IMPACT ANALYSIS OF MONETARY POLICY, INFLATION AND EXCHANGE RATE FLUCTUATION IN NIGERIA

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ABSTRACT

Monetary policy is a vital tool employed by the Central Bank of Nigeria (CBN) to achieve macroeconomic stability and economic growth. It has been observed that monetary policy plays an important role in driving economic growth of developing countries (Nigeria inclusive) through reduction of inflation rate and exchange rate fluctuation in the economy. This study examined the effect of monetary policy on inflation and exchange rate fluctuation in Nigeria, utilizing annual time series data from 1990 to 2022. The study employed a quantitative research design and utilizing the Vector Autoregression (VAR) model estimation technique. Result of the estimate showed that monetary policy has significant effect on exchange rate in Nigeria, while monetary policy has a negative and insignificant effect on exchange rate in Nigeria. Based on the results, the study recommends among other things that government should take positive steps towards formulating workable monetary policies that would stabilize exchange rate and hence reduce inflationary pressure on the Nigerian economy.

KEYWORDS: Monetary Policy, Inflation, Exchange Rate, VAR and Granger Causality.

1. INTRODUCTION

Nigeria's economic stability and growth potential have been severely hampered by the notable changes in inflation and exchange rates that the country has seen in recent years. Being a major actor in the world economy, the Nigerian government has tried to regulate currency rate swings and control inflation by using a number of monetary policy measures Central Bank of Nigeria, (2022). But economists and decision-makers continue to disagree over how successful these monetary policy tools are, according to Ojo (2018). In order to shed light on how monetary policy, inflation, and exchange rate changes affect Nigeria's macroeconomic indicators, this undergraduate project aims to explore the relationship between these factors.

One of the biggest economies in Africa, Nigeria, has been working to achieve long-term economic development and prosperity. Nonetheless, historically, the nation's economy has been vulnerable to changes in currency rates and inflation. Ojo (2018). Nigeria has experienced difficulties both domestically and internationally over the last ten years, which has affected its currency and changed domestic price levels Ibeabuchi (2020). The Consumer Price Index (CPI), which measures inflation, has experienced periods of gradual development and unexpected spikes. The value of the Nigerian naira in relation to other currencies, or the exchange rate, has also fluctuated significantly, which has an impact on global investment, trade, and economic stability in general. Ibeabuchi (2020).

Monetary policy in Nigeria is formulated and carried out in large part by the Central Bank of Nigeria (CBN). The central bank's (CBN) principal goal is to keep prices steady while promoting economic expansion and a stable exchange rate system (CBN, 2022). The CBN has used a variety of monetary policy instruments, including reserve requirements, discount rates, open market operations, and foreign exchange market intervention, to accomplish these goals.

The link between monetary policy, inflation, and currency rate variations in Nigeria has been the subject of numerous research. Ajayi (2017) carried out a thorough investigation into how monetary policy affects inflation and discovered that variations in the money supply and interest rates have a big impact on inflation dynamics.

Comparably, Okafor and Nwachukwu (2019) investigated how monetary policy is transmitted to exchange rate swings, finding both direct and indirect influences on the value of the currency.

Though some research has yielded insightful information, there is still a knowledge vacuum about the complex interplay among monetary policy, inflation, and exchange rate changes in Nigeria. Furthermore, given the fluidity of current economic situations, a current study on this subject is necessary to provide timely and pertinent policy recommendations.

The Central Bank of Nigeria (CBN) uses monetary policy as a key tool to promote macroeconomic stability and economic expansion. It seeks to preserve exchange rate stability and price stability, both of which are necessary for long-term, sustainable economic growth (CBN, 2021). Nonetheless, there is ongoing discussion and research over the efficacy of Nigeria's monetary policy.

Even with the adoption of a number of monetary policy initiatives, Nigeria has continued to struggle with controlling inflation and exchange rate swings. Exchange rate changes can cause uncertainty for firms, investors, and trade operations, while high and volatile inflation rates reduce consumer purchasing power and interfere with economic planning. Nwachukwu and Okafor (2019).

The execution of monetary policy in Nigeria is hampered by a number of variables, such as structural limitations, changes in the global economy, fiscal policy difficulties, and external shocks. These complications cast doubt on the degree to which the nation of Ibeabuchi (2020) can effectively control inflation and exchange rate swings through monetary policy.

Although this relationship has been the subject of previous research studies, more work is still required to meet current policy changes and economic trends. Further research is necessary to determine the precise transmission pathways that monetary policy uses to influence exchange rates and inflation in Nigeria.

Consequently, the goal of this study is to evaluate how well monetary policy tools work to keep inflation in Nigeria under control. Examining the connection between the nation's exchange rate movements and monetary policy. Evaluating how current policy changes and economic advancements have affected the way that monetary policy is transmitted. Finally, the goal of this study is to offer insightful information regarding the opportunities and difficulties associated with monetary policy in Nigeria to stakeholders, scholars, and policymakers. It is intended that by comprehending the relationships among monetary policy, inflation, and exchange rate swings, more focused and efficient policy interventions may be created to promote the country's stability and sustainable economic growth.

