeria. SVAR Techniques was applied and the study showed that all price shocks influence the channels in the MTM different ways, while some channels in the MTM are significant responsive to oil price fluctuations, some are not.

In contrast to the above studies, Ugwuanyi and Chris (2021) employed Structural VAR method of the differential impacts of monetary policy shocks on several outputs in Nigeria. The study clearly reveals that the liquidity ratio is the most important tool used for total output and not interest rate while broad money supply tends to be the most efficient monetary

policy tool use to manipulate many sectors of the economy. Similarly, Salama and Toriola (2021) study the impact of monetary policy shocks on the economic growth of Nigeria. The study used a regression model and Vector Autoregression (VAR) techniques as tools of estimation. Findings reveals that monetary policy shocks had a significant impact on output growth in Nigeria while interest rate and inflation has no any significant impact.

Using ARDL technique of analysis, Chaudhry Iqbal, Umar and Faheem (2021) assessed the impact of monetary policy on inflation and investment in Pakistan, a time series analysis were conducted. Demonstrating the long-term influence of money supply, this has a significant and positive effect on investment. Additionally, other macroeconomic variables, including trade, foreign direct investment, and gross domestic savings, were found to have a positive correlation with investment. Conversely, certain macroeconomic indicators, such as interest rates and exchange rates, exhibited a negative relationship with investment.

Also, Abiodun (2018) determines the impact of unexpected changes in monetary policy on economic output and prices in Nigeria from 1986-2016 employing quarterly data, the analysis employed Auto-regressive Distributed Lag (ARDL) models as the methodological approach. The results shows that monetary policy shocks is more efficient on output in boom period than recession and have more impacts during recession than boom.

Conclusively, Fasanya, et al. (2013), examine the effect of monetary policy on Nigerian economic growth. The study employed time-series data spanning from 1975 to 2010. The effects of stochastic shocks of each of the endogenous variables are explored, taking Error Correction Model (ECM) as tools of analysis. The research revealed that there is long-run relationship among the variables. Additionally, the result also indicated that inflation rate, exchange rate and external reserve are significant to monetary policy tools that move growth of Nigeria forward.

3.0 Methodology

This section focuses on the methodology used in the research work. It also looks at the nature and sources of data, model specifications and estimation procedures.

3.1 Sources of Data Collection

The data used in this analysis are basically time series data covering a period of 1986-2022 totaling 36 observations. The basis for this is to conform to the central limit theorem of 30 minimum observations the variables are broad money supply, exchange rate, inflation rate and economic growth proxied for output growth and are sourced from Central Bank of Nigeria (CBN) Statistical Bulletin for 2022 and World Development Indicators of the World Bank (2022).

3.2 Model Specification

An econometric model has been developed to analyze the impact of monetary policy shocks on Nigeria's economic growth. In this model, real economic growth serves as the dependent variable, while broad money supply, inflation rate, and exchange rate are considered the

explanatory variables. This is according to the work of Fernando Berran (1996) but with some little modifications. Thus, the functional relationship between the variables is specified in equation (1):

$$RGDP_t = f(M2_t, EXR_t, IFL_t) \quad (1)$$

Mathematically, this functional relationship can be specified below in a linear form as in the work of Abdullahi, Badayi and Garba (2020):

$$RGDP_t = \beta_0 + \beta_1 M2_t + \beta_2 EXR_t + \beta_3 IFL_t + \varepsilon_t \quad (2)$$

Where, RGDPt represent Real Gross Domestic Product; while, M2t stands for Broad Money Supply; and EXRt represents Exchange Rate ; IFLt signify Inflation and μ represents Error Term respectively.

Similarly, β0 denotes intercept; where β1 stands coefficient of Broad Monetary Supply; β2 represents Coefficient of Exchange Rate; while β3 signify coefficient of Inflation.

The model is transformed in to log-linear form as expressed below:

$$logRGDP_t = \beta_0 + \beta_1 M2_t + \beta_2 logEXR_t + \beta_3 IFL_t + \varepsilon_t \quad (3)$$

Where

LogRGDP signify for log of Real Gross Domestic Product; represent M2 Broad Money Supply; while IFL stands for Inflation and EXR for Exchange Rate; and μ for Error Term.

