Monetary Policy and Inflation Dynamics in Nigeria: Implications for Policy Formulation

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Abstract

The study examines the effects of monetary policy on inflation in Nigeria, using data covering the period 1986 to 2023. It employed the Vector Auto regression (VAR) model, using EViews 12 econometric software for the estimation. The results show that monetary policy rate (MPR) and money supply have positive effects on inflation whereas, interest rate and liquidity ratio exert negative effect on inflation in Nigeria with liquidity ratio being statistically significant. The study therefore, stresses the need for the monetary authority to take charge of the cash movements by maintaining stable monetary policy rate that would stabilize interest rate and encourage borrowings from financial institutions in order to keep money supply at moderate state to discourage inflation.

Keywords: Inflation, monetary policy, money supply, liquidity ratio, Vector Auto regression.

Introduction

The formulation of policy on the control of money in the economy is vested with the Central Bank of Nigeria. Monetary policy is the control of money circulating in the economy through the employment of monetary instruments by the monetary authorities. The formulation of policy framework that will ensure price stability and reduced inflation has attracted the attention of research scholars and policy makers from different institutions. The increasing attention is premised on the understanding of the distortions high inflation or deflation can exert on the domestic economy, developed or less-developed. While rising inflation creates price distortions, wipes out savings, arbitrarily redistributes income, and erodes real income of fixed income earners at the micro-level, it induces uncertainty, misallocation of resources, dissuades capital accumulation activities, and distracts the economy from a path of sustainable growth.

Nigeria's monetary policy experiences could be divided into two broad policy regimes: The direct method of control (1960- 1993) and the indirect control (1993-till date). The direct control method was characterized by quantitative ceilings on credits, administered interest and exchange rates, aggregate/sectoral allocation of credits and stabilization securities. Under this regime the economy was divided into preferred sector and the less preferred sector and banks were required to allocate a given proportion of their credits to different sectors. The rationale was to moderate aggregate demand by controlling the volume and cost of credit that goes into the economy. Key instruments used include: administrative fixing of the minimum rediscount rate (MRR), cash reserve requirements, liquidity ratio, stabilization securities and transfer of federal government's (including ministries and parastatals) deposits to and from the central bank. Monetary management using direct controls faced a number of constraints which led to repressed financial market (Sanusi, 2009).

Indirect method of control employs market-based instruments and requires some levels of market infrastructural development to be effective. It relies on the power of monetary authorities to influence the availability and rate of return on financial assets. Two broad regimes could be identified during the indirect method of monetary management viz: indirect control

under the pre-consolidation era (1993-2005) and indirect control during the post consolidation era (2006- date). Instruments used under this regime include open market operation (OMO) through use of the Nigerian Treasury Bills (NTB) and Certificates, CBN Bills and Special NTBs, reserve requirements, liquidity ratios and movement of government deposits to and fro CBN (Ogwuma, 2019). A new framework for monetary policy implementation was introduced in December 2006 to enable CBN leverage on the success of the banking system consolidation. Elements of the new framework included the introduction of the monetary policy rate (MPR) to replace the MRR, and a standing lending and deposit facility. Instruments under the new framework included, open market operations, repurchase transaction (REPO and reverse REPO), expanded discount window operations (EDW), cash reserve requirements (averaging system) and foreign exchange swap (Sanusi, 2009).

Okere and Sanni (2020) observed that inflation has become one of the perennial problems that has plagued the Nigerian economy especially in the late 80s and 90s and even presently. According to Okere and Sanni, (2020), the trend shows major episodes of high inflation in excess of 30 percent characterized (especially during the SAP era) by wage increase which created a cost-push effect. The late 1980s indicates an excess monetization of oil exports revenue which gave inflation a monetary character reaching the peak at 40 percent in 1991. At that time, the government was under pressure to devalue her currency from debtor groups like the IMF. The expectation that devaluation was imminent fueled inflation as price adjusted to the parallel rate of exchange. Over the same period, excess money growth was about 43 percent and credit to government had increased by over 70 percent (Okere & Sanni, 2020; Ogunbiyi & Okunola, 2021). The next high inflation episode started in the last quarter of 1987 and accelerated through 1988 and 1989. This episode is related to the fiscal expansion that accompanied the 1988 budget. Though, initially, the expansion was financed by credit from the CBN, it was later sustained by increasing oil revenue that was not sterilized.

The trend of inflation continued on a swinging note up to 1999 when Nigeria became a democratic nation and the rate stood at 11.1 percent in February 2011 (CBN, 2022). Furthermore, Nigeria's inflationary episode continued in 2017 when it was reported by the National Bureau of Statistics and the Central Bank of Nigeria of the inflationary rate increase to 16.5% which seems to be abnormal. Thus, from 1986 to 2024, which is the period of study, inflationary rate has remained at a high level. Thus, it becomes imminent to conduct this research on monetary policy and inflation dynamics in Nigeria and its implications for policy decisions.

Available evidence from National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN, 2023) shows that in 1986, inflation rate in Nigeria was 5.72%. The cost of services and cost of living in the country as at 2000 to 2021 has been high compared to late 1980s and early 1990s (Ayenajeyi, 2021). Also, as time progressed, inflation rate kept fluctuating and as at end of 2021, inflation rate in Nigeria rose to 16.5% (CBN, 2023). Fast forward to the year 2023, inflation rate reached 24.66%. In the same year, monetary policy rate was 18.75% while interest rate and liquidity ratio were 13.9% and 51.97% respectively.

Given these background statistics, it is obvious that the monetary authority in Nigeria is already striving to maintain stable rate of inflation. The Central Bank of Nigeria (CBN, 2019) noted that open market operations (OMO) remained the main instrument of monetary policy, to be complemented by monetary policy rate (MPR) and others. Okotori (2017) noted that the main thrust of CBN's recent strategy was monetary targeting as well as a close monitoring of growth in money supply (MS). Policy makers don't need only to specify a set of objectives in order to succeed, but they need to understand the effects of policies designed to arrive at those objectives (Odior & Ejedegba, 2018; Altavila & Ciccarelli, 2019). Nigeria recently adopted an

inflation targeting monetary policy framework in late 2023 and the framework allows the Nigerian central bank to set an inflation target for the coming quarters or year and use its monetary policy instruments to meet the inflation target while taking into account the lags between policy decisions and their effect on output and prices (Ozili, 2024). It will be interesting, therefore, to understand how monetary policy variables affect inflation rate in Nigeria.