2. LITERATURE REVIEW

In the context of Nigeria, this literature review investigates the current conceptual understanding of the connection between monetary policy, inflation, and currency rate fluctuations. The review's objective is to compile and evaluate pertinent research that has advanced our knowledge of this important economic relationship.

Inflation and Exchange Rate in Nigeria:
Nigeria has endured ongoing difficulties with inflation and currency rate swings throughout the years. Unpredictable fluctuations in the nation's inflation rate have severely disrupted price levels, reduced purchasing power, and impeded economic expansion. Furthermore, there has been a great deal of fluctuation in the exchange rate, which makes it challenging for investors and businesses to manage resources effectively.

Monetary Policy Framework in Nigeria:
Creating and carrying out monetary policy is the responsibility of the Central Bank of Nigeria (CBN). The CBN manipulates the money supply and, in turn, economic activity through a variety of tools, such as reserve requirements, open market operations, discount rates, and exchange rate management. It has been of scholarly interest and policy concern whether these policy tools are effective in reaching desired outcomes in terms of exchange rate stability and inflation management.

Past Research on Monetary Policy and Inflation:
The connection between Nigerian inflation and monetary policy has been the subject of numerous research. Ojo (2018) discovered that while shifts in the monetary policy rate had a major short-term influence on inflation, structural and supply-side factors eventually reduced the efficacy of such policies. But Akintunde et al. (2019)

contended that, in the long run, monetary policy measures were successful in reducing inflation, especially when combined with structural changes and budgetary restraint.

Exchange Rate Fluctuation and Monetary Policy:
The literature has also looked at the relationship between changes in Nigeria's exchange rate and monetary policy. According to Ibeabuchi (2020), an expansionary monetary policy tends to put pressure on the currency rate to depreciate, which increases import costs but makes Nigerian exports more competitive. Conversely, contractionary monetary policy measures were linked to an increase in currency rates, which could provide difficulties for businesses that depend on exports.

Theoretical Framework of Monetary Policy:
Different economic theories serve as the basis for monetary policy, enabling decision-makers to create and carry out the right policies. The Quantity Theory of Money, which asserts a direct correlation between the money supply and price levels, is one of the most prominent theories. This idea states that inflationary pressures would result from an increase in the money supply. The Central Bank of Nigeria's (CBN) judgments regarding the management of interest rates and the money supply have been influenced by this viewpoint (Friedman, 1956).

Transmission Mechanisms of Monetary Policy:
The methods by which monetary policy affects the larger economy determine how effective it is in affecting inflation and exchange rate fluctuations. One such route via which adjustments to the monetary policy rate can affect inflation is the interest rate channel. In the end, the CBN's policy rate adjustments impact borrowing costs, investment choices, and consumption trends, which in turn impact overall demand and inflationary pressures (Tobin, 1969)

Inflation and Monetary Policy in Nigeria:
The connection between Nigerian inflation and monetary policy has been the subject of numerous research. In order to attain long-term price stability, Okunrounmu and Adebusuyi (2017) stressed the significance of adopting a proactive and forward-looking monetary policy posture. They maintained that the CBN's dedication to low inflation might boost its reputation and improve its ability to control inflation expectations.

Exchange Rate and Monetary Policy in Nigeria
One important connection between monetary policy and the external sector is the currency rate. Because oil exports account for a large portion of Nigeria's economy, changes in oil prices have a big effect on the country's currency rate. currency rate pass-through, or the degree to which changes in currency rates impact domestic prices, was determined to be insufficient in Nigeria by Adebiyi and Oyinlola (2018) because of structural rigidities and pricing practices.

Challenges and Limitations of Monetary Policy in Nigeria:
The CBN has worked to control inflation and currency rate swings, but a number of obstacles have made Nigeria's monetary policy ineffective. The inability of monetary policy to achieve desired results has been attributed to structural bottlenecks, supply-side constraints, and fiscal supremacy (Acharya et al., 2021).

Recent Policy Developments:
The relationship between monetary policy, inflation, and currency rate variations in Nigeria may have changed as a result of recent economic developments and policy changes. The relationship between these variables may be affected, for example, by the adoption of an inflation targeting framework and modifications to exchange rate management techniques (Onanuga, 2022).

An overview of the main theoretical tenets and empirical data regarding the impact of monetary policy on inflation and exchange rate volatility in Nigeria is given in this conceptual literature review. It emphasizes how crucial it is to comprehend the transmission mechanisms and the difficulties faced by policymakers in accomplishing their goals. The assessment also emphasizes the need for more investigation to determine how recent policy changes have affected Nigeria's monetary policy's efficacy.

