THE IMPACT OF MONETARY POLICY VARIABLES ON ECONOMIC GROWTH IN NIGERIA

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ABSTRACT
Monetary policies are undertaken to control the magnitude, price and credit availability in order to attain internal and external balances in the nation. This can reflect in adjusting the money supply, interest rates, exchange rate and provision of credit facilities to the private sector to boost business. Its main target includes price stabilization, encouraging investment, and fostering economic expansion. This study investigated the impact of monetary policy variables on Nigeria's economic growth from 1981 to 2021 adopting autoregressive distributive lag (ARDL) model employing secondary data. Results revealed that the interest rate had a significant and positive effect on Gross Domestic Product (GDP), the impact of the credit to private sector on GDP was insignificant. Money supply and exchange rate were found to have negative, yet significant effect on GDP. Additionally, the bound test highlighted the presence of a long-term association among the variables. The study suggested based on the findings of the research that Central Bank of Nigeria should maintain an interest rate that is low enough to encourage increased investment by all and sundry; Central Bank of Nigeria should ensure that there is an increase in money supply in order to bolster economic growth; Central Bank of Nigeria should ensure that exchange rate is not overvalued in order for the domestic currency to be competitive. This will to a large extent enhance economic growth; and lastly, Central Bank of Nigeria should ensure that credits allocated should be based on economic consideration as opposed to mutual gains from private sector.

Keywords: Monetary Policy; Economic Growth, Interest Rate, Money Supply, Exchange Rate, Private Sector Credit.
JEL Classification Code: E42, E52, O42, O47

1. INTRODUCTION
Monetary policy is a premeditated activity taken by monetary authorities to control the magnitude, price and credit availability in order to attain internal and external balances in the country (CBN, 2011; Jonathan & Ezekiel 2020). Monetary policy describes varieties of financial management mechanism predetermined by a nation's Central Bank to regulate the

availability, value and amount of currency in the domestic economy to achieve projected macroeconomic equilibrium (Imoisi, Olatunji & Ekpenyong, 2013; Efayena & Buzugbe (2017)). Such action includes adjusting the money supply and/or interest rates in order to manage the amount of money in the economy. Sometimes monetary policies are strict, and other times they are loose, with the primary purpose of stabilizing prices, encouraging investment, and eventually fostering economic expansion. Consequently, a financial strategy is a deliberate move by a nation's central bank to maintain economic balance by specifying the value and quantity of money in transmission with cash and credit availability for investment in the private sector of the economy during a given time period. Relatedly, economic growth occurs when there is increase in the quantity of commodities and services in a country at a given time. This demonstrates that economic growth is occurring when the actual per capita income of a country increases over time. A developing economy generates more commodities and services with each passing period, indicating that its production capacity is growing. In general, economic growth entails an increase in the standard of living and a decrease in income inequality (Jhingan, 2004; Nwala & Saleh, 2021). The Central Bank of Nigeria (CBN) is tasked with guaranteeing price stability through the implementation of policies that promote and sustain economic growth as well as changes in the money supply. In numerous nations, the objectives of monetary policy are specifically specified in the legislation creating their central banks, but in general, they include achieving price stability and other macroeconomic goals. Direct control measures, such as the selected control credit ceiling, rate of interest regulation, cash reserve requirements, exchange rate control, and the demand for special deposits, are used to implement monetary policy (Takon & Ita, 2020).

In recent years, there has been a growing demand for the efficient application of monetary policies to stimulate economic growth and preserve internal and external stability. The financial crisis of 2007-2009, the Nigerian economic recession of 2016, and the impending recession caused by the corona virus pandemic in 2020 all highlight the importance of this. Monetary policy is a powerful tool used by the government to stabilize the economy and boost productivity (Brima & Brima, 2017). It has also been seen as indispensable instruments for economic regulation, rendering fiscal policy instruments ineffective in most modern economies (Duskobilov, 2017). However, the primary objectives of monetary policy are to achieve price stability, maintain balance of payments equilibrium, reduce unemployment, promote economic growth, and facilitate product development (Adigwe, Echekoba, & Onyeagba, 2015). Specifically in emerging nations such as Nigeria, the importance of achieving these goals has grown overtime. For example, as a result of the Corona virus outbreak of 2019, the Nigerian economy declined by -1.78% in 2020 while unemployment and inflation rates increased to 6% and 16.95% respectively. The use of monetary policy to stimulate economic growth has been widely accepted by various nation and the importance of such measures to secure financial stability does not weaken the role of fiscal policy instruments but governments usually favour the use of monetary policy instruments in most of the developed nations especially when facing economic challenges. Achieving sustainable economic growth is a primary objective of the Central Bank of Nigeria's monetary policy. Despite the Nigerian Government's implementation of various monetary policies, the country's economic growth continues to face significant issues such as high unemployment rates, inadequate investment, elevated inflation rates, and unstable currency rate.