The aprior expectations are as follows:

$$\beta0>0, \beta1>0, \beta2>0, \beta3>0,$$

3.3 Method of Data Analysis

To attain the study's objectives, econometric techniques are utilized. Firstly, the Augmented Dickey-Fuller (ADF) test is adopted for the preliminary data analysis. The Augmented Dickey-Fuller Test is part of the Unit Root test that is meant to check for the stationarity of the time series data. Therefore, there is need to make time series data stationary in order to have a guide during estimation against spurious results. However, the SVAR Model is used to examine the effect of monetary policy shocks on the economic growth of Nigeria. Furthermore, the study conducted impulse response, variance decomposition, normality test, heterosedasticity, serial correlation, and stability tests using E-Views 10.

3.4 Structural Vector Autoregressive (S-VAR) Model

The SVAR model is one of the most effective approaches in any study related to transmission of monetary policy shocks (Olamide, et al. 2022). It is the most used technique in the literature for investigating monetary policy shocks (Jonathan & Christian 2017: Abdullahi, et al. 2020). However, the VAR model, estimation of parameters in the SVAR

model is more effective and the rationales for the imposition of restrictions to address the monetary policy shocks are provided. This makes the SVAR a powerful instrument for analysing macroeconomic policy.

$$Y_t = \Phi_o + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \cdots . + \Phi_p Y_{t-p} + \varepsilon_t \qquad (5)$$

Where: Yt stands for Vector of the endogenous variables at time t; while Φo represents Vector of the constant, also representing the intercept term. While, p is the number of lags in the model. And Φo, Φ2 …… Φp are the matrices of coefficient for lagged endogenous variables. ε is the vector of white noise disturbance at time t.

However, given our variables for this study, equation (3) can be expressed as:

$$log\text{RGDP}_{it} = C_1 + b_{11}\, log\text{RGDP} + b_{12}\, log\text{M2}_{t-1} + b_{13}\, \text{logEXR}_{t-1} + b_{14}\, IFL_{t-1} + \varepsilon_{1,t} \ldots (6)$$

$$log\text{M2}_{it} = C_2 + b_{21}\, log\text{RGDP} + b_{22}\, log\text{M2}_{t-1} + b_{23}\, \text{logEXR}_{t-1} + b_{24}\, IFL_{t-1} + \varepsilon_{2,t} \ldots (7)$$

$$\text{EXR}_{it} = C_3 + b_{31}\, log\text{RGDP} + b_{32}\, log\text{M2}_{t-1} + b_{33}\, \text{logEXR}_{t-1} + b_{34}\, IFL_{t-1} + \varepsilon_{3,t} \ldots (8)$$

$$IFL_{it} = C_4 + b_{41}\, log\text{RGDP} + b_{42}\, log\text{M2}_{t-1} + b_{43}\, \text{logEXR}_{t-1} + b_{44}\, IFL_{t-1} + \varepsilon_{4,t} \ldots (9)$$

In the study, four structural shocks which include: Gross Domestic Product, Broad Money Supply, Exchange Rate and Inflation rate would be considered.

The four component structural VAR models specified above can be written in matrix form as:

$$\begin{matrix} \Delta \text{RGDP}_t \\ \Delta MPR_t \Delta E \rangle \\ \Delta \text{IFL}_t \end{matrix} \quad \begin{matrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{matrix} \quad \begin{matrix} \varepsilon_t^{RGDP} \\ \varepsilon_t^{MPR} \\ \varepsilon_t^{EXR} \\ \varepsilon_t^{IFL} \end{matrix}$$

To estimate the coefficients of the equations, the study follows; Amisano and Giannini (1997-2012) and imposes restrictions on both A and B matrices in the following forms:

$$A = \begin{matrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{matrix} \qquad B = \begin{matrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{11} & 0 & 0 \\ 0 & 0 & b_{11} & 0 \\ 0 & 0 & 0 & b_{11} \end{matrix}$$

However, since the estimated SVAR model passed the diagnostic tests, impulse response functions and variance decomposition are employed to identify and trace out the shocks through imposed restriction on the matrices A and B.

