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## EFFECTS OF MONETARY POLICY MEASURES ON NIGERIA'S ECONOMIC GROWTH

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### Abstract

This study examined the effect of monetary policy measures on Nigeria's economic growth. The natural log of real GDP was employed as the dependent variable against the explanatory monetary policy variables- interest rate, discount rate and open market rate. The time series data used spanned the period from 1985 to 2015. The study adopted an Ordinary Least Squares technique and also conducted the unit root tests. The results of the study suggest that while Money supply (OMR) has significant positive effect on Nigeria's economic growth, the effect of interest rate and discount is positive but non-significant. The study recommends that government should channel its attention on the control of money supply as a veritable monetary policy instrument for enhancing price stability and boosting Nigeria's economic growth.

**Keywords:** monetary policy; interest rate, discount rate, open market rate, economic growth, Nigeria.

### 1. Introduction

The practice of monetary policy formulation dates back to the times of Adam Smith. In the recent times, it is championed by the monetary economists (Adigwe, Echekoba & Justus, 2015). It plays some role in influencing macroeconomic objectives like economic growth, price stability, equilibrium in balance of payments, promotion of employment and a host of others. Monetary policy is an economic management technique that is expected to promote sustainable economic growth and development. It is considered by many nations as a formal articulation of how money affects economic aggregates. It has the cardinal objectives of reducing the level of unemployment, reducing the level of inflation, maintaining healthy balance of payments positions for the country, sustaining growth in the economy, increasing industrialization and stabilizing the economy. In addition, a good monetary policy should help to maintain equilibrium in the balance of payments that is consistent with exchange rate stability (Cheng, 2012). These broad objectives are achieved through the use of appropriate instruments depending on which objective the policy formulators want to achieve at a given point in time and the level of development in the economy.

An effective monetary policy is expected to enhance economic growth and development. In the pursuit of macroeconomic stability, the managers of monetary policy have often set targets on intermediate variables which include the short-term interest rate, growth of money supply and exchange rate. However, among these intermediate variables of monetary policy, the exchange rate is argued to have a greater influence on the economy as a result of its impact on the value of domestic currency, inflation, external sector, macroeconomic credibility, capital flows and financial stability. Increased exchange rate directly affects the prices of imported commodities and an increase in the price of imported goods and services contributes directly to increase in inflation.

The formulation of monetary policies in Nigeria dates back to the time when the Central Bank of Nigeria (CBN) became saddled with the responsibility of formulating and implementing monetary



policies via the Central Bank Act of 1958. This role facilitated the emergence of active money market where treasury bills, a financial instrument used for open market operations (OMO) and raising debt for government, has grown in volume and value. The treasury bills have become prominent earning assets for investors and source of balancing liquidity in the market. Another popular instrument of monetary policy (by the CBN) was the issuance of credit rationing guidelines, which primarily sets the rates of change for the components and aggregate commercial bank loans and advances to the private sector. On the other hand, the sectoral allocation of bank credit in CBN guidelines was put in place to stimulate the productive sectors and stem inflationary pressures while interest rates were fixed at relatively low levels was done mainly to promote investment and growth (Abeng, 2016).

There have been various regimes of monetary policy in Nigeria economic history. Sometimes it would be tight while at other times it would be loosened all with the intention of stabilizing prices. With the series of monetary policy adjustments, the Nigerian economy has witnessed several moments of expansion and contraction. However, the reported economic growth has hardly been sustainable. Rather, there appear to be evidences of macroeconomic instability. The failure of the monetary policy in achieving price stability has caused growth instability as Nigeria's record of growth and development has been very poor. A close look at the summary of the long-term pattern reveals some circular swings. For instance, CBN (2010) discloses that from 1965 to 1968, there was a rapid decline. From 1969 to 1971, there was some revival. From 1972 to 1980, there was a boom. During the period from 1981 to 1984 there was a crash, while the period from 1985 to 1991 witnessed some renewed growth and wobbling. Furthermore, despite the various monetary regimes that have been adopted by the Central Bank of Nigeria over the years, inflation still remains a major threat to Nigeria's economic growth. Nigeria has experienced high volatility in inflation rates. Since the early 1970's, there has been more than three major episodes of high inflation in excess of 30 percent. The growth of money supply correlates with this high inflation episode because money growth was often in excess of real economic growth. The question is, could the period of growth be attributed to appropriate monetary policy and could the periods of economic down turn be blamed on factors other than monetary policy ineffectiveness? These and similar questions have remained unresolved by the existing empirical studies in Nigeria. In the light of the above therefore, this study intends to subject these issues to empirical examination in order to evaluate the effect of monetary policy on economic growth in Nigeria. Specifically, this study sought to (i) determine the influence of interest rate, (ii) examine the effect of discount rate and (iii) assess the impact of open market rate on Nigeria's gross domestic product. The significance of the outcome of this study lies in its ability to inform public authorities on the relevance and usefulness of monetary policy as an effective tool for enhancing the Nigerian economic growth.