Several previous empirical studies have made varying conclusions ranging from the positive effect of monetary policy on inflation rate (Okotori, 2019; Ogunmuyiwa and Babatunde, 2019; Ikechukwu and Olaniyi, 2020; etc.), to the negative effect of monetary policy on inflation in Nigeria (Eggon and Sabo, 2020; Ezeanyeji *et al.*, 2021; Ayenajeyi, 2021; etc.). These inconsistencies in research may have arisen from the selection of variables or limited number of observation period for the data. Additionally, the problem of limited updated research on monetary policy and inflation dynamics using the Vector Autoregression (VAR) method to show the dynamic inter-relationship amongst the variables will be tackled in this study.

According to Goodhart and Vinals (2024), for any economy to have a beneficial and considerate inflation rate, it should be between 2.0% to 3.0%. Evidence from advanced studies and other economies revealed that no developed economy in the world has inflation rate beyond 3.0% (Yoosoon, Fabio & Gee, 2022; Koshy, 2022; Bayramoglu & Allen, 2019; Batini, 2024). Also, the Central Bank of Nigeria has taken so many measures in an attempt to meet expectations and tackle inflationary trend in Nigeria. For instance: the deregulation of the financial system in 1986, the introduction of monetary policy rate (MPR) in 2006, the deviation from monetary targeting to inflation targeting in 2007, the review of liquidity ratio and cash reserve ratio by CBN to tackle inflationary rate in Nigeria and many other reforms, but in spite of all these efforts being made, inflationary rate in Nigeria appears to be on a steady increase.

For the purpose of this study, attention is focused on the effect of monetary policy on inflation in Nigeria using vector auto regression model approach with data covering the period 1986-2023. The study is focused on direct instruments of monetary policy, including monetary policy rate, money supply, interest rate and liquidity ratio. Inflation rate is used as the dependent variable. From the introductory section, section 2 clarifies certain conceptual issues as related to the study. Section 3 reviews the relayed literature; section 4 presents the research method; section 5 discusses the empirical results while section 6 contains the concluding remarks.

Conceptual Issues
Monetary Policy

Monetary policy manipulates the money supply and rate of interest in such a way to achieve the set goals (Batini, 2024). The term monetary policy has been defined by experts from many perspectives. According to CBN (2006), monetary policy concept was defined as "Any policy measure designed by the federal government through the CBN to control cost availability and supply of credit. It is also referred to as the regulation of money supply and interest rate by the CBN in order to control inflation and to stabilize the currency flow in an economy". It is referred to as either being expansionary or contractionary, where an expansionary policy increases the total supply of money in the economy more rapidly than usual, and contractionary policy expands the money supply more slowly than usual or even shrinks it. Expansionary policy is traditionally used to try to combat unemployment in a recession by lowering interest rates in the hope that easy credit will entice businesses into expanding. Contractionary policy is intended to slow inflation in order to avoid the resulting distortions and deterioration of asset values. The instruments of monetary policy used by the Central Bank depend on the level of development of the economy, especially its financial sector.

According to CBN (2022), monetary policy is a combination of measures designed to regulate the value, supply and cost of money on an economy in consonance with the expected levels of economic activities Monetary policy is maintained through actions such as increasing interest rate, or changing the amount of money banks need to keep in vault. Monetary was also defined as the specific actions taken by the Central Bank to regulate the value, supply and cost of money in the economy with a view to achieving Government's macroeconomic objectives (CBN, 2023). Jhingan (2009) refers monetary policy as the credit measures adopted by the central bank of a country. Nwankwo (2017) defined monetary policy as one of the macroeconomic instruments with which monetary authority of a country employed in the management of their economy to attain desired objectives.

Wrightsman (2016) considered monetary policy as those actions initiated by the central bank which aim at influencing the cost and availability of credits. According to Okwo, Eze and Nwoha (2022), monetary policy consists of a government formal effort to manage the money in its economy in order to realize specific economic goals. According to Ogunjimi (2019), three basic kinds of monetary policy decision can.be made - the amount of money in circulation; the level of interest rate; and the functions of credit markets and the banking system. The combination of these measures is designed to regulate the value, supply and cost of money in an economy, in line with the level of economic activity. Abeng (2016) explained that monetary policy is valid only for a highly monetized economy. If the economy is not monetized, the efficacy of monetary policy is restricted. For instance, in an underdeveloped economy where a large proportion of output is produced in a subsistence sector, supply of money would be independent (Egbulonu, Dim & Duru, 2018).

A close observation of these definitions of monetary policy shows that monetary policy boils down to adjusting the supply of money in the economy to achieve macroeconomic goals as well as to curb inflation in the Nigeria economy. Most economist agree that in the long run output usually measured by gross domestic product (GDP) is fixed, so any changes in the money supply only cause prices to change. But in the short-run, because prices and wages usually do not adjust immediately, changes in money supply can affect the actual production of goods and services (Koshy, 2022). Monetary policy relates to the supply of money and credit allocation, which is controlled via factors such as interest rates and Cash Reserve Requirements (CRR) for banks by the CBN in order to influence outcomes like economic growth, inflation, exchange rates with other currencies and unemployment. Interest rates, reserve requirements; currency peg, discount window, quantitative easing; Open Market Operations; and signaling are some of the tools of monetary policy. Monetary policy involves changing the interest rate and influencing the money supply. It is a policy used to pursue policies of higher economic growth or controlling inflation. It is usually carried out by the CBN monetary authorities who are charged with the following monetary policy role of maintaining price stability, exchange rate stability, balance of payment equilibrium, maintaining full employment and growth in the economy as highlighted earlier (Sanusi, 2009).