4.0 Results and Findings

This section analyses the data in line with the study's objectives. Interpretations of the various results, stationarity tests, SVAR estimates, impulse responses, variances decompositions, stability and diagnostic tests are presented and analysed.

Table 4.1: ADF Stationarity Test at Level and First Difference

	At Level		At First Difference		
	Intercept	**Trend and Intercept**	**Intercept**	**Trend and Intercept**	
Variable	**T- Statistic**	**T- Statistic**	**T- Statistic**	**T- Statistic**	**Order of Integration**
RGDP	0.6150	-3.6036**	-3.8516***	----	I(0)
M2	-1.5750	-3.4170*	-4.3632***	-4.2973	I(1)
IFL	-3.4792**	-4.5635**	----	----	I(0)
EXC	-2.8634*	-2.9080	-6.1999	-6.3780	I(1)

Source: Author's Computation Using E- Views 10.

ADF test results in the Table 4.1 suggest that RGDP and IFL are stationary at level while EXC and M2 are stationary at first difference based on their respective order of integration and T-Statistics as showed above.

Table 4.2: Phillips-Peron Stationarity Test at Level and First Difference

	At Level		At First Difference		
	Intercept	**Trend and Intercept**	**Intercept**	**Trend and Intercept**	
Variable	**T- Statistic**	**T- Statistic**	**T- Statistic**	**T- Statistic**	**Order of Integration**
RGDP	-0.514	-1.5168	-3.7433***	-3.7043**	I(1)
M2	-0.8040	-2.2287	-4.9480***	-4.8306***	I(1)
IFL	-2.9505**	-3.3706*	----	-6.6555	I(0)
EXC	-3.1873**	-2.9076	----	-6.7220	I(0)

Source: Author's Computation Using E- Views 10.

The Phillips-Perron test outcomes provide valuable insights into the stationarity properties of the macroeconomic variables. This suggests that RGDP is non-stationary in its level form, indicating an order of integration of I(1). Similarly, M2 is non-stationary in its level form but

becomes stationary in its first difference form, denoted as I (1). In contrast, the Inflation Rate (IFL), is stationarity in its level form with an order of integration of I(0). While, Exchange Rate (EXC), is stationary in its level form, denoted as I(0), but becomes non-stationary in its first difference form.

Impulse Response Function (IRF)

IRF of RGDP to RGDP and M2 Respectively

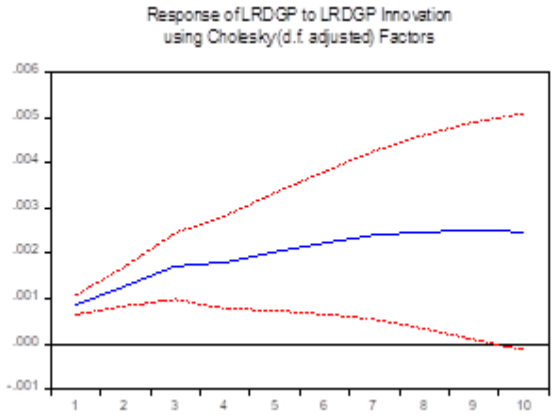


Figure 1

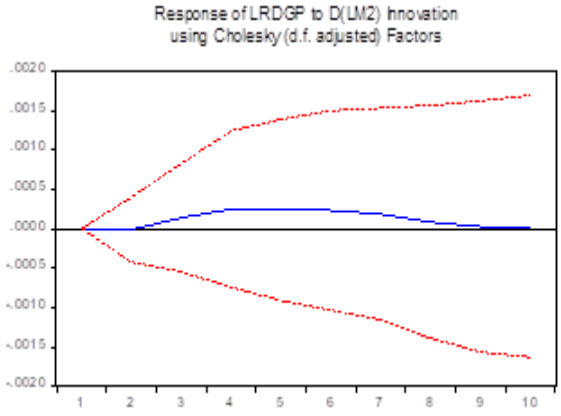


Figure 2

IRF of RGDP to RGDP: From figure 1 above, the initial increase in RGDP from 0.001 to 0.002 during periods 1 to 3 suggests a positive response to its own shock. This could be indicative of a self-reinforcing cycle, where an initial positive shock to RGDP leads to subsequent increases in economic output. The continuous upward trend in RGDP from periods 4 to 10 implies a sustained positive impact. This suggests that the initial shock has a lasting effect on real economic output, contributing to a prolonged period of economic expansion. The impulse response of RGDP to itself indicates a self-reinforcing cycle, where an initial positive shock leads to a continuous increase in real economic output over the specified periods. This pattern suggests a positive feedback mechanism contributing to a period of economic expansion.