The Nigerian economy growth rate has been unstable in the last decade with negative growth rates of -1.62% and -1.79% in 2016 and 2020 respectively. It however had a positive growth rate of 3.65% in 2021 (World Bank, 2021). Observation on interest rate in Nigeria also reflects instability which can be described as worrisome to the Nigerian economic climate. Interest rate

is a critical part of the economy and its importance cannot be overlooked for several reasons. High interest rate discourage people from investing on their own since the cost of borrowing money would be exorbitant. However, high interest rates may encourage people to save because they will gain more money in the long run from doing so (Iheonu & Nwakeze, 2016; Claessens, Coleman, & Donnelly, 2018; Ogungbenle & Ogungbenle (2019). This can reflect in delaying investments like buying new machinery to increase operations, therefore businesses may be discouraged from adding to the labour force value which will consequently lead to slow economic growth (Lee & Shin, 2018; Christopher, Emmanuel & James, 2020). Even if the economy has stabilized somewhat and the monetary policy rate has been falling steadily in recent years, interest rates can be stubbornly high sometimes (Kwakye, 2010). The interest rate spread (IRS) in poor nations like Nigeria is much bigger than in advanced economies (Borio, Gambacorta &Hofmann, 2017). The interest rate stood at 13.6% and 1.2% in 2015 and 2021 respectively in Nigeria (WDI, 2021). From the above background, this study becomes vital to assess the extent to which monetary policy variables influences the economic expansion of Nigeria.

This study seeks to address the following research questions: To what degree has interest rate impacted Nigeria's economic growth? Does exchange rate have a significant influence on economic growth in Nigeria? How much effect does money supply have on economic growth in Nigeria? And lastly, does private sector credit affect economic growth in Nigeria? By examining these research questions, the study will pursue the following research objectives: analyze the impact of interest rate on economic growth in Nigeria; assess the impact of exchange rate on economic growth in Nigeria; identify the extent of the impact of money supply on economic growth in Nigeria; and measure the effect of private sector credit on economic growth in Nigeria.

In the light of these, this study examined the impact of monetary policy variables on economic growth in Nigeria from 1981 to 2021 adopting ARDL model specifications to assess the functional impact of money supply, interest rate, exchange rate, and credit to the private sector on economic growth. The research aimed to provide insights that will be helpful to policy makers especially the central bank in making decisions regarding monetary policy. The findings of the study will also add to existing literature and stimulate more research in this area. The rest of the paper is divided into four Sections. The next Section contains literature review, followed by methodology in Section 3. Section 4 contains results and discussion of findings and finally conclusion and policy recommendations.