According to the CBN (2023), the instruments/tools of monetary policy can be divided into two: the Direct and indirect instruments. The direct monetary control tools are the reserve requirement, interest rate policy, sectoral allocation of credit, maximum credit expansion, stabilization of securities and loans to indigenous borrowers. While the indirect monetary policies include Open Market Operation (OMO), discount rate mechanism, liquidity ratio,' selective credit control and cash reserve requirement (CRR). These tools can be discussed as thus:

Open Market Operations

Open market operations are when central banks buy or sell securities. These are bought from or sold to the country's private banks. When the central bank buys securities, it adds cash to the banks' reserves. That gives them more money to lend. When the central bank sells the securities, it places them on the banks' balance sheets and reduces its cash holdings. The bank now has less i f to lend. A central bank buys securities when it wants expansionary monetary policy. It sells them when it executes contractionary monetary policy. Quantitative easing is open market operations on steroids. Before the recession, the U.S. Federal Reserve maintained between $700 to $800 billion of Treasury notes on its balance sheet. It added or subtracted to affect policy, but kept it within that range (CBN, 2010).

Cash Reserve Requirement

The reserve requirement refers to the money banks must keep on hand overnight. They can either keep the reserve in their vaults or at the central bank. A low reserve requirement allows banks to lend more of their deposits. It's expansionary because it creates credit. A high reserve s requirement is contractionary. It gives banks less money to loan. It's especially hard for small banks since they don't have as much to lend in the first place. That's why most central banks don't impose a reserve requirement on small banks. Central banks rarely change the reserve requirement because it's expensive and disruptive for member banks to modify their procedures (CBN, 2020).

Central banks are more likely to adjust the targeted lending rate. It achieves the same result as changing the reserve requirement with less disruption. The fed funds rate is perhaps the most well-known of these tools. Here's how it works. If a bank can't meet the reserve requirement, it borrows from another bank that has excess cash. The interest rate it pays is the fed funds rate. The amount it borrows is called the fed funds. The Federal Open Market Committee sets a •target for the fed funds rate at its meetings. Central banks have several tools to make sure the rate meets that target. The Federal Reserve, the Bank of England, and the European Central Bank pay interest on the required reserves and any excess reserves. Banks won't lend fed funds for less than the rate they're receiving from the Fed for these reserves. Central banks also use open market operations to manage the fed funds rate (Ogunjimi, 2019).

Discount Rate and Monetary Policy Rate

The discount rate is the third tool. It's the rate that central banks charge its members to borrow at its discount window. Since the rate is high, banks only use this if they can't borrow funds from other banks. There is also a stigma attached. The financial community assumes that any bank that uses the discount window is in trouble. Only a desperate bank that's been rejected by others would use the discount window.

The Central Bank of Nigeria (CBN) uses MPR which is the anchor rate for other rates in the banking system as a way of influencing the level of economic activities (Ahmad et al, 2021). The CBN adopted various policy instruments in its attempt to effectively influence the quantity of money or interest rates compared to the direct measure applied from 1974-1994 (Okechukwu, 2024). The Minimum Rediscount Rate (MRR) which was used as a price- based technique to influence the movement of cost of funds in the economy, however, was still not effective. According to Okechukwu (2024), the introduction of MRR was a way to shift from direct form of monetary policy implementation by the CBN. A change in this rate provides a platform for the monetary disposition of the Bank. Since MRR was not too effective, the CBN eventually introduced the Monetary Policy Rate (MPR) in 2006 which establishes an interest rate corridor of either plus (+) or (-) certain percentage points of prevailing MPR.

Liquidity Ratio

Central bank tools work by increasing or decreasing total liquidity. That's the amount of capital available to invest or lend. It's also money and credit that consumers spend. It's technically more than the money supply, known as Ml and M2. The Ml symbol denotes currency and check deposits. M2 is money market funds, CDs and savings accounts. Ogwuma (2019) categorized the objectives of monetary policy pursued by the CBN, which have remained broadly the same since its establishment in 1958, into two broad groups as follows: Promoting monetary policy stabilization, and enhancing economic development. Following Oyejide (2022), the list of Nigeria's monetary policy objectives includes: achievement of domestic price and exchange rate stability; maintenance of healthy BOPs position to support national currency against other Currencies; development of a sound financial system; and promotion of rapid and sustainable rate of economic growth and development.

Inflation has been widely defined as a sustained increase in the aggregate or general price level in an economy (Ayenajeyi, 2021; Egbulonu, Dim & Agba, 2018). It also means that there is an appreciable increase in the cost of living which implies that nominal income cannot buy as much today as it could yesterday (Ayenajeyi, 2021). As a result of inflation, the purchasing power of a unit of currency (i.e. the implicit value of money) falls. Inflation is measured by the percent change in the Consumer Price Index (CPI) from one year to the next. The CPI represents the prices paid by the average urban consumer in each respective country (Egbulonu, Dim & Agba, 2018). Inflation can also be calculated with other price indexes such as the Producer Price Index (PPI) or the Gross Domestic Product (GDP) deflator (Akerlof, 2015).

Monetarists theorize that inflation is related to the money supply of an economy. However, besides an imbalance in the demand and supply of money, it could also occur due to changes in production and distribution cost or increase in taxes on products. A well-known example of the relationship between money supply of an economy and inflation is the hyperinflation (i.e. inflation above 100 per cent) that struck the German Republic in 1920, when Germany printed paper notes thereby flooding the economy with more and more money and its value plummeted to the level where people would paper their walls with the practically worthless bills. Similar situations occurred in Peru in 1990 and in Zimbabwe in 2007 - 2008 (Whitman and Marina, 2019).