IRF of RGDP to M2: from figure 2, the initial response of RGDP to Money Supply (M2) is zero during periods 1 to 2, suggesting no immediate impact on real economic output. However, there is a slight positive increase from period 2 to 9, indicating that as the money supply expands, there is a gradual positive effect on RGDP. The subsequent stabilization of the response at zero beyond period 9 implies that the initial impact has saturation peak, and there is no further visible effect on RGDP. This pattern suggests that the influence of Money Supply on RGDP is relatively short-term, and the positive effects are not sustained in the long run.

IRF of RGDP to EXC and IFL Respectively.

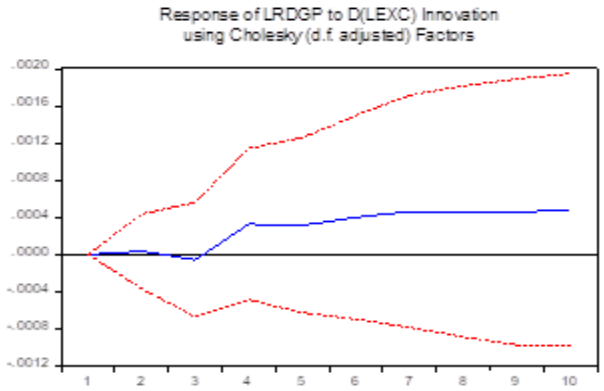


Figure 3

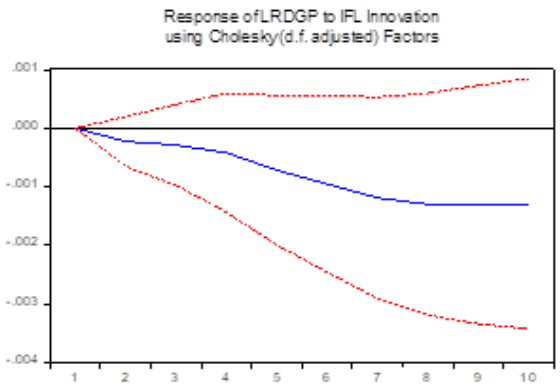


Figure 4

IRF of RGDP to Exchange Rate (figure 3): The initial response of RGDP to Exchange Rate (EXC) is zero during periods 1 to 3, suggesting no immediate impact on real economic output. However, there is a positive and steady increase from periods 4 to 10, indicating that as the exchange rate changes, there is a gradual and sustained positive effect on RGDP. The continuous positive trend in the response implies that the influence of Exchange Rate on RGDP becomes more pronounced and enduring over the specified periods. This pattern suggests that alterations in the exchange rate yield a positive effect and cumulative impact on real economic output, potentially influencing factors such as exports or international competitiveness.

IRF of RGDP to Inflation in Figure 4, the initial response of RGDP to the Inflation Rate is zero in period 1, suggesting no immediate impact on real economic output. However, a steady negative decline is observed from periods 1 to 3, indicating that as inflation increases, there is an adverse effect on RGDP during this initial phase. The continuous decline in the response from periods 4 to 8 suggests a sustained and aggregate negative impact of inflation on RGDP. This could imply that increasing inflation rates have enduring negative consequences on real economic output, influencing factors such as consumer spending and business investment.

The subsequent steady negative trend from periods 8 to 10 indicates that the negative impact of inflation on RGDP continues, although with a potentially diminishing magnitude.