Effect of Monetary Policy on Inflation
Transmission Paths of Monetary Policy: Interest rate, credit, and exchange rate channels are only a few of the ways that monetary policy can impact inflation. According to Ogbonna and Agunwa (2018), the interest rate channel affects borrowing and spending decisions, which in turn affects inflation and aggregate demand. The

credit channel highlights how changes in monetary policy are transmitted to inflation through bank lending (Odusanya & Osinubi, 2019).

Persistence of Inflation: Nigerian inflation has shown some persistence, suggesting that historical inflation patterns have an impact on the dynamics of inflation now. Investigations of monetary policy's capacity to combat inflation persistence have revealed that the efficacy of such actions may fluctuate over time and among various inflation regimes (Ogundipe & Alimi, 2018).

Effect of Monetary Policy on Exchange Rate Fluctuation:
Exchange Rate Regimes: There have been several exchange rate regimes in Nigeria, including managed float systems, fixed exchange rates, and floating exchange rate periods. Exchange rate variations are impacted by the central bank's operations as well as the choice of exchange rate regime (Akande & Adediran, 2020).
3.2 Sterilization Policy: Exchange rate movements have been observed to be influenced by the CBN's sterilization policy, which aims to neutralize the impact of capital flows on the money supply and inflation (Okonkwo et al., 2019). Sterilization policies' ability to control currency rate swings is dependent on outside variables like foreign exchange reserves and international capital flows.

Interaction between Inflation and Exchange Rate
Exchange Rate-Inflation Nexus: In Nigeria, there is a reciprocal relationship between exchange rates and inflation. Excessive inflation may result in a decline in the value of the currency, which would impact consumers' purchasing power and drive up import prices. Exchange rate changes can also affect the cost of imports and, in turn, the levels of local prices (Dauda et al., 2021). Exchange rate pass-through effects: The degree to which fluctuations in exchange rates impact local prices is referred to as pass-through effects. Studies on the pass-through effect in Nigeria reveal that it is substantial but incomplete, demonstrating that monetary policy can influence inflation indirectly by influencing exchange rate swings (Ogunbiyi & Falokun, 2022). An overview of the theoretical frameworks and empirical research that look at how monetary policy affects inflation and exchange rate fluctuations in Nigeria is given in this conceptual literature review. In order to attain macroeconomic stability and sustained economic growth in Nigeria, a well-designed and targeted monetary strategy is crucial, as the reviewed literature emphasizes the intricacy of the linkages between monetary policy, inflation, and currency rates.

Theoretical Literature
Understanding the underlying mechanisms and transmission channels via which monetary policy actions influence these macroeconomic variables is made possible by reading the theoretical literature on the impact of monetary policy on inflation and exchange rate fluctuation in Nigeria. The theoretical frameworks and models that have been used to examine the connection between monetary policy, inflation, and exchange rate fluctuations in the Nigerian environment are reviewed in this section.

The Quantity Theory of Money
According to the Quantity Theory of Money, price levels are directly impacted by changes in the money supply. According to this hypothesis, there may be more money available to drive up prices in the Nigerian setting, hence expansionary monetary policy actions like raising the money supply could result in greater inflation rates (Folarin, 2017). On the other hand, contractionary monetary policy measures, including lowering the money supply, may be able to lessen inflationary pressures.

The Mundell-Fleming Model:
A common paradigm for examining how monetary policy, currency rates, and output interact in an open economy setting is the Mundell-Fleming model. This model has been applied to Nigeria, which is open to capital flows and international commerce, to comprehend how changes in monetary policy impact fluctuations in currency rates (Owoye & Olomola, 2020). For example, reduced interest rates under an expansionary monetary policy may result in capital flight and depreciation of the exchange rate, increasing export competitiveness but also possibly causing inflation.

The Taylor Rule:
Central banks frequently utilize the Taylor Rule as a guide when determining interest rates, taking into account factors like inflation and the output gap. This guideline has been used to evaluate the suitability of the Central Bank of Nigeria's (CBN) monetary policy initiatives in the Nigerian environment (Ogbonna & Agunwa, 2018). According to the guideline, the CBN should modify interest rates in reaction to shifts in output and inflation in order to preserve price stability and foster economic expansion.

Exchange Rate Regimes

Nigeria has gone through a variety of currency rate regimes, including managed float systems and fixed exchange rates. The degree of exchange rate flexibility and the efficiency of monetary policy in controlling exchange rate volatility are influenced by the exchange rate regime chosen (Akande & Adediran, 2020). For instance, because the central bank is committed to upholding a fixed exchange rate, monetary policy measures may have less of an impact on the exchange rate in a fixed exchange rate regime.

A variety of models and frameworks are used in the theoretical literature on the impact of monetary policy on inflation and exchange rate fluctuations in Nigeria, which aids in clarifying the complex link between these macroeconomic variables. Policymakers can more effectively design and implement monetary policy measures to ensure price stability and exchange rate stability while fostering economic growth in Nigeria by having a better understanding of the underlying theories and transmission channels.