Consumer Price Index (CPI) is generally used in measuring the inflation rate of an economy. The index, which is adjusted to inflation, tracks the prices of core goods and services overtime (Whitman and Marina, 2019). The final consumers are mostly the worst affected by inflation which makes the cost of living high, making them unable to satisfy even the basic needs of life. Inflation, therefore, erodes the value of money and reduces the purchasing power of consumers. Hence, governments and monetary authorities worldwide try to keep inflation under control through the manipulation of fiscal and monetary policy tools. For example, assuming a 9.0 per cent inflation rate, a loaf of bread that costs ₦100 in 2019 will cost ₦109 in 2020 (i.e. after a year) and ₦153.86k in 2025 (i.e. after 5 years). At the same rate of 9.0 per cent, a savings account that earns no interest on deposits that was worth ₦1000 in 2020 would be worth ₦624.03k after 5 years (i.e. in 2025) and only ₦389.42k after 10 years (i.e. in 2030) (Abeng, 2016).

One of the characteristics of a good economy is one with a moderate level of inflation rate of 2.0 or 3.0 per cent and which encourages people to buy more and borrow more since the level of interest rate also remains low during lower inflation times. It also encourages investment, both local and foreign. Consequently, low or moderately steady inflation rate is a major macroeconomic objective of all governments as well as central banks as it boosts consumers and producers' confidence in the 'economy.

Theoretical Framework

This study is anchored on the theory of Money. The transmission mechanism of money as propounded by Keynes in 1930, asserts that changes in demand and supply of money affects global demand called transmission mechanism. The transmission mechanism operates in three stages; the equilibrium interest rate, currency and interest rate will change if the balance between money demand and money supply (inelastic) is affected by a change in either the money supply or money demand (a growth of money demand with money supply unchanged, will increase interest rates, a decline in the demand for money will cause a decrease in the interest rate), the correlation between interest rates and investment spending, investments respond to changes in real interest rates. Thus, the level of prices is affected indirectly as a result of the effects of the changes in the quantity of money on the rate of interest and hence investment. Money supply growth leads to a decrease in interest rates and an increase in investment spending (Mgbomene & Nnamocha, 2023). On the other hand, Mgbomene and Igben (2023) observed that a decrease in the money supply leads to an increase in interest rates and a decline in investment spending and the correlation between investment spending and aggregate demand.

Monetarist Theory of Inflation

When the transmission mechanism of money is examined closely, we can observe that there are intermediates variables including interest rate, income level, output and rise in production costs, and these intermediates lead to increase in prices. However, the monetarist theory of inflation expresses a direct relationship between money supply and inflation. The monetarist is a school of thought led by Milton Friedman and it represents a modem variant of classical macroeconomics. They developed a subtler and relevant version of the quantity theory of money. Like any school of thought, Friedman (1970) emphasized on the supply of money as the key factor affecting the well-being of the economy. This theory states that money supply has a major influence on inflation.

Thus, this study is anchored on the Monetarist theory of inflation. This means that as money supply increases due to growth in production and employment, this creates an inflationary condition in an economy. The monetarists base their views on money supply as the key factor affecting the wellbeing of the economy (Friedman, 1968). They believe that an increase in money supply will lead to an increase in nominal demand, and where there is excess capacity, they believe that output will be increased. In the long-run, the monetarist position is that the increase in money supply will be inflationary without any effect on investment, employment and aggregate demand. This direct relationship is tested for validity in this present study.

Table 1.: Empirical Literature Review

Author and Date	Study	Outcome/Finding	Method	Gap Observed
Odior and Ejedegba (2018)	Central Bank of Nigeria contemporary monetary policy and banks' profitability: An ARDL approach	Monetary policy rate, cash reserve ratio and exchange rate increased profitability of banks in the long run thus leading to considerable check in the rate of hyper-inflation.	ARDL	The study did not directly relate CBN's contemporary monetary policy to inflation.
Ezeanyeji *et al* (2021)	Impact of monetary policy on inflation control in Nigeria.	Monetary policy showed no significant impact on inflation control in Nigeria both in the short – run and long – run.	Error Correction model (ECM)	Data stopped in 2019

Ayenajeyi (2021)	Effect of Monetary Policy on inflation in Nigeria	Monetary policy measures are weak in tackling inflationary rate in Nigeria.	Autoregressive-distributive Lag (ARDL) model	The study did not show the inter-relationship amongst the variables.
Onehi, Adigwe and Jato (2022)	Effect of monetary policy on price stability in Nigeria	Exchange rate, M2, and monetary policy rate have negative and insignificant on price stability.	Auto-regression Distributed Lag (ARDL)	Data stopped in 2020
Iyeli *et al.* (2022)	Effectiveness of monetary policy in combating inflation in Nigeria	Liquidity ratio and interest rate are the leading monetary policy instruments that can be used in combating inflation in Nigeria	Classical least square technique	The methodology did not show inter-relationship between the variables. VAR framework would have been appropriate
Ngerebo (2022)	Monetary policy and inflation in Nigeria	Broad money supply, credit to private sector, narrow money supply, and savings rate were significant in explaining inflation in Nigeria	Ordinary least square estimation	Methodology did not show inter-relationship between the variables. VAR framework would have been appropriate
Adudo, Akindutire and Ogunyemi (2022)	Effectiveness of monetary policy and control of inflation in Nigeria.	Only money Supply and Interest Rate were statistically significant in explaining variation in inflation rate.	Error Correction Model (ECM)	Methodology did not show inter-relationship between the variables.
Moses and Tule (2023)	Relationship between money supply, inflation and monetary policy in Nigeria.	Relationship exists between growth in monetary aggregates and inflation, but this relationship has weakened in recent years.	Vector Auto regressive (VAR) model	Data was limited to 2022
Uloko, Oniore and Aigbedion (2023)	Effects of monetary strategy on inflation benchmarks in Nigeria	Volume of currency in circulation and the monetary policy rate has a negative yet substantial influence on inflation rate in Nigeria.	Autoregressive Distributed Lag (ARDL) approach	Only money supply and MPR were the variables considered
Idisi, Dirisu, Adewale *et al* (2023)	Empirical analysis of the impact of monetary policy on inflation in Nigeria	Monetary policy has failed to effectively manage inflation in the country.	Systematic Literature Review (SLR) method	Data analysis is missing in the study. The conclusion was based on review of literature.
Odior (2023)	Monetary policy, bank lending and inflation in Nigerian: VAR approach	Monetary policy and bank lending rate do affect inflation partially.	Vector Auto Regression (VAR) technique	Data was limited to 2020