4.1 Variance Decomposition

Table 4.3 Variance Decomposition of RGDP

Period	Standard Error	LRGDP	D(LM2)	D(LEXC)	IFL
1	0.031932	100.0000	0.000000	0.000000	0.000000
2	0.055433	98.38391	0.002190	0.023064	1.590832
3	0.081715	97.69866	0.317649	0.069826	1.913861
4	0.104325	95.55073	0.798802	0.926495	2.723970
5	0.127581	93.04119	0.910461	1.167738	4.880615

6	0.151875	90.40975	0.893992	1.445427	7.250829
7	0.177136	87.81642	0.781210	1.687237	9.715133
8	0.201170	85.98282	0.629432	1.793853	11.59390
9	0.222680	84.80470	0.517250	1.849791	12.82825
10	0.241794	83.94371	0.442011	1.928439	13.68584

Source: Author's Computation Using E-Views 10 software

In the initial phases, Real GDP is predominantly affected by its inherent factors (LRGDP), accounting for the entirety of the variance in Period 1. As we progress, however, the relative influence of Real GDP's own factors gradually diminishes. Regarding external variables, the Changes in Broad Money Supply (D(LM2)) exhibit a minor decrease of 0.0022% in Period 2, gradually increasing to 0.442% in Period 10. Changes in Exchange Rate (D(LEXC)) experience a minimal decrease of 0.0231% in Period 2, expanding to 1.9284% by Period 10. The Inflation Rate (IFL) undergoes a more significant decrease of 1.5908% in Period 2, with the percentage decrease intensifying to 13.6858% by Period 10. These patterns collectively signify a shifting dynamic in the factors contributing to the variability in Real GDP. External elements, particularly changes in Broad Money Supply, changes in Exchange Rate, and Inflation Rate, progressively play a more substantial role in shaping economic fluctuations. This underscores the interconnectedness of economic variables and emphasizes the need to consider external factors in comprehending the changes observed in Real GDP over the analyzed periods.

Table 4.4 Variance Decomposition of M2

Period	Standard Error	LRGDP	D(LM2)	D(LEXC)	IFL
1	0.141337	1.085963	98.91404	0.000000	0.000000
2	0.148933	2.834799	91.67305	1.012702	4.479453
3	0.154249	4.152994	88.67686	1.013245	6.156902
4	0.173452	10.83552	80.01033	2.759416	6.394739
5	0.175662	11.74058	78.57653	3.432895	6.249991
6	0.176122	11.96158	78.16955	3.435664	6.433209
7	0.179606	13.33958	76.34460	3.311840	7.003988
8	0.181014	13.50525	76.19849	3.379656	6.916596
9	0.181732	13.48677	75.64285	3.379461	7.490916
10	0.182866	13.73831	75.05695	3.405362	7.799380

Source: Author's Computation Using E-Views 10 software

The variance decomposition results for Broad Money Supply (M2) over ten periods provide a detailed understanding of the factors contributing to its fluctuations.

In the initial period, the primary driver of the variance in M2 is its own factors (D(LM2)), contributing a substantial 98.91% to the total variance. Real GDP's own factors (LRGDP) and other external factors have minimal impact at this stage. As the analysis progresses, a noticeable shift occurs. The relative contribution of changes in Broad Money Supply (D (LM2)) gradually decreases, allowing other factors to play a more significant role. Real GDP's own factors (LRGDP) experience a steady increase in contribution, along with the influence of changes in Exchange Rate (D (LEXC)) and Inflation Rate (IFL). By the tenth period, changes in Broad Money Supply contribute 75.06% to its own variance, while other external factors collectively contribute more. This suggests a dynamic evolution in the factors driving the variability of M2.

Table 4.5 Variance Decomposition of EXC

Period	Standard Error	LRGDP	D(LM2)	D(LEXC)	IFL
1	0.243064	27.92553	0.150583	71.92389	0.000000
2	0.275788	22.02402	0.947722	63.34108	13.68718
3	0.282459	22.22213	2.393068	60.41771	14.96710
4	0.288543	21.92275	2.548276	58.44015	17.08882
5	0.298537	20.57045	6.506122	56.58115	16.34227
6	0.306583	20.92273	6.722518	53.96429	18.39046
7	0.311545	21.83798	6.833258	52.43838	18.89038
8	0.315894	23.04384	7.238639	51.02921	18.68831
9	0.317715	23.51067	7.410772	50.53329	18.54527
10	0.317813	23.54163	7.413724	50.50848	18.53617