2. LITERATURE REVIEW

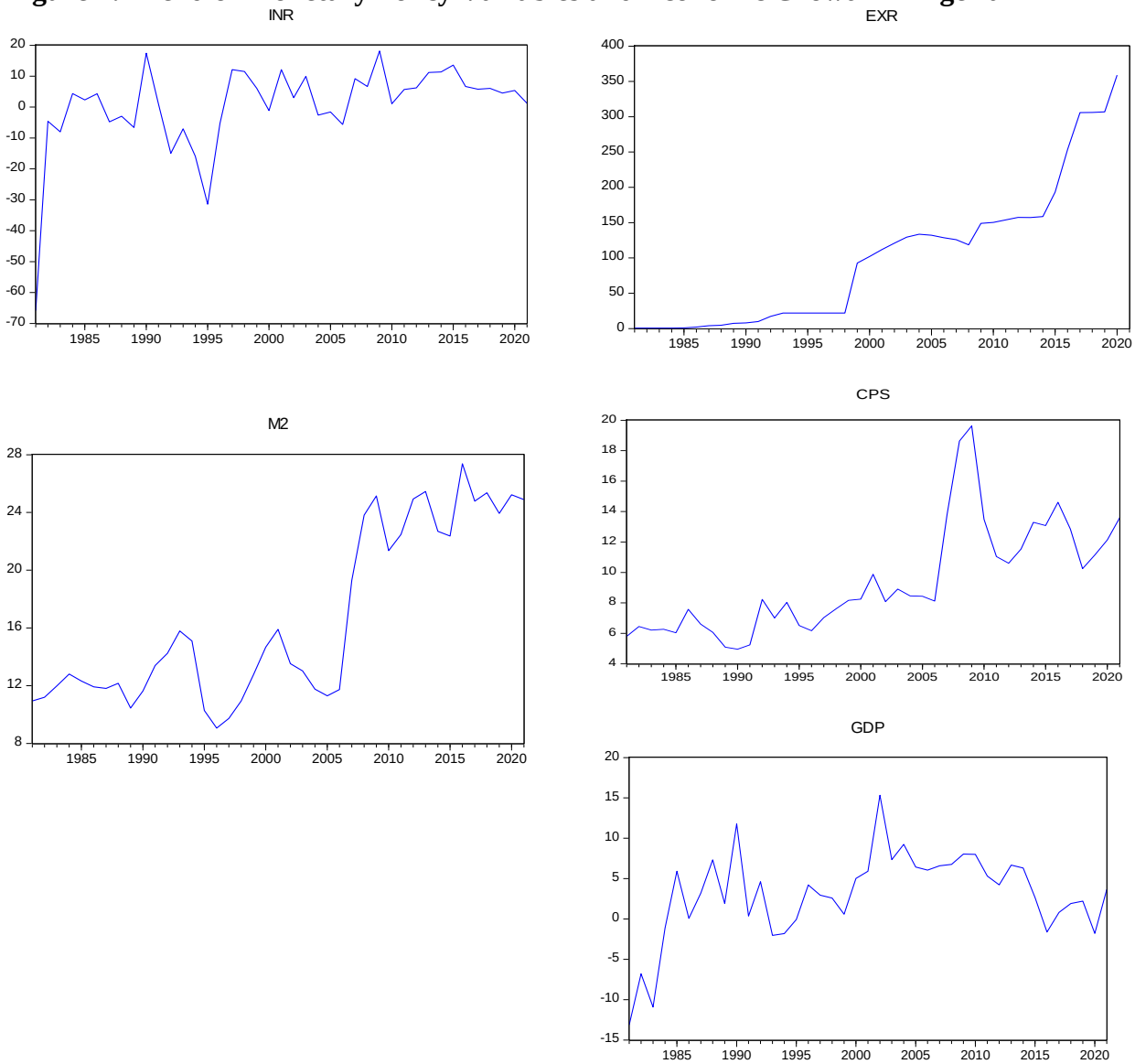
2.1 Conceptual Review

Monetary Policy: In an effort to maintain economic stability, monetary policy are decisions taken by regulating bodies in order to shape the behaviour of financial institutions through the use of direct and indirect mechanisms (Meme & Madueme, 2016; Ayodeji & Oluwole, 2018). The Central Bank of Nigeria (CBN) was established in 1958 and is responsible for implementing the country's monetary policies. Interest rate, central bank reserve requirements, trading in government assets, and exchange rate management are all examples of monetary policy that have affected Nigeria's money supply (Bodunrin, 2016; Okorie, Sylvester, & Simon-Peter, 2017; David & Emmanuel, 2020). Two approaches can be followed in monetary policy decision, they include expansionary and contractionary monitory policy (Bodunrin, 2016). The contractionary monetary policy tightens the money supply and raises interest rates, while expansionary policy increases the money supply and lowers the rates of interest. The Central Bank's persistent market operations have an effect on the money supply, which impacts both the exchange rate and the rate of interest (Ahiabor, 2013; Emmanuel, Isa & Gbatsoron, 2020). The Central Bank of Nigeria implements several measures within its monetary policy,

such as managing the nation's money supply, regulating interest rates and influencing moral persuasion and open market activities (OMO) as well as adjusting commercial banks' reserve requirements (CBN, 2018).

Economic Growth: It is characterized by a steady rise in a nation's per-capita output or income, combined with an increase in the labour force, demand and volume of trade. It is a process that leads to a sustained enhancement of goods and services per capita also contended that economic growth is signified by an increase in the total value of the economy's output over time; the growth rate of a country's Gross Domestic Product (GDP) is used to measure this. (Jhingan, 2007; Todaro & Smith, 2011; Andohol, 2012).

Figure 1: Trend of Monetary Policy Variables and Economic Growth in Nigeria



Source: Authors' Computation, 2023.

Figure 1 above displays the trend of Nigeria's monetary policy parameters and GDP growth from 1981 to 2021. Interest rate (INT) has been unstable from the period of observation with the lowest in 1981 which witness sharp and continual increase since then. It however recorded another decline around 1995. Lower interest rate is expected to impact the economy positively than higher interest rate. Observation on money supply (M2) shows it has been trending from inception with continual increment yearly, though with slight decrease in some year. A naira as at 1981 was exchanged at equivalent of $0.61 while it was exchanged at ₦423.7 as at 2022.

It has however increased to over ₦600 per dollar as at 2023, this has shown existence of devaluation in the home currency. Amount of credit available to the public (CPS) needs to be given more and adequate attention, observation shows it has not been encouraging with highest value around 2010 which had been declining since then but gradually picking up as at 2020. Nigeria economy growth rate measured by GDP growth rate, though not stable has been declining instead of improving since 2013 up to 2020. It was around 6% between 2013 and 2014; it declined to -1.61% and -1.79% in 2016 and 2020 respectively. Economic growth is expected to bring about increase in money supply, stable exchange rate, lower interest rate with massive availability of fund to the private sector.

2.2 Theoretical Literature

There is no unanimity among economists over whether government involvement through monetary policy will stabilize the economy. This dispute has separated economies into various schools which include the classical, Keynesian and monetarist. Each school has their own perspective on how variations in monetary variables could affect economic stability.

The theory of the classicists was based on the Fisherian equation of exchange, which assumed a constant velocity of money in circulation and full employment. Therefore, any change in the money supply will have no influence on real demand, investment, or output. The exchange theory equation is represented as MV = PQ ----------(1).

The Federal Government can manipulate the money supply (M) to influence the current market value of all final products and services (nominal GDP, or PQ). According to the exchange equation, this is equivalent to the money supply multiplied by the number of times a currency is exchanged in a given year (V) (Shiskin, 2017). The theory further assumes the economy tends to remain close to its natural real GDP in the short-term, which implies Q is fixed in the equation (Blinder, 2018). Additionally, the velocity of money circulation is presumed to stay constant, making V fixed (Taylor, 2003). Consequently, increases in the supply of money result in direct proportionate changes to the price level (P), meaning expansionary monetary policy will lead to inflation, while contractionary monetary policy will provoke deflation. (Ademola, 2020; Aminu, Idris, Mohammed & Zaharaddeen, 2021)