Ayubu (2023)	Monetary policy and inflation dynamics in the Tanzanian economy	Inflation in Tanzania is more of an output factor than a monetary phenomenon.	Impulse response function on SVAR and VECM model	The study was not carried out on the Nigerian economy.
Abbas (2023)	Effectiveness of monetary policy and inflation dynamics in Nigeria	Monetary policy rate and cash reserve ratio significantly influence the inflation rate in the long run	Autoregressive Distributed Lagged (ARDL)	The study did not show the dynamics or inter-relationship of the variables
Nwosu and Akpan (2023)	Relationship between monetary policy shocks and sub-national inflation dynamics in Nigeria,	Exogenous monetary policy shock is not sufficient to address sub-national inflation dynamics in Nigeria.	Structural Vector Autoregressive (SVAR) model	The analysis focused on inter-regional effect of monetary policy shock on inflation.
Adebiyi, Adamgbe and Odu (2024)	Monetary policy shock and inflation dynamics in Nigeria within an open economy	Findings revealed a significant impact of monetary policy shock on inflation.	Bayesian Dynamic Stochastic General Equilibrium (DSGE) model	The study did not show the dynamics or inter-relationship of the variables
Amassoma *et al.* (2024)	Influence of money supply on inflation in Nigeria.	Money supply does not considerably influence inflation both in the long and short run possibly because the country is in recession	Error Correction model (ECM)	The study did not show the dynamics or inter-relationship of the variables
Osuji and Akujobi (2024)	Role of inflation targeting and monetary policy instruments in Nigeria and Ghana	Monetary policy changes did not significantly affect price fluctuations. In the long term, neither exchange rates nor interest rates had a significant impact on prices.	Vector Auto Regression (VAR) technique	The study was more of a comparative study rather than a focus on one country
Gbadebo and Muhammed (2024)	Monetary policy and inflation control in Nigeria	Key factors driving inflation in Nigeria included the exchange rate, interest rate, money supply, and oil prices.	Error Correction Model,	The study did not show the dynamics or inter-relationship of the variables
Ozili (2024)	Inflation-targeting monetary policy framework in Nigeria: The success factors	The effectiveness of Inflation-targeting framework has come under question following series of policy inconsistencies.	Systematic Literature Review (SLR)	No data were analyzed to give empirical back-up to the findings
Ejuvbekpokpo and Ejedegba (2025)	Impact of monetary policy on stock market development in Nigeria	broad money supply had significant positive relationship with market capitalization	Autoregressive Distributed Lag (ARDL) model and Granger causality tests	The study did not establish a direct relationship between monetary policy and inflation.

Source: Author's construction, 2025.

Table 1 summarizes the literature reviewed while highlighting limitations of the studies. Obviously, there has been ample literature linking monetary policy to inflation both in Nigeria and outside of Nigeria. The conflicting results from the above study suggest the need to revisit the evidence.

Research Method
The study adopts annual time series data covering the period 1986 to 2023. The data were sourced from several editions of Central Bank of Nigeria (CBN) Statistical bulletin and economic review, the Annual Abstracts of Statistics (various issues) published by the National Bureau of statistics (NBS). Vector Auto Regression (VAR) model is employed. The VAR model treats all the variables as endogenous and allows all the endogenous variables to interact among themselves in the economy; and estimates the effect and long run impacts of shocks to each variable on itself and other variables (Saad, 2021). Transforming the VAR model to a moving average term, the study obtains the impulse response and the forecast error decomposition following the route of Studenmund and Johnson, 2017. The data analysis was preceded by the tests for unit root and cointegration.

To capture the monetary policy and Inflation dynamics in Nigeria, the model of Gbadebo and Muhammed (2024) is adapted to suit the study purpose

$$INF = \alpha_0 + \alpha_1 MPR + \alpha_2 MSS + \alpha_3 INT + \alpha_4 LIR + U \tag{1}$$

Where:

$INF = $ *Inflation rate*
$MPR = $ *Monetary policy rate*
$MSS = $ *Money supply*
$INT = $ *Interest rate*
$LIR = $ *Liquidity ratio*

A-priori expectation, $\alpha_1 - \alpha_4 < 0$

Empirical Result and Analysis
Unit root test
In order to verify the reliability of the time series data used for this analysis, a unit root test was conducted on the selected time series data to determine whether they are stationary or non-stationary in level form. The unit root test that employed in this task is the Augmented Dickey Fuller unit root test. The result of the ADF Test is presented below.

Table 2: Unit root test

Variable	ADF. test stat. @Levels	@First Difference	5% critical value	Remark
INF	-2.9077	-5.4891*	-2.9458	$I(1)$
MPR	-2.8181	-7.1799*	-2.9458	$I(1)$
MSS	-2.5584	-4.1638*	-2.9458	$I(1)$
INT	-1.0339	-6.1843*	-2.9458	$I(1)$
LIR	-1.0939	-6.9310*	-2.9458	$I(1)$

Source: Author's computation, 2025.

The 5% critical value for the ADF test statistic is -2.945842. The asterisk (*) sign is used to indicate stationarity at the 5% significance level.

From Table 2 above, it can be seen that all the variables are found to be stationary in first difference indicating that they are integrated of order one I(1). Having identified the order of integration of the selected variables, the study proceeded with the test for long run properties of the data using the Johansen cointegration test.

Table 3: Johansen Cointegration

Hypothesized No of CE (S)	Eigen-Value	Trace statistics	5% critical Value	Prob.	Max-Eigen statistics	5% crit. value	Prob.
None *	0.7929	92.284	69.819	0.0003 *	56.689	33.877	0.0000 *
At most 1	0.4153	35.595	47.856	0.4170	19.318	27.584	0.3903
At most 2	0.2140	16.277	29.797	0.6927	8.669	21.132	0.8581
At most 3	0.1257	7.608	15.495	0.5083	4.838	14.265	0.7622
At most 4	0.0741	2.769	3.841	0.0961	2.769	3.841	0.0961

Source: Author's computation, 2025.