Empirical Literature

Examining the body of research that looks into the connection between monetary policy, inflation, and exchange rate fluctuations in Nigeria is the goal of this review of empirical literature. This section aims to offer insights into the efficacy of monetary policy tools in attaining price stability and exchange rate stability in the Nigerian economy by examining pertinent empirical research.

Empirical Studies on Monetary Policy and Inflation in Nigeria:

Ojo (2018): Ojo's research looked at how Nigerian inflation was affected by shifts in the monetary policy rate. The findings showed that changes to the policy rate had a major impact on inflation in the near term. However, supply-side and structural issues eventually undermined the ability of monetary policy to control inflation.

In 2019, Akintunde et al. Akintunde and associates investigated the long-term relationship between monetary policy and inflation in Nigeria in a distinct study. They discovered that long-term inflationary pressures might be effectively reduced by monetary policy actions combined with structural changes and budgetary restraint.

Ogundipe & Alimi (2018): Ogundipe and Alimi examined the reasons behind Nigeria's ongoing inflation and the monetary policy ramifications. According to their findings, inflation showed some persistence, suggesting that historical inflation trends had an impact on the dynamics of inflation today. This implies that in order to attain price stability, policymakers may need to take previous trends into account while conducting monetary policy.

Empirical Studies on Monetary Policy and Exchange Rate Fluctuation in Nigeria

Ibeabuchi (2020): Ibeabuchi's research examined the connection between Nigeria's currency rate fluctuations and monetary policy. The findings demonstrated that an expansionary monetary policy has a tendency to put pressure on the currency rate to depreciate. Although this depreciation increased import costs and thus raised the possibility of stronger inflationary pressures, it also made Nigerian exports more competitive. In 2020, Akande and Adediran: The effect of various exchange rate regimes on exchange rate variations in Nigeria was investigated by Akande and Adediran. According to their research, different exchange rate regimes—managed float, floating, and fixed—had different impacts on the evolution of currency rates. Exchange rate movements were significantly influenced by the central bank's operations and the choice of exchange rate regime.

In 2019, Okonkwo et al. Okonkwo and associates examined the efficacy of the Central Bank of Nigeria's (CBN) sterilization program in handling swings in exchange rates. The results showed that sterilization policies affected changes in currency rates, but their efficacy was reliant on outside variables like foreign exchange reserves and international capital flows.

Empirical Studies on the Interaction between Inflation and Exchange Rate

Dauda et al. (2021): In this study, Dauda and associates investigated the reciprocal relationship between Nigerian exchange rates and inflation. According to their analysis, excessive inflation may result in a decline in the value of the currency, which would reduce consumer purchasing power and raise import inflation. Exchange rate changes also affected import expenses concurrently, which in turn affected domestic pricing levels. Falokun & Ogunbiyi (2022): The pass-through effects of currency rate variations on domestic pricing in Nigeria were studied by Ogunbiyi and Falokun. According to their research, the pass-through impact was substantial but incomplete. This suggests that fluctuations in exchange rates may have an indirect effect on inflation and may have consequences for the efficacy of monetary policy initiatives.

The empirical research discussed in this part sheds insight on the subtleties and complexity of the connection between Nigeria's exchange rate fluctuations, inflation, and monetary policy. Numerous research' conclusions suggest that monetary policy decisions can have a big impact on inflation and exchange rate fluctuations both in the short and long term. However, depending on outside variables, currency rate policies, and the duration of inflationary pressures, these measures' efficacy may differ.

Monetary Policy and Inflation
Time-Series Studies: To examine the effect of monetary policy on inflation in Nigeria, Ogundipe and Owoye (2017) used a Vector Autoregression (VAR) model. According to their findings, short-term inflation might be effectively controlled by implementing contractionary monetary policy measures such raising the monetary policy rate. However, structural limitations and supply-side issues seemed to make the long-run relationship less meaningful.

Structural Break Analysis: Adeyemi et al. (2018) investigated the efficiency of monetary policy under various Nigerian inflation regimes as well as the persistence of inflation using a Markov-switching Autoregressive (MS-AR) model. They distinguished between two different inflation regimes and discovered that, while monetary policy measures were more persistent during high inflation periods, their efficacy differed between the regimes. Monetary Policy and Inflation Expectations: Adediran and Dada's (2019) study examined how inflation expectations affect how Nigeria's monetary policy is transmitted. They proved that anchoring inflation expectations was essential for the success of monetary policy in establishing price stability using a Dynamic Stochastic General Equilibrium (DSGE) model.

Monetary Policy and Exchange Rate Fluctuation:
Event Study Analysis: In order to determine how the Central Bank of Nigeria's monetary policy announcements affected exchange rate volatility, Akande and Bello (2018) carried out an event study analysis. According to their results, there were notable variations in the exchange rate right following monetary policy announcements, indicating that monetary policy decisions had a big impact on the currency rate. Cointegration and Error Correction Modeling: Using a cointegration and error correction modeling approach, Ibrahim and Isah (2019) looked into the long-term link between monetary policy, exchange rates, and inflation in Nigeria. Their findings showed a strong long-term correlation between inflation, the exchange rate, and monetary policy, indicating that monetary policy was a major factor in determining the dynamics of the exchange rate.