Keynesian theory does not follow the assumption that the relationship between money and price is direct and proportional. Instead, it proposes an indirect relationship that operates through interest rates. In contradiction to the idea of the economy always staying at or near its natural level of real Gross Domestic Product (GDP), Keynesian theory believes that Q in the exchange equation usually varies. Regarding the velocity of money, Keynesians argue that it is adaptable to changes in aggregate demand. Moreover, an expansionary monetary policy increases the availability of loanable money through the banking system, decreasing interest rates in the process. This leads to a rise in investments and interest-sensitive consumption, thus producing a rise in real GDP. Therefore, monetary policy can indirectly affect real GDP without influencing price (Nwoko, 2016). This is based on the belief that the interest rate is the primary determinant of investment in a market economy. This investment process requires labor and capital, resulting in increased overall employment (Nkalu, Edeme & Agu, 2016)

Friedman's monetarism school of thought was a major influence in the field of monetary theory. Friedman (1963) argued that the level of money supply had a significant impact on the performance of an economy, and efficient monetary policy was needed in order to guarantee its stability. The monetarists assumed that an increase in money supply would lead to increased nominal demand and economic growth when the capacity to produce it was available. They also believed that in the long run, an increase in money supply would be inflationary, but would not affect investment, employment, or aggregate demand (Ademola, 2020; Aminu et al, 2021 & Musa, 2021). Lucas (1988) and Romer (1990) later introduced the endogenous growth theory which argued that economic growth is mainly driven by factors which originate within the economy. In addition, it asserts that investment and innovation, knowledge and human capital

are substantial economic growth drivers. It also highlights the favourable externalities and spillover benefits that a knowledge-based economy has on economic expansion. According to this theory, government action is crucial in setting the pace of an economy's long-term expansion. This theory also acknowledges that effective governance and strong institutions are vital for a nation's overall economic potential.

2.3 Empirical Literature

Many researchers have discussed the effects of monetary policy variables on economic growth in various economies across decade. Isaac and Akutson (2023) studied the impact of different monetary policy regimes in the West African Monetary Zone on price stability. The study findings suggested that a combination of a steady money supply and a stable monetary policy rate could contribute to price stability in this region. Dong, Zheng and Li (2023) investigated the stability of monetary policy during the COVID-19 crisis and its effect on systemic risk in the pharmaceutical industry. The findings revealed that under normal conditions, a liberal monetary policy leads to increase in price level and a restrictive monetary policy leads to price decline, albeit with a lag. Increased short-term growth and prices result from more robust policy, whereas long-term volatility in growth rates and price levels result from the COVID-19 shock and systemic risk scenarios. Policy loosening has minimal effect on growth. Simşek (2022) compared the real income of MIST (Mexico, Indonesia, South Korea and Turkey) countries with their nominal income. Tests of asymmetric causality confirmed two-way relationship between the money supply and real income. Han and Kim (2023) studied the impact of monetary policy in the Republic of China, the Republic of Korea, and the United States on the Korean stock market (such as the KOSPI). It was observed that a positive shock in the money supply (M2) was beneficial to the Korean stock markets, though the effect varied among the countries. Result also showed that the KOSPI reacted adversely to a positive shock in the policy rate of Korea, but largely ignored the policy rate of China or the US federal fund rate. Through a Structural Vector Autoregression model, Fusari (2023) applied a novel method to detect monetary policy shocks between 1965 and 2007. The study incorporated conventional sign limits with external variable constraints on the central bank's macroeconomic forecasts and high-frequency monetary surprises.

To begin with, it was discovered that contractionary monetary policy shocks unambiguously reduce output, clarifying the unclear implications of ordinary sign-restricted SVARs. In contrast to the traditional approaches to uncovering the effects of monetary policy, non-traditional methods show associations with central banking knowledge sets and a weak correlation with monetary surprises. Bitros and Vidali (2023) then investigated how real interest rates and monetary policy are connected in the United States post Bretton Woods, and found that the real rate of interest has long-term dependence on real investments, the velocity of circulation, wage rate, GDP growth, changes in technology and population growth. Mekonnen (2023) emphasized that the Ethiopian government's monetary policy brings about a significant and negative reaction in the foreign-exchange market when there is a shock to domestic credit.

Tule, Onipede and Ebuh (2020) investigated the impact of both monetary and fiscal policies on the Nigerian economy using monthly data from 2003 to 2007 while employing a structural vector auto-regressive (SVAR) model. The findings revealed that expansionary monetary policies had an immediate positive effect on the economy while expansionary fiscal policies did not necessarily lead to growth. Rami and Bassam (2020) used the Vector Error Correction Model to assess the effects of monetary policy in Jordan, quarterly data from 2005 to 2017 was analyzed for the study. Outcomes from the study revealed that monetary policy instruments had a positive effect on the real GDP growth in the short and long run.

Miftahu (2019) evaluated the influence of monetary policy on Nigeria's economic growth from 1980 to 2017 using secondary data. The study applied the co-integration test and the ordinary least squares (OLS) approach. Conclusions from the study showed that variables such as the interest rate and currency rate, had a negative effect on GDP, whereas the money supply had a positive effect. However, the study revealed a long-term relationship between Nigeria's monetary policies and economic growth. Ayodeji and Oluwole (2018) examined the impact of monetary policy on Nigeria's economic growth using the Johansen co-integration test and the Vector Error Correction Mechanism (VECM). The study utilized data from 1981 to 2016 with money supply, exchange rate, interest rate, and liquidity ratio functioning as independent variables. Evidence from the study showed that money supply and exchange rate had an insignificant effect on GDP while interest rate and liquidity ratio have a negative impact on economic growth. Ufoeze, Odimgbe, Ezeabalisi and Alajekwu (2019) examined the impact of monetary policy on Nigeria's economic growth from 1986 to 2016 using the ordinary least squares method and co-integration test. The study discovered a long-term association between the variables and ultimately concluded that monetary policy rate, interest rate, and investment had an insubstantial impact on economic growth. In contrast, money supply had a substantial significant effect on economic growth.