The results in Table 3 show that there is a long run relationship between the monetary policy variables, interacting in order to bring about changes in inflation rate in Nigeria.

The granger causality test is carried out to show the presence or absence of bidirectional relationship amongst the variables which is a necessary pre-condition for fitting the vector auto regression model (Egbulonu, 2019). The result is as presented in Table 4 below:

Table 4: Summary of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
MPR does not Granger Cause INF	37	6.24808	0.0216
INF does not Granger Cause MPR		6.39651	0.0331
MSS does not Granger Cause INF	37	4.66932	0.0115
INF does not Granger Cause MSS		8.80838	0.0029
INT does not Granger Cause INF	37	7.01545	0.0018
INF does not Granger Cause INT		6.38082	0.0481
LIR does not Granger Cause INF	37	5.39409	0.0344
INF does not Granger Cause LIR		0.06761	0.7964

Source: Author's computation, 2025.

Table 4 above evidences the presence of bidirectional relationship between monetary policy rate (MPR) and inflation rate, and also between money supply (MSS) and inflation rate in Nigeria. Additionally, bidirectional causal relationship is also seen between interest rate and inflation rate. The probability values are all less than 0.05 critical value hence the rejection of the respective null hypotheses. The implication is that the current trend of movement in the monetary policy variables (MPR, MSS and INT) can be used to predict future inflation rate in Nigeria, and vice versa. However, only liquidity ratio granger causes inflation rate meaning that liquidity ratio can be used to predict outcome of inflation rate in Nigeria and not the other way round.

Table 5: VAR Model Estimate

Standard errors in ( ) & t-statistics in [ ]					
	INF	MPR	MSS	INT	LIR
INF(-1)	0.467663	0.029663	-0.063920	0.001098	-0.005622
	(0.16253)	(0.06464)	(0.03106)	(0.03319)	(0.06296)
	[2.87732]	[0.45890]	[-2.05782]	[0.03309]	[-0.08930]
MPR(-1)	0.264704	0.649120	0.022292	0.115707	0.373621
	(0.10155)	(0.19946)	(0.09585)	(0.10241)	(0.19428)
	[2.60664]	[3.25432]	[0.23256]	[1.12980]	[1.92309]
MSS(-1)	0.060563	-0.019439	0.979388	-0.024132	0.029685
	(0.01827)	(0.01920)	(0.00922)	(0.00986)	(0.01870)
	[3.31489]	[-1.01269]	[106.176]	[-2.44849]	[1.58772]
INT(-1)	-0.407605	-0.238907	0.158030	0.488016	-0.176621
	(0.54606)	(0.21716)	(0.10436)	(0.11150)	(0.21152)
	[-0.74645]	[-1.10012]	[1.51431]	[4.37673]	[-0.83500]
LIR(-1)	-0.217453	-0.055390	0.018730	-0.145401	0.364453
	(0.04864)	(0.17842)	(0.00574)	(0.09161)	(0.17379)
	[-4.47066]	[-0.31044]	[3.26307]	[-1.58717]	[2.09714]
C	3.253472	1.891909	-0.045994	1.925800	1.791835
	(2.09518)	(0.83325)	(0.40041)	(0.42783)	(0.81160)
	[1.55283]	[2.27053]	[-0.11486]	[4.50134]	[2.20778]
R-squared	0.876148	0.435655	0.798163	0.715589	0.430636
Adj. R-squared	0.775527	0.344632	0.767867	0.669716	0.338803
F-statistic	3.738257	4.786187	3368.784	15.59942	4.689347

Source: Author's computation, 2025

From the estimated output of the restricted VAR model, it can be seen that the first period lag of monetary policy rate (MPR) exert positive effect on inflation rate increasing it by 0.2647 units. The first period lagged positive effect of MPR on inflation rate was significant given the *t-statistic* of 2.6066. Monetary policy rate also increased other variables in the VAR model (money supply, interest rate and liquidity ratio). For money supply, monetary policy rate increased it by 0.0223 units while increasing interest rate and liquidity ratio by 0.1157 and 0.3736 units respectively. Both increases were not significant.

For money supply, we observed that it has a direct and positive relationship with inflation rate in Nigeria in the first lagged periods increasing inflation by 0.0606 units. The positive effect of money supply on inflation rate was significant in the first lagged period implying that a unit increase in the amount of money in circulation in the previous year will add to current year's inflation rate. Similar positive effect was found between money supply and liquidity ratio as it exerted 0.0297 units increase on liquidity ratio. However, changes in money supply led to 0.0194 and 0.0241 units decrease in MPR and interest rate respectively. The decrease in interest rate occasioned by money supply was significant (*t-stat. = -2.4485*).

The effect of interest rate on inflation in Nigeria was found to be negative in the first period lag. Even though the first period lagged effect of interest rate was not significantly negative, interest rate exerted 0.4076 units decreasing effect on inflation rate in Nigeria. However, increase in interest rate increases money supply in Nigeria by 0.1580 units signifying a situation where borrowers do not get discouraged by the existing interest rate as the amount of money in circulation rises despite changes in interest rate. There was negative effect of interest rate on monetary policy rate and liquidity ratio decreasing both variables by 0.2389 and 0.1766 units respectively.

A further examination of the vector model reveals that the previous year's value of liquidity ratio (LIR) decreased inflation rate significantly by 0.2175 units. Liquidity ratio also decreased MPR and interest rate by 0.0554 and 0.1454 units respectively. However, the decrease was not statistically significant at 5% level. The VAR model further showed significant positive effect

of liquidity ratio on money supply increasing money supply by 0.0187 units. Interestingly, the lagged coefficients of the variables exerted positive and significant own-effect on their current year values meaning that previous year's effects of MPR, MSS, INT and LIR on their current year was positive and significant.