Exchange Rate Movements and Capital Flows: Adebayo and Ogunbiyi (2021) looked at how capital flows affected Nigeria's exchange rates. Using a VAR model, they discovered that variations in capital flows had an impact on exchange rate swings. This finding emphasizes the significance of regulating capital flows in tandem with monetary policy to attain exchange rate stability.

Interaction between Inflation and Exchange Rate
Granger Causality Test: Using the Granger causality test, Nwanji and Emeka's (2018) study examined the causative relationship between inflation and fluctuations in Nigeria's exchange rate. Their findings suggested that there is a unidirectional causal relationship between inflation and exchange rates, meaning that inflation may have an impact on changes in the nation's currency rates. Currency Rate Pass-through and Inflation: In 2020, Okonkwo and colleagues investigated the impact of Nigeria's currency rate pass-through on inflation. Their results showed a strong pass-through impact, suggesting that changes in exchange rates may directly affect domestic price levels and thus the rate of inflation as a whole.

The intricate interplay between these macroeconomic factors is demonstrated by the empirical research on the impact of monetary policy on Nigerian inflation and exchange rate fluctuations. Numerous modeling methodologies and econometric tools have been used to investigate this link, offering policymakers insightful information. The results of these studies highlight how crucial it is to put in place efficient monetary policy tools in order to control inflation and maintain exchange rate stability in Nigeria.

3. METHODOLOGY
The National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN) will serve as the study's main data sources. For the years 1990 to 2022, pertinent data on monetary policy indicators, such as the policy rate (also known as the monetary policy rate, or MPR), inflation rates (also known as the consumer price index, or CPI), and exchange rates (Nigerian Naira to US dollar), will be gathered.

Model Econometric: The primary econometric instrument to be used in the analysis of the relationship between monetary policy, inflation, and exchange rate fluctuations is the Vector Autoregression (VAR) model. The VAR model can shed light on the dynamic reactions of inflation and exchange rates to monetary policy shocks and is suitable for capturing the simultaneous interactions between various time-series variables (Ogundipe & Owoye, 2017).

Estimation and Analysis
Eviews, Stata, or R are examples of suitable statistical software that will be used to estimate the VAR model. The short- and long-term links between monetary policy, inflation, and exchange rate volatility will be examined using the estimation results. The dynamic impact of monetary policy shocks on inflation and exchange rates will be understood through the computation of impulse response functions and variance decomposition. Implications for Policy: The interpretation of the research findings will yield significant policy implications. The Central Bank of Nigeria's goals of attaining price stability and exchange rate stability while promoting sustainable economic growth will be affected by these ramifications.

With the use of a quantitative research approach and the VAR model for data analysis, this study seeks to advance knowledge of how monetary policy affects inflation and exchange rate volatility in Nigeria. The above-described technique will offer a strong framework for making trustworthy deductions and advising decision-makers on the best course of action to bring about macroeconomic stability in the nation.

Variables Definition
The model will include the following variables:
a) Inflation Rate (INF): This variable represents the percentage change in the Consumer Price Index (CPI) over time, reflecting the inflationary pressures in the Nigerian economy.
b) Exchange Rate (EXR): This variable denotes the nominal exchange rate of the Nigerian Naira (NGN) to the US Dollar (USD), reflecting the competitiveness and external value of the domestic currency.
c) Monetary Policy Rate (MPR): This variable represents the benchmark interest rate set by the Central Bank of Nigeria (CBN) as a tool to control money supply and influence economic activity.

Model Specification:
Introduction:
The model specification for this undergraduate project aims to investigate the relationship between monetary policy, inflation, and exchange rate fluctuation in Nigeria. The Vector Autoregression (VAR) model will be used to capture the simultaneous interactions between these macroeconomic variables, allowing for a comprehensive analysis of their dynamic responses to monetary policy shocks. The VAR model will be specified based on the theoretical foundation, including the following variables: inflation rate (INF), exchange rate (EXR), and monetary policy rate (MPR). Additionally, lag lengths will be determined using statistical criteria like the Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC) to ensure the model's parsimony and accuracy.
The functional model will be converted to a stochastic relationship below:
$INF = B_o + B_1 EXR + B_2 MPR + \mu$ ------------------- 1
$EXR = B_o + B_1 INF + B_2 MPR + \mu$ ------------------ 2
$MPR = B_o + B_1 INF + B_2 EXR + \mu$ ------------------ 3