In conclusion, this study aims to contribute to the current body of knowledge by extending the period of investigation to the year 2021 based on data available. This is done to accommodate Nigeria's current economic conditions. In addition, this study uses appropriate pre- and post-estimation tests to confirm the validity of the research findings.

3. METHODOLOGY

3.1 Research design

The study adopted ex-post facto research design. This design is suitable for analysing secondary data which has been previously collected and preserved. Thus, the researcher cannot manipulate the data; the study therefore examined the cause and effect relationship to demystify the impact of monetary policy variables on economic growth.

3.2 Model specification

The research is anchored on the endogenous growth model. According to the endogenous growth hypothesis, the expansion of the economy is as a result of the economic system of the country and not external factors. In other words, the economic environment endogenously determines economic growth. The consequence is that the economic success of Nigeria is contingent upon the efforts of its administration, the efficient use of its resources, technological advancement, and the application of the notion of learning by doing (Nyoni & Bonga, 2018; Taliat & Akinola,2021).

In accordance with the theoretical framework underlying this investigation, the endogenous growth model expresses economic growth as a function of internal causes, including monetary policy. In light of this, the model's functional structure is as follows:

$$GDP = f(INR, M2, CPS, EXR) \quad (1)$$

Where: GDP represent GDP growth rate; real interest rates as INR; broad money supply as M2; CPS is credit to private sectors and EXR is exchange rate. The mathematical form of the model is expressed as:

$$GDP_t = \alpha_0 + \alpha_1 INR_t + \alpha_2 M2_t + \alpha_3 CPS_t + \alpha_4 EXR_t + \mu_t \quad (2)$$

α_0 is the constant term or intercept of the regression line. $\alpha_1 - \alpha_4$ are the parameters or regression coefficients to be estimated and μ is the error term**.**

The ARDL model specifications assess the functional impact of money supply, interest rate, exchange rate, and credit to the private sector on economic growth. This relationship is expressed in Equation.

$$\Delta GDPt = \alpha 0 + \Delta GDPt\text{-}k + \Delta INRt\text{-}k + \Delta M2t\text{-}k + \Delta CPSt\text{-}k + \Delta EXRt \quad (3)$$

where α0 denotes the drift component, Δ denotes the first difference, and μt denotes the white noise. In order to determine how long of a time lag to utilize, the researchers applied the Akaike information criterion (AIC). In this study, the error correction model (ECM) is used to determine short-run dynamics following the identification of long-run associations between variables. As seen in Equation (4), the ECM general form of Equation (3) is as follows:

$$\Delta GDPt = \alpha 0 + \Delta GDPt\text{-}k + \Delta INRt\text{-}k + \Delta M2t\text{-}k + \Delta CPSt\text{-}k + \Delta EXRt\text{-}k + \emptyset ECMt\text{-}k + \mu t \quad (4)$$

where Δ denotes the first difference while Ø denoted the coefficients of ECM for short-run dynamics. The ECM demonstrates how quickly a system returns to equilibrium following a short-term disturbance.

3.3 Data discussion

The study used secondary data sourced from World Bank, 2021. Specifically,

Gross domestic product (GDP): Gross Domestic Product is the cumulative value of all finished goods and services produced within a country's borders in a specified period of time. The GDP yearly percentage change is a measure of economic growth.

Interest rates: The interest rate is the remuneration for lending one's money to another. The interest rate is the cost incurred by borrowers in order to access funds from a lender; it is the price of capital that reflects the opportunity cost of utilizing the funds. Keynes (1936) argues that the interest rate is payment for foregoing the opportunity to hoard cash in favour of using it productively for a set period of time.

Exchange rates: Exchange rate is a term that describes the relative worth of one currency compared to another in the global foreign exchange market. This value gives an idea of how much of one currency is required to purchase a unit of another currency.

Credit to private sector: Money that banks and other financial institutions make accessible to the private sector in the form of loans, investments in non-equity securities, trade credits, and other accounts receivable are included here. According to Central Bank criteria, these credits are allocated to priority sectors (Chowdhury, Freyburg, Ehrenberg, Nayar & Wilson, 2019)

Money supply (M2): Broad money supply (M2) consists of M1 and quasi-money. Thus, M2 corresponds to currency in circulation, demand deposits, and near money.

3.4 A-Priori Expectation

The a-priori expectations discuss the relationship, principles and criteria that should exist among the variables under review. It also defines the criteria on which the results of the estimation of the study were evaluated. Below is a table displaying the a priori expectation derived from the model described above:

Table 1: Expected signs

S/N	Dependent	Independent	Signs	Explanation
1	GDP	INR	Negative i.e <	Interest rate will have negative impact on economic growth.
2	GDP	M2	Positive i.e >	Money supply will have positive impact on economic growth.
3	GDP	CPS	Positive i.e >	Credit to private sector will promote economic growth.
4	GDP	EXR	Negative i.e <	Exchange rate will have negative impact on economic growth.

Source: Authors' Computation, 2023.