Source: Author's Computation Using E-Views 10 software

The variance decomposition results for Exchange Rate (EXC) reveal the changing dynamics of its fluctuations over the ten analyzed periods. In the early stages, EXC is predominantly affected by its internal factors (D(LEXC)), which account for a significant 71.92% of the overall variance. As we progress through periods 2 to 4, the dominance of EXC's own factors gradually diminishes, making room for notable contributions from Real GDP's own factors (LRGDP) and changes in Broad Money Supply (D(LM2)). During periods 5 to 7, a continued decrease in the contribution of EXC's own factors is observed. Real GDP's own factors (LRGDP) and changes in Broad Money Supply (D(LM2)) gain prominence, signaling a shifting dynamic in the factors influencing EXC. In the later periods (8 to 10), the contribution of changes in EXC (D(LEXC)) stabilizes at around 50%, indicating a balanced influence with other factors. In the tenth period, the factors intrinsic to the Exchange Rate account for 50.51% of the variation, whereas the own factors of Real GDP (LRGDP) contribute 23.54%. Additionally, fluctuations in the Broad Money Supply (D(LM2)) represent 7.41% of the changes, and the Inflation Rate (IFL) contributes 18.54%.

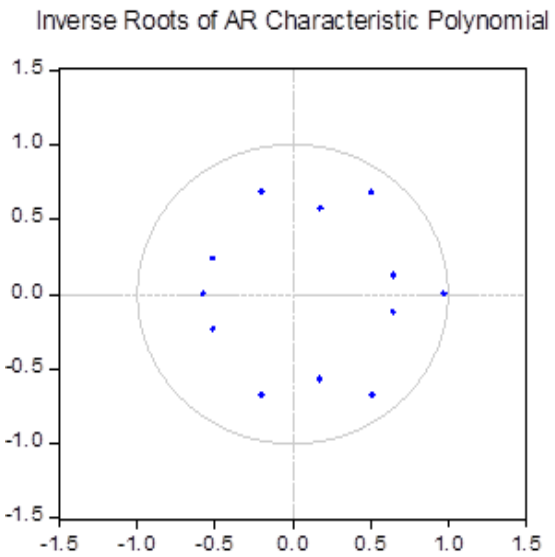
Table 4.6: Variance Decomposition of IFL

Period	Standard Error	LRGDP	D(LEXC)	IFL	M2
1	11.90902	37.21378	10.44263	10.32052	42.02306
2	16.85687	40.30068	5.259746	8.243011	46.19656
3	18.37100	41.29983	7.869517	7.877244	42.95341
4	18.80270	42.36528	8.980476	7.552189	41.10205
5	18.94813	42.23139	8.851084	8.380658	40.53687
6	18.97490	42.12019	8.944519	8.444341	40.49095
7	19.02926	41.89270	9.352464	8.414663	40.34018
8	19.14416	41.79729	9.399418	8.409067	40.39423
9	19.29358	42.00955	9.305111	8.286238	40.39910
10	19.40831	42.25177	9.431331	8.202330	40.11457

Source: Author's Computation Using E-Views 10 software.

In the early stages (1-3), the Inflation Rate is significantly affected by the Money Supply (M2), accounting for approximately 42% of the variance. Real GDP's own factors (LRGDP) and changes in Exchange Rate (D(LEXC)) also make substantial contributions, while Inflation Rate's own factors play a significant but diminishing role. As we progress into periods 4-6, the influence of Inflation Rate's own factors continues, stabilizing at around 8-9%. Money Supply (M2) remains a significant contributor, and Real GDP's own factors (LRGDP) maintain a steady influence. Changes in Exchange Rate (D(LEXC)) also contribute consistently, highlighting the interplay of internal and external factors in shaping Inflation Rate dynamics.

Figure 5



Source: Author's Computation Using E- Views 10 software.

The evaluation of a time series model's stability and normality is conducted through the analysis of the inverse roots of the autoregressive characteristic polynomial. If all the points fall with the unit circle, it signifies a stable autoregression process. In practical terms, this observation implies that the system is inclined to return to equilibrium over time. Deviations from the mean are expected to diminish rather than amplify, indicating a tendency towards a stable and converging behavior in the time series.