Where:
INF= INFLATION RATE
EXR= EXCHANGE RATE
MPR= MONETARY POLICY RATE
μ= Error Term
B_o = Intercept of the regression
B_1 AND B_2 = slopes coefficient of the respective explanatory variables.
The general form of the VAR model can be represented as follows:
$INF\_t = c + \Sigma(\varphi\_ij * INF\_t-i) + \Sigma(\theta\_ij * EXR\_t-i) + \Sigma(\delta\_ij * MPR\_t-i) + \varepsilon\_t$
$EXR\_t = c + \Sigma(\varphi'\_ij * INF\_t-i) + \Sigma(\theta'\_ij * EXR\_t-i) + \Sigma(\delta'\_ij * MPR\_t-i) + \varepsilon'\_t$
$MPR\_t = c + \Sigma(\varphi''\_ij * INF\_t-i) + \Sigma(\theta''\_ij * EXR\_t-i) + \Sigma(\delta''\_ij * MPR\_t-i) + \varepsilon''\_t$
where INF_t, EXR_t, and MPR_t represent the current values of inflation rate, exchange rate, and monetary policy rate, respectively, and ε_t, ε'_t, ε''_t are error terms

4. RESULTS AND DISCUSSION

Unit root test

Conventionally, the universal assumption in testing economic model is that the variables be stationary, but is not generally true. Therefore, before estimating the model of the research, we shall check for the time series properties of the data. The unit root was tested using Augmented Dickey-Fuller test at 5% level of significance. The choice of lag length was lag (9) which was used uniformly for all variables. The result is shown in the table below:

Table 1: Summary of the Augmented Dickey-Fuller Test

Variables	ADF Statistics	5% Critical value	Probability	Order of integration	Remark
EXCR	-3.679488	-2.963972	0.0098	1(1)	Stationary
INF	-4.511443	-2.963972	0.0012	1(1)	Stationary
MPR	-3.974105	-2.960411	0.0046	1(0)	Stationary

Sources: Authors computation using Eview 10

The table above shows the results of the unit root test. The decision rule state that if the Augmented Dickey Fuller statistics is > than the critical value at 5% then there is no unit root in the data, but its stationary. The result shows that monetary policy rate (MPR) is stationary at level while INF and EXCR were stationary at 1st difference, hence the data is stationary.

Granger causality test

Although regression analysis deals with the dependence of one variable on the other, it does not imply causation. In other words, the existence of a relationship between variables does not prove causality or the direction of influence (Gujarati, 2004). The essence of employing causality analysis, using the granger causality test in this research work is to actually ascertain whether a causal relationship exists between Inflation Rate (INF), Exchange Rate (EXCR) and Monetary Policy Rate (MPR). The F- statistics is used to reject or accept the null hypothesis of no causation between the variables when F-statistics is greater than 2 and less than 2 respectively. Or the probability value, the null hypothesis is rejected if p- value is less than 5% level of significance. Consider the table below to check for direction of influence between the variables in Nigeria for the period under study (i.e. from 1990 to 2021).

Table 2: Granger Causality Test Result

Pairwise Granger Causality Tests
Date: 07/9/23   Time: 12:51
Sample: 1990 2021
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCR does not Granger Cause INF	30	0.81965	0.4521
INF does not Granger Cause EXCR		0.65037	0.5305
MPR does not Granger Cause INF	30	0.56490	0.5755
INF does not Granger Cause MPR		0.46334	0.6345
MPR does not Granger Cause EXCR	30	0.54558	0.5863
EXCR does not Granger Cause MPR		0.95837	0.3972

Source: Author's computation using Eview 10

The result shows that there is no causality between the variables, which are all tested on the same lag. The outcome is presented in Table 2 above. The results suggest that there is no direction of causality between the Effect of

Monetary Policy on Inflation and Exchange Rate Fluctuation in Nigeria. Also, the result showed that all the variables their probability is greater than 0.05 and that means they are not Granger causing each other. That is, no relationship exists between them.

Table 3: Vector Autoregressive Result
Bayesian VAR Estimates
Date: 07/9/23   Time: 12:37
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	INF	EXCR	MPR
INF(-1)	0.245060	-0.177926	-0.001985
	(0.08091)	(0.15257)	(0.01097)
	[3.02862]	[-1.16623]	[-0.18098]
INF(-2)	0.015252	-0.069679	0.001491
	(0.04728)	(0.08893)	(0.00639)
	[0.32259]	[-0.78351]	[0.23315]
EXCR(-1)	-0.037266	0.784904	0.000878
	(0.02726)	(0.05206)	(0.00372)
	[-1.36709]	[15.0764]	[0.23603]
EXCR(-2)	-0.011602	0.156160	-0.001222
	(0.02352)	(0.04507)	(0.00321)
	[-0.49325]	[3.46503]	[-0.38066]
MPR(-1)	-0.225427	0.182243	0.071879
	(0.62723)	(1.19062)	(0.08625)
	[-0.35940]	[0.15307]	[0.83340]
MPR(-2)	-0.135884	0.180767	-0.016541
	(0.34815)	(0.66087)	(0.04796)
	[-0.39030]	[0.27353]	[-0.34492]
C	22.91124	24.61184	7.327655
	(6.63914)	(12.5948)	(0.90957)
	[3.45094]	[1.95413]	[8.05621]
R-squared	0.417875	0.946969	0.056910
Adj. R-squared	0.266017	0.933134	-0.189114
Sum sq. resids	4746.667	17003.95	68.80327
S.E. equation	14.36582	27.19011	1.729580
F-statistic	2.751739	68.45091	0.231319
Mean dependent	18.58584	146.4900	7.711333
S.D. dependent	16.76824	105.1501	1.586094