3.5 Estimation procedures

The empirical analysis started with conducting unit root test on the variables employed. Augmented Dicky-Fuller Unit root test was employed in this process. For cointegration, ARDL bound test was adopted. The methodology was chosen based on the level of integration of the variables. The variables were integrated at level and order one. Additionally, the study further employed ARDL model and Engel granger causality test for analysis.

3.5.1 Unit root test

The Augmented Dickey–Fuller (ADF) test is a statistical tool used to assess whether a time series variable possesses a unit root, indicating non-stationarity. The alternative hypothesis suggests that the series is stationary. If the null hypothesis is rejected, it implies that the time series is stationary and free from unit root. The ADF equation is as follows:

$$\Delta yt = \alpha 0 + \alpha 1 yt{-}1 + \sum \alpha \Delta yi + \varepsilon t \qquad (5)$$

The first difference operator (Δ) was applied to the series (Y), while the trend (t) and white noise error term (ε) were also taken into account. After performing the Augmented Dickey-Fuller unit root test, it was determined that the variables had an order of integration of I(1), meaning they were stationary at first difference. As a result, the Johansen co-integration and Error Correction Model were then employed.

3.5.2 Co-integration

Co-integration is a statistical property of certain time series data, characterized by the concept of stationarity and the sequence of integration of the series. Co-integration is applied to series with time-varying standard deviations and means. In other words, the method enables estimation of the long-run equilibrium in systems with unit-root variables. The order of integration of a series can be inferred by determining how many times it needs to be differentiated before it becomes stationary. This requires a test of the residuals for a unit root; in practice, if the parameters of interest have a unit root that is integrated of the same order, then the Johansen-Juselius approach can be used to investigate the long-run relationship (Kwofie & Ansah, 2018; Aronu et al., 2020). However, an autoregressive distributed lag (ARDL) bound test should be used when the variables are integrated in a non-ordered fashion. Due to the mixed order (I(1) and I(0)) integration of the variables, the ARDL bound test is used to analyze the long-term connection between the variables (Essia & Mba, 2017).

3.5.3 Autoregressive distributed lag (ARDL) Model

ARDL model illustrate the rate of adjustment from the short to long run equilibrium state after the existence of co-integration has been determined. If co-integration is adopted, it implies that the model is best stated in the initial difference of its variables with a one-period lag of the residual CointEq (-1) equilibrium as supplementary regression. In this regard, a regression analysis was performed on their initial difference. By collecting their first difference, we lost the long-term association encoded in the data, indicating that we must use the variables in both their levels and first differences. The ARDL model features an integral co-integrating equation that connects the short-run disequilibrium to the long-run equation, which is a significant advantage. ARDL model incorporates a co-integration connection into its specification, limiting the long-run behavior of endogenous variables to the co-integration relationship but permitting short-run modification. Consequently, ARDL model is a unique option for this study.

3.6 Post estimation test

In order to ensure that the estimates can be relied upon, post-estimation tests were done. This also encompasses the applicability of the research estimates for predicting the future values of the dependent variable.

4. RESULTS AND DISCUSSION OF FINDINGS

The primary objective of this study was to investigate the impact of monetary policy variables on the economic growth of Nigeria. To fulfill this purpose, the researchers utilized a suitable methodology and the findings of the investigation are presented in this session. The variables employed for this study consisted of Gross Domestic Product (GDP) as the dependent variable while the independent variables included exchange rates, interest rates, broad money supply (M2), and credit to private sector. The empirical results are presented below:

4.1 Unit Root Test

The Augmented Dickey-Fuller test was employed to analyze the integration nature and order of the data series. The results are shown in the table below.

Table 2: Augmented Dickey-Fuller Unit Root Test Result

Variables	ADF (level)	Prob.	ADF (1st diff.)	Prob	Order	Remark
GDP	-3.141912**	0.03	-10.35776*	0.00	I(0), I(1)	Stationary
INR	-7.477454*	0.00	-10.07486*	0.00	I(0), I(1)	Stationary
M2	-0.957687N	0.76	-5.157983*	0.00	I(1)	Stationary
EXR	2.161118N	0.99	-4.126596*	0.00	I(1)	Stationary
CPS	-2.171063N	0.22	-5.938902*	0.00	I(1)	Stationary

Source: Authors' Computation, 2023.

Notes: The values of *, **, and *** represent the significance levels of 1%, 5%, and 10%, respectively, and "N" is used to indicate that it is Not Significant.

According to table 1 above, at a significance level of 5%, GDP and INR were stationary at level. On the other-hand, M2, EXR and CPS became stationary at first difference. Since the variables were stationary at a mixed order, ARDL bound test was used to determine their long-term relationship.

4.2 Co-integration

The primary justification for cointegration analysis is that variables will often follow each other closely even if they do not have the same non-stationary property. Consequently, it is vital to carry out cointegration test. Pesaran et al. (2001) explains that if all of the variables involved are integrated of various orders I (0) and I (1) and none are integrated of second order (2), the Autoregressive Distributed Lag (ARDL) or Bound Testing approach to cointegration can be utilized. Table 3 illustrates the cointegration result after conducting the ARDL model with a lag length of 2, which follows the Akaike information criterion (AIC).

Table 3: ARDL Bound test result for cointegration

Test Statistic	Value	K
F-statistic	4.684071	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Authors' Computation, 2023.

The results presented in Table 3 indicate that the F-statistic is larger than both the lower and upper bounds, thereby rejecting the null hypothesis of no level relationship. This implies that a long-run relationship exists among the variables.