Testing for Shocks in the VAR Model (Impulse Response Function)
The aim of the Impulse Response Function (IRF) is to test the effect of a one standard deviation shock to any of the variables, on the current and future values of the endogenous variables. The test is summarized in the figures below:
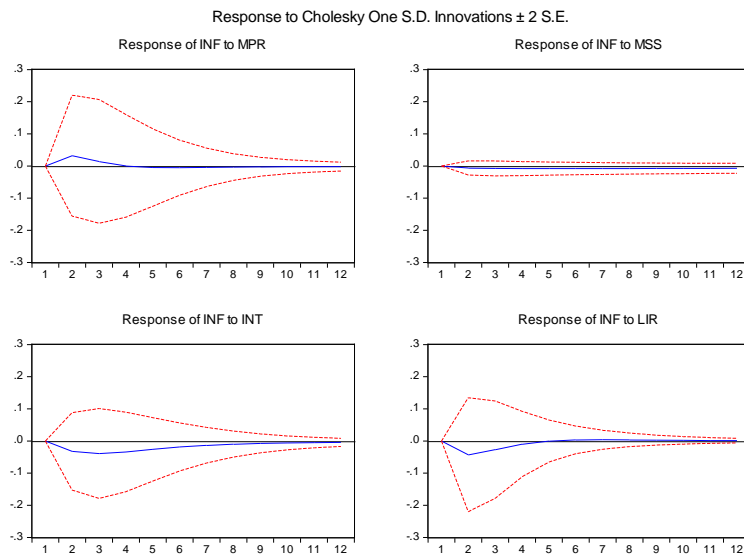

Fig. 1: Response of Inflation Rate to shocks in the Monetary Policy variables

As evidenced in figure 1 above, when shocks or abnormal movement is witnessed in monetary policy rate, inflation rate increases initially within the first two months before falling back to the zero-mean value. No further changes is witnessed in inflation rate for the rest of the year. In terms of shocks to money supply, inflation rate remains unchanged throughout the entire 12-month period which implies no significant changes in inflation rate as a result of shocks to money supply. When there is one standard deviation shock to interest rate and liquidity ratio, inflation rate falls to an initial negative trend but remains below the -1 mark. With a persistent shock to both monetary policy variables, inflation rate gradually recovers towards the 4th month and remains on the zero-mean line for the rest of the period. This signifies robust strategies to curb rapid inflation since inflation rate does not fall to negative trend for a long period of time.

Furthermore, figure 2 below shows the response of money supply to one standard deviation shock to the monetary policy variables.
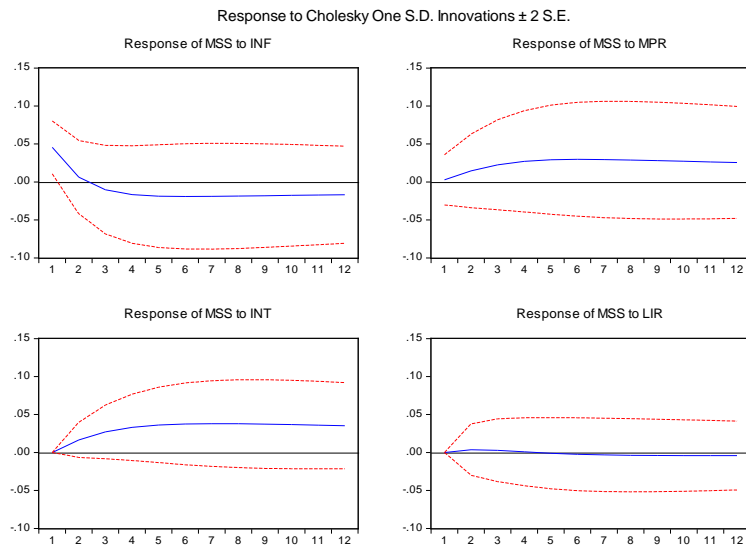
Fig. 2: *Response of Money Supply to shocks in the Monetary Policy variables*

As shown in Figure 2 above, money supply reacts negatively to shocks to inflation rate falling sharply within the first 2 months. IT continues on a negative trend throughout the rest of the period. This can be attributed to the immediate response of the monetary authority to changes in inflation rate through contractionary monetary policy (decrease in money supply). However, shocks to MPR exerted steady positive effect on money supply likewise shocks to interest rate. Both rates (MPR an INT) led to steady increase in money supply which gives the impression of a possible rise in general price level (inflation rate). For liquidity ratio, a one standard deviation shock led to no significant changes in money supply for the entire 12-month period.
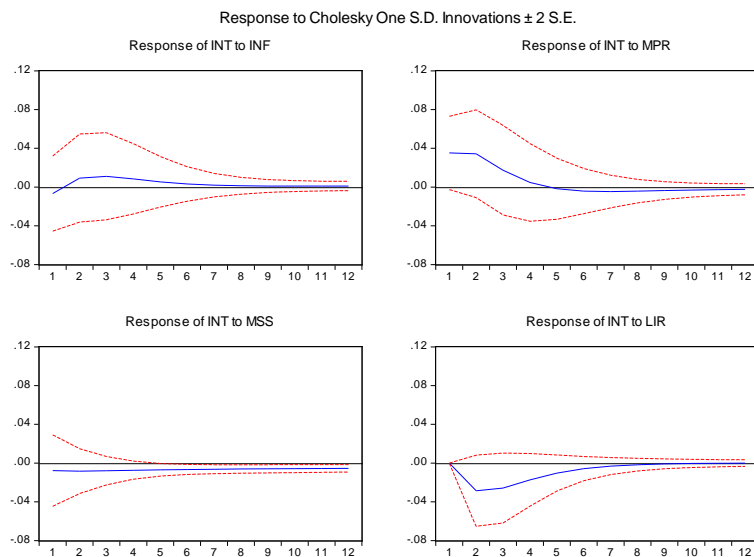