Table 4.7: SVAR Diagnostic Test

Summary Results of VAR Residual Normality Tests		
Statistics Tests	Joint Chi-Square/Jargue-Bera	Joint Probability
Skewness	7.3084	0.1205
Kurtosis	5.4008	0.2486
Jargue-Bera	12.7091	0.1223
Summary result of VAR Residual Heterosedasticity Tests (Level and Squares)		
Statistics tests	Joint Chi-Square Tests	Joint Probability Test
Heterosedasticity	242.0615	0.4506
Summary results of VAR Residual Serial Correlation LM Tests		
Null Hypothesis: No Serial Correlation at lag h		
Statistics Test	Lag Length	Probability
Serial Correlation	3	0.1700
Null Hypothesis: No Serial Correlation at lags 1 to h		
Statistics Test	Lag Length	Probability
Serial Correlation	3	0.3290

Source: Author's Computation Using E-Views 10 software

The diagnostic tests conducted on the residuals of the Vector Autoregression (VAR) model reveal important insights. The normality tests, assessing skewness and kurtosis, along with the Jargue-Bera test, suggest that the residuals have reasonably followed a normal distribution. The high p-values in these tests indicate a good fit to normality. The heterosedasticity test indicates no strong evidence of varying variances in the residuals, while the serial correlation reveals the absence of autocorrelation. Overall, the SVAR model appears to meet the assumption of normality, homoscedasticity and serial correlation.

The findings from the Impulse Response Function and Variance Decomposition indicate that shocks to real Gross Domestic Product (RGDP) exert a positive and statistically significant influence on RGDP itself, demonstrating a self-sustaining cycle. It contribute much in explaining the variability of the system, it also has a long lasting effect on itself (long run impact). This implies that an RGDP shock amplifies over time. It explained 100% and 83% in the first and last periods, Inflation and Exchange rate explained 13% and 1.9% at last periods respectively. However, Monetary policy (M2) explained only 0.4% variation in

RGDP throughout the periods, this means there is no direct link between monetary policy shocks and real GDP but indirect through monetary transmission mechanism as explained by Keynes (1936).

So, also in terms of Inflation Rate, RGDP responded in a negative way with a short run negative impact due to rising inflation, this is in disagreement with our aprior expectation (INF>0). However, this is consistent with the findings of Gunenek, et al. (2021) and Babawule and Tahir (2021). By implications, when inflation goes up, economic activities take a hit, during period of higher inflation individuals purchasing power decreases and become eroded; likewise lot of uncertainties affects the economy, both of which retard growth. However, RGDP responded positively to the exchange rate shocks at initial stage up to period four signifying a positive in both short and long run effect. This is in line with our aprior expectations (EXC>0) and the studies of Fasanya et al. (2013) and Amassoma (2011). A positive and stable exchange rate contributes to an increase in economic activities which eventually promote economic growth.

RGDP responded positively to Broad Money Supply (M2), it is positive and statistically significant. M2 is exogenous variable this is in agreement with our aprior expectation (M2 > 0) and is consistent with the studies of Ibrahim (2019), Salami, et al. (2021) and Ugwuanyi and Chris (2021). Whenever, M2 goes up, RGDP responds positively, since the economy experienced an injection (Inflow) of money. Economic agents engaged in spending and borrowing by businesses, resulting to a boost of economic activities and contributing economic growth.

5.0 Conclusion and Policy Recommendations

The findings of this research provide helpful observations into the interdependencies and impacts of monetary policy shocks on Nigerian economic growth. The findings indicate that shocks to monetary policy significantly affect the economic growth of Nigeria. Furthermore, it emphasizes the complexity of policy decision and the need for balanced and integrated approaches to ensure sustainable economic growth in Nigeria amidst various global and domestic challenges.

The findings of this research work has some policy recommendations, such as Monetary Policy Authority (CBN) should consider the balanced adjustment of the Monetary Policy Rate (MPR) which is employed to mitigate the potential adverse effects on Nigeria's economic growth. And the government should strategize and stabilize exchange rate to support economic growth and competitiveness in order to achieve long term impact on Nigerian economy. Also, in order to achieve substantial and stable economic growth in Nigeria, policies to control inflation has to be considered and implemented. Similarly, judicious supply of money should also be considered for economic expansion but inflation should be put under watch.

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