4.3 Result and Analysis of Long run relationship and Short run dynamics

The findings of Table 4 demonstrate that interest rate has a positive and statistically significant influence on GDP growth in the long run. Meanwhile, the effects of exchange rates and credit to the private sector on GDP were not statistically significant even though they had a positive indicator. In contrast, a decrease in money supply had a statistically significant negative correlation with economic growth.

Table 4: Estimated Long-run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	0.430225	0.111868	3.845829	0.0007
M2	-0.558655	0.270669	-2.063979	0.0488
EXR	0.004305	0.013034	0.330269	0.7437
CPS	0.558297	0.352408	1.584236	0.1248
C	8.284937	2.902507	2.854407	0.0082

Source: Authors' Computation, 2023.

Similarly, the short-run estimates of monetary policy variable and economic growth in Nigeria are presented in Table 5 below.

Decision Rule: Adjustment from any short-term distortion to its long-run equilibrium can be understood by the sign of the lagged error correction term co-efficient "CointEq (-1)," which was shown to be a statistically significant (coefficient = -0.747690; p-value = 0.0001). The adjustment effect, often known as feedback, demonstrates that 74.8% of the out-of-whack state will eventually return to a stable equilibrium. This suggests that the GDP will return to its pre-shock level when the initial shock from short-term fluctuations has subsided. In this way, the model's sufficiency and statistical efficacy are validated. With an R2 of 0.55 (Adjusted R-squared), the model accounts for almost 55% of the variation in GDP across the study period. R2 also shows how well the model fits the study. The F-statistic of 0.000211 indicates a statistically significant interaction between the independent variables and the dependent variable. Moreover, the Durbin-Watson statistic has a value close to 2, which shows that the residuals are not exhibiting serial autocorrelation.

Table 5: Estimated short-run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.285501	0.138395	-2.062939	0.0489
D(INR)	0.213541	0.067954	3.142429	0.0040
D(INR(-1))	-0.115871	0.049485	-2.341538	0.0268
D(M2)	-0.832391	0.302543	-2.751309	0.0105
D(EXR)	-0.097851	0.032053	-3.052761	0.0050
D(CPS)	0.417433	0.283504	1.472408	0.1525
CointEq(-1)	-0.747690	0.161210	-4.638001	0.0001

R2 = 0.55, F-Statistic = 5.44, prob. (F-statistic) = 0.000211, Durbin-Watson = 2.44

Source: Authors' Computation, 2023.

The short run estimate reveals that money supply had negative and significant impact on GDP in the short run. Given a t-value of -3.0528, exchange rate is shown to have a significant negative influence on GDP in the short run. Interest rate on the other hand indicated a significant positive impact on GDP in the short run. However, credit to private sector was positive but statistically insignificant. Economic theory proposes that an increase in money supply would have an inverse effect on interest rate, thereby stimulating investment, income, output and employment at least in the short run.

Interest rate had a coefficient of 0.213541; implying that a one percentage increase in interest rate will result to an increase in GDP by about 21.4% and vice versa. Conversely, exchange rate indicated negative and significant impact on GDP with a coefficient of -0.097851. This show that a 1% increase in exchange rate will decrease GDP by about 9.8% and vice versa. Exchange rate is the price of a county's currency in relation to other currencies in the foreign exchange market. Just like other prices, the demand for naira is inversely related to the price of naira, all things being equal. It is expected for a nation to keep an exchange rate considered optimum or competitive in the face of the socio-economic feature of the nation. In same vein, money supply indicated negative and significant impact on GDP with a coefficient of -0.832391. This demonstrates that a one percent rise in the money supply will lead to a reduction of approximately 83.2 percent in the Gross Domestic Product in the short term.

4.5 Post estimation test.

A post-estimation test was conducted to verify that the model matched econometric criteria. The study did this by conducting autocorrelation and heteroscedasticity tests.

Table 6:Breusch-godfrey serial correlation LM test:

F-statistic	2.173732	Prob. F(2,25)	0.1348
Obs*R-squared	5.629229	Prob. Chi-Square(2)	0.0599

Source: Authors' Computation, 2023.

To determine whether the error term exhibits autocorrelation, the LM serial correlation test was performed. The table above indicates that there is no serial correlation in the error terms. The probability value of the chi-square in the table above was higher than the 5% level of significance, which explains this. Therefore, autocorrelation is not an issue for this model.

Test of heteroscedasticity

The test to check the nature of the variance and covariance of the error term, that is, whether the variance and covariance are time variant or invariant. This was done using the Breusch-Pagan Godfrey test of heteroskedasticity.

Table 7: Breusch-Pagan-Godfrey Heteroskedasticity Test

F-statistic	0.748515	Prob. F(10,27)	0.6743
Obs*R-squared	8.248060	Prob. Chi-Square(10)	0.6046
Scaled explained SS	10.11120	Prob. Chi-Square(10)	0.4308

Source: Authors' Computation, 2023.

Given that the probability values of the F-statistics and Chi-square are significantly higher than 5%, we can accept the Null hypothesis of homoscedasticity and reject the alternative of heteroscedasticity. By accepting the assumption that the error term is homoscedastic, we simply mean that the variance and covariance are constant even at different values of the explanatory variables whether higher or lower. From the post estimation test in table 6 above, we can see that the research results are good and can be used for forecast of future values of the dependent variable.