The values in () represents the standard error and [] denotes t-statistics.
The overall goodness of fit statistics for statistics for the models are quite impressive for some. The coefficient of determination R^2 for Exchange Rate equation is approximately 0.933. This indicates that the regressors in the equation accounted for about 93.3 percent of the systematic variation in monetary policy. The R^2 for Inflation Rate is 0.417, which indicated that a 41 percent of the changes in monetary variables is by the explanatory and the remaining 59 percent is by the dummy variables. The goodness of fit for Monetary Policy Rate equation is very

poor which shows only 5 percent is accounted by the explanatory variables with 95 percent by the dummy variables

The F-statistics for the four equations are: 2.751739, 68.45091 and 0.231319 respectively. They indicated that the VAR model is significantly different from zero. This is because each statistics is greater than the critical value of 0.0001 at 5% level. In other words, the explanatory variables is jointly considered are significantly important in explaining the variation in each endogenous variables.

From the inflation equation, the two lagged values of exchange rate shows a negative relationship in both the one year lag and the second year lag. However, the coefficient value of both first and second year lagged value of monetary policy rate is negative. Considering the exchange rate equation, the coefficient of inflation in both first a second lag are negative but that of monetary policy rate are both positive. The equation of monetary policy rate shows that the coefficient of inflation in both the lag is negative while that of exchange rate is positive in the first year lag is positive and negative in the second lag.

Impulse Response Functions
In order to conduct the dynamic analysis among the variables, the impulse response functions are examined. The result are in the forms of dynamic impulse response of the variables of VAR (INF, EXCR, and MPR) to an increase in each relevant variable equivalent to the sample standard deviation. The results in graphical form is presented below:

Figure 1: Impulse Response Function

Response to Cholesky One S.D. (d.f. adjusted) Innovations
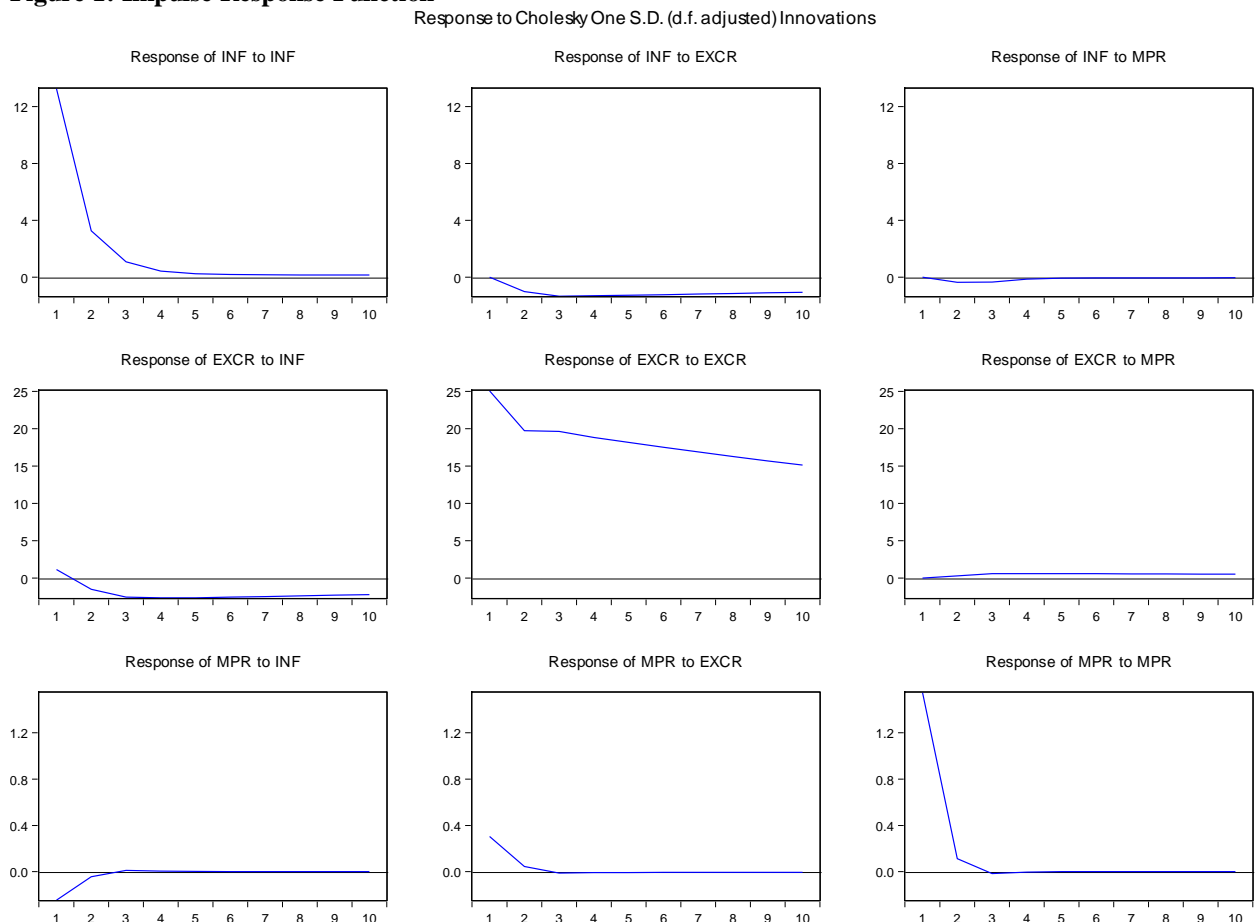
Source: Author's computation using Eview 10