Fig. 3: *Response of Interest Rate to shocks in the Monetary Policy variables*

The question on how interest rate responds to one standard deviation shock to the exogenous variables is answered in figure 3 above. The impulse response function reveals that interest rate starts on a negative trend when there is shock to all the monetary policy variables. Shock to inflation rate led to slight increase in interest rate before falling back to the zero mean line which shows no significant effect. Shock to MPR led to initial sharp fall in interest rate before falling back to the zero mean line as well. Shock to money supply did not significantly change interest rate while shock to liquidity ratio led to initial decrease in interest rate before falling back in the zero-mean line.
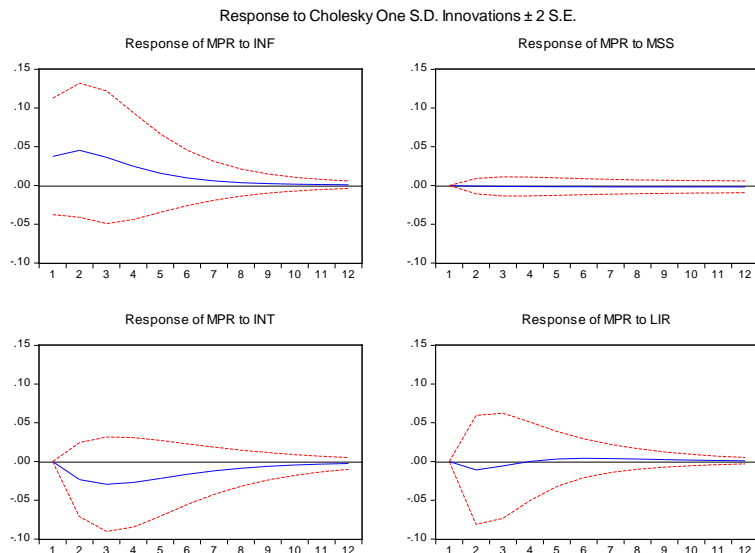
Response to Cholesky One S.D. Innovations ± 2 S.E.

Fig. 4: *Response of Monetary Policy Rate to shocks in other Monetary Policy variables*

As shown in figure 4, there was significant change in monetary policy rate as a result of one standard deviation shock to inflation rate and interest rate. While MPR starts on a positive trend and falls steadily to the zero-mean line for inflation rate shocks, MPR started on a negative trend and falls to the zero-mean line for shocks to interest rate. There was minimal effect of shocks to MSS and LIR on MPR.

Variance Decomposition

The variance decomposition test allows the study to understand the relative contribution of the monetary policy variables within the VAR framework to the overall variance of inflation rate. Essentially, the test reveals which variables have the most effect on observed changes in inflation rate in the VAR model. Table 6 below summarizes the test.

Table 6: Variance Decomposition Test

Variance Decomposition of INF

Period	S.E.	INF	MPR	MSS	INT	LIR
1	0.577909	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.650998	99.06917	0.241679	0.008844	0.247590	0.432715
3	0.669217	98.55724	0.271824	0.021684	0.576110	0.573139
4	0.674055	98.28744	0.267937	0.035759	0.822921	0.585941
5	0.675513	98.12670	0.272264	0.050104	0.967497	0.583431
6	0.676059	98.02921	0.278197	0.064368	1.043370	0.584853
7	0.676318	97.96951	0.282065	0.078377	1.082387	0.587660
8	0.676468	97.93066	0.284209	0.092016	1.103332	0.589783
9	0.676571	97.90277	0.285496	0.105199	1.115548	0.590990
10	0.676652	97.88068	0.286440	0.117872	1.123416	0.591592
11	0.676720	97.86186	0.287279	0.130008	1.128987	0.591869
12	0.676781	97.84505	0.288115	0.141597	1.133257	0.591987

Source: Author's computation, 2025.

The variance decomposition test summarized above show that in the short run, i.e. the first period or first year, impulse or innovation or shock to the exogenous variables accounts for nearly 100% (between 97% to 99%) variation of the fluctuations in inflation rate. The 12-month period signifies percentage changes in inflation rate as a result of changes in the exogenous variables (monetary policy variables). The first half of the year signifies the period when the monetary policy variables severely affected inflation rate while the second half of the year signifies the period when there was reduced effect of the monetary variables on inflation rate.

The monetary policy variables (MPR, money supply, interest rate and liquidity ratio) jointly accounted for 77.55% of the total changes in inflation rate within the period under study. This is very high coefficient of determination and shows good model fitness. The implication is that the monetary policy variables account for a significant proportion of the changes in inflation rate in Nigeria.

Findings from the first approximation reveal that monetary policy rate (MPR) has significant effect on inflation rate in Nigeria. The positive coefficient implied that monetary policy rate positively influenced inflation rate in Nigeria.

However, when there is shock in MPR, inflation rate remains minimal but shocks to MPR increased money supply. Also, shock to MPR leads to gradual fall in interest rate as a way of encouraging more borrowers that are outside the financial system. This creates the notion that prolonged inconsistencies in monetary policy is detrimental to inflation control.

Conclusion

The monetary policy and inflation dynamics in Nigeria has been aptly examined, using data covering the period 1986 to 2023, obtained from CBN Statistical bulletin and the National Bureau of statistics (NBS), 2023. It employed the Vector Auto regression (VAR) model, using EViews 12 econometric software for the estimation. The results indicate that monetary policy has significant effect on inflation dynamics in Nigeria. This is coming from the position of the significant effects of monetary policy rate, money supply and liquidity ratio on inflation rate in Nigeria. Monetary policy rate and money supply tend to have increased effects on inflation rate, which is detrimental to the economy. Yet, the cushioning effect of liquidity ratio does not seem to deter inflation rate from spiraling since increased interest rate does not discourage borrowing from the economy but persistent changes in MPR increases inflation rate. Arising from the foregoing, the Nigerian economy needs to be set on the path to decreased inflation rate if the goal of sustainable economic growth must be achieved. In that case, there is the need for the monetary authority to take charge of the cash movements by maintaining stable monetary policy rate that would stabilize interest rate and encourage borrowings from financial institutions in order to keep money supply at moderate state to discourage inflation.

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