4.5 Test of Research Hypotheses

Decision rule: The null hypothesis will be accepted if and only if the P-value is smaller than the chosen level of significance (0.05). This is true for every hypothesis examined in this study.

Hypothesis one:

H01: interest rates do not have a significant impact on the economic growth in Nigeria.

Result and conclusion:

The results of the analysis reveal that interest rate has a probability value of 0.0040 (or 0.4%) in the short run, which is significantly below the 5% threshold. Consequently, the null hypothesis is rejected. Additionally, the p-value in the long run stands at 0.0007, which speaks to the significance of interest rate as a determinant of economic growth in Nigeria in both short-term and long-term periods.

Hypothesis two:

H02: There is no significant impact of exchange rate on the economic growth in Nigeria.

Result and conclusion:

Based on the data from the short-term estimation, the corresponding probability value with the exchange rate is 0.0050, which is clearly lower than the 5% threshold. This suggests that the null hypothesis can be rejected and there is evidence suggesting that exchange rate has a significant effect on economic growth in Nigeria. However, according to the p-value in the long-term estimation (0.7437), which is higher than the theoretical value for the relevant degree of freedom, it can be concluded that exchange rate is not a significant determinant of economic growth in the long-term in Nigeria.

Hypothesis three

H03: Money supply does not have a significant impact on the economic growth in Nigeria.

Result and conclusion:

The results of the short-run analysis suggest that the probability associated with money supply is 0.0105, significantly less than 5%. A long-run examination equally reveals that it is a strong determinant of Gross Domestic Product (GDP), with a p-value of 0.0488. Consequently, it can be concluded that money supply plays a major role in Nigerian economic growth, both in the short and long terms.

Hypothesis four

H04: Private sector credit does not significantly impact on economic growth in Nigeria.

Result and conclusion:

The short-run coefficient of private sector credit yields a p-value of 0.1525, which is higher than the conventional 5% threshold. Thus, we accept the null hypothesis and conclude that private sector credit does not have a statistically significant effect on economic growth in Nigeria in the short run. Interestingly, in the long run, the same coefficient yields a p-value of 0.1248, reaffirming the lack of significant influence that credit to the private sector has on economic growth in Nigeria.

4.6 Implication of the study

Results from the ARDL model on the short-run effects indicate that exchange rates had a negative and significant impact on GDP, with a coefficient of -0.097851 and a p-value of 0.0050. This implies that a 1% increase in exchange rate will lead to a decrease in GDP by 9.8%, which goes against the prior expectation. Similarly, money supply (M2) had a significant negative effect on economic growth, contrary to the expected result of lower real rates of interest, induced investment and higher economic growth. Interest rate had a significant positive coefficient of 0.213541 and a p-value of 0.0040, meaning a 1% variation in rate of interest will be directly related to a 0.4% increase in GDP. Conversely, credit to the private sector showed positive yet insignificant effects on economic growth. This suggests that while monetary policy may be useful in stimulating economic growth in Nigeria, the allocation of

economic resources has not been effective and lastly credit to private sector did not make a significant impact on GDP in the short-term, thus, it is important to assess credits based on economic consideration instead of mutual gains.

5. CONCLUSION AND POLICY RECOMMENDATIONS

5.1.1 Summary of Findings

This study investigated the impact of monetary policy variables on economic growth in Nigeria over the period 1981 to 2021. It utilized a set of narrow goals, which included determining the impact of interest rate, assess the effects of the exchange rate, determining the extent to which money supply impacts economic growth, and estimating the impact of private-sector credit on economic growth. The application of Augmented Dickey-fuller test, Bound test, and ARDL Model revealed the following results:

i. Interest rate had a significant positive impact on economic growth in Nigeria.
ii. Money supply had a significant negative impact on economic growth in Nigeria.
iii. Exchange rate had a significant negative impact on economic growth in Nigeria.
iv. Credit to private sector indicated a positive and insignificant impact on economic growth in Nigeria.

5.1.2 Conclusion

The efficacy of monetary policy in stimulating economic growth can be seen through its various instruments. This study explored the relationship between monetary policy variables and economic growth from 1981 to 2021. The results of the analysis revealed that the interest rate had a significant positive impact on GDP, while private sector lending had a positive but insignificant effect on economic growth. In contrast, both money supply and exchange rate had negative and significant effects on GDP. These findings are consistent with those of shobande (2018), Tule et al., (2020), Rami and Bassam (2020), Taiga and Adofu (2021) who showed that monetary policy instruments had significant long-term and short-term impacts on economic growth in Nigeria. This research thus concludes that though monetary policy can have a significant influence on economic growth, its effectiveness is still limited due to its inefficient allocation and implementation.

5.1.3 Policy Recommendations

This study therefore recommends as follows based on the research outcomes.

i. The Central Bank of Nigeria should maintain an interest rate that is low enough to encourage increased investment by all and sundry
ii. The Central Bank of Nigeria must take steps to increase the money supply in order to strengthen economic growth. This step includes reducing the interest rate and introducing quantitative easing in order to bolster economic growth.
iii. The Central Bank of Nigeria should ensure that exchange rate is not overvalued in order for the domestic currency to be competitive. This will to a large extent enhance economic growth.
iv. The Central Bank of Nigeria should ensure that credits allocated should be based on economic consideration as opposed to mutual gains from private sector.

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