The figure above shows the result of the impulse response function. It is used to produce the time path of the dependent variables in the Vector Auto-regression (VAR), to shocks from all the explanatory variable. If the system of equations is stable any shock should decline to zero, an unstable system would produce an explosive time path.

In this study, the focus is the time path of INF to ascertain if it is stable or unstable in the long-run. From the figure, INF to INF shows a positive and declining to equilibrium level. The response of INF to EXCR shows that there is negative and moving below equilibrium response. This can be seen from the graph above. The response of INF to MPR shows the response from the beginning to the end is at equilibrium and statistically significant. For EXCR to EXCR shows a positive and a declining response. The response of EXCR to MPR is moving in equilibrium and the response of MPR to INF is raising and moving to equilibrium. The response of MPR to EXCR is declining and moving to equilibrium. Finally the response of MPR to MPR is positive and declining to equilibrium.

Discussion of Findings
From the result of the regression, it evidence that the monetary policy have a significant effect on inflation and exchange rate in Nigeria. Given that the F-statistics for the four equations are: 2.751739, 68.45091 and 0.231319 respectively. They indicated that the VAR model is significantly different from zero. This is because each statistics is greater than the critical value of 0.0001 at 5% level. It revealed that there is a significant effect of monetary policy on inflation and exchange rate in Nigeria during the study period. The finding revealed the effect of monetary policy on exchange rate and inflation in Nigeria. The study shows a positive effect of monetary policy on inflation in both the first and the second lagged. This is consistent with Alimi (2018) who found a positive a persistent increase in inflation rate over the years. This could be as a result of the increase in money supply and increase in the prices of raw materials which triggered the inflation. This is because it will lead to an increase in the cost of production thereby leading to an increase in the prices of goods and services in the economy.

On the other hand, exchange rate exerts a negative effect in both the first and the second lagged. This is also in line with Ibeabuchi (2020) whose research shows that expansionary monetary policy will lead to a reduction in exchange rate. An expansionary monetary policy will make export from Nigeria cheaper and import will be expensive. Lastly, monetary policy rate shows both negative in the first and second lagged. The combine F-statistics shows a significant effect of monetary policy on inflation and exchange rate fluctuation in Nigerian economy. Government therefore, need to put more effort in controlling the inflation and make sure the shocks of inflation and exchange rate fluctuation is minimized.

5. CONCLUSION AND RECOMMENDATIONS
The research examined the Effect of Monetary Policy on Inflation and Exchange Rate Fluctuation in Nigeria. The study used Vector Autoregressive model in which inflation Rate, Exchange Rate and Monetary policy rate as the dependent variable respectively, and inflation Rate, Exchange Rate and Monetary policy rate as the independent variable too. The main objective is to examine the impact of monetary policy measures, such as interest rates and money supply, on inflation in Nigeria. This study applied pre and post diagnostic tests to determine validity, (Augmented Dickey Fuller, Granger Causality Test and Vector Autoregressive) which were met and the following results were found. The impact of inflation was discovered to be positive for both the lag, exchange rate and monetary policy both exerts negative effect

The impulse response function result shows a positive and significant relationship between the monetary policy and the inflation and exchange rate fluctuation in Nigeria.
The granger causality shows no causality between the variables

CONCLUSION
The effect of inflation and exchange rate fluctuation cannot be undermined. This is because it is critical to the development of any nation. Inflation should be minimize to encourage producers in the production of goods and services. So also, exchange should be put in such a way that our export will lead to an increase in the income of the country.

RECOMMENDATIONS
Based on the results of this research study, the following recommendations are made:
Policies that will reduce the amount of money in circulation such as open market operation, require reserve by the commercial banks can help to reduce the negative effect of inflation on the economy
Exchange rate should be fixed to reduce its negative effect in the economy, the central bank should stand strong on that.

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