The remaining part of this paper is arranged as follows. In section 2, there is a brief review of the related literature. Section 3 describes the empirical model, while section 4 presents the estimation results and discussion. Section 5 concludes the study

## **2. Review of the related literature**

### **2.1 Conceptual framework**

#### **2.1.1 The concept of monetary policy**

Generally, monetary policy refers to a combination of a number of measures designed to regulate the value, supply and cost of money in an economy in consonance with the expected level of economic activities (Onyeiwu, 2012). According to Udude (2014), monetary policy is a deliberate effort by the monetary authorities to control money supply and credit creations for the purpose of achieving certain



broad economic goals. In other words, monetary policy is policy employed by Central Bank in the control of the supply of money as an instrument for achieving the objectives of general economic policy. The concept of monetary policy has attracted a lot of interest from scholars and researchers. This has contributed to the different definitions of the concept; each author defining the concept from their own perspective. For instance, Owolabi and Adegbite (2014) define monetary policy as the combination of measures designed to regulate the value, supply and cost of money in an economy to match with the level of economic activities. For Adigwe, Echekeba and Justus (2015), monetary policy is a major economic stabilization weapon which involves measures designed to regulate and control the volume, cost, availability and direction of money and credit in an economy to achieve some specified macroeconomic policy objectives. It is a deliberate effort by the money authorities (or Central Bank) to control the money supply and credit conditions for the purpose of achieving certain broad economic objectives. Further, Udude (2014) describes monetary policy as the act of controlling the direction and movement of monetary policy and credit facilities in pursuance of stable price and economic growth in an economy. Monetary policy attempts to regulate the economy by regulating the supply of money and terms and the availability of credit. Salvin (2013) defined monetary policy as the use of open market operations, changes in discount rate, change in reserve requirement and other measures available to the monetary authorities to control the rate of growth of money supply. He further noted that the goals of monetary policy are price stability, relatively full employment and satisfactory rate of economic growth. Monetary policy is equally seen as a measure or combination of measures designed to influence or regulate the volume, price and direction of money and credit. It comprises six different policies dealing with the volume of money and credit, its price or the rate of interest and its allocation. In Nigeria, monetary policy is designed to attain price stability, balance of payment equilibrium and high rate of economic growth. The CBN ensures that the nation attains price stability, balance of payment equilibrium the money supply, interest rate and total credit. Monetary policy has some proxy variables such as real interest rate, inflation, official exchange rate and M2 money supply, discount rate, etc. Discount rate, also called rediscount rate, or bank rate refers to the rate charged by an apex monetary institution of a country for the loans of reserve funds to commercial banks and other financial intermediaries. Originally, this charge was an actual discount (an interest charge held out from the amount loaned), but the rate is now a true interest charge, even though the term discount rate is still used.

Interest refers to the cost of borrowing money or the reward for saving (Investopedia,2021). An interest rate is a percentage charged on the total amount one borrows or saves. It is the amount charged on top of the principal by a lender to a borrower for the use of the lender's assets. When a loan is considered low risk by the lender, it will have a lower interest rate. On the other hand, a loan that is considered high risk will have a higher interest rate. Consumer loans typically use an annual percentage rate (APR). This does not use compound interest. The interest rate charged by banks is determined by a number of factors, such as the state of the economy.

When demand is weak, lenders charge less to part with their cash; when demand is strong, they're able to boost the fee, the interest rate Eager to increase lending, banks put their money "on sale" by dropping the rate. Supply also changes as economic conditions fluctuate If the supply of bonds decreases (the supply curve shifts left), bond prices increase (the interest rate falls) and the equilibrium quantity decreases. If the demand for bonds falls (the demand curve shifts left), prices and quantities decrease (and the interest rate increases A country's central bank usually sets the interest rate, which each bank uses to determine the APR range it offers. When the central bank sets interest rates at a high level, the



cost of debt rises. When the cost of debt is high, it discourages people from borrowing and slows consumer demand. Also, interest rates tend to move up along with inflation. It is part of the monetary policy action taken to meet the target that the Government sets to keep inflation low and stable. Bank rate determines the interest rate paid to commercial banks that hold money with depositors. It influences the rates those banks charge people to borrow money or pay on their savings. The lower the interest rate, the more willing people are to borrow money to make big purchases, such as houses or cars. When consumers pay less in interest, this gives them more money to spend, which can create a ripple effect of increased spending throughout the economy.

Central Bank of Nigeria is cited as reporting that it left its monetary policy rate unchanged at 11.5% during its January 2021 meeting. In December, headline inflation climbed further to an over three-year high of 15.75%. This was mainly linked to dollar shortages and surging jihadist attacks in farming areas as well as lingering disruptions from the COVID-19 pandemic. During the same, Nigeria had slipped into its second recession in four years in the third quarter of 2020, at a time when the COVID-19 restrictions and low oil prices were also having their impact.

Economic growth refers the increase in the amount of goods and services in a given country at a particular time. When the real per capita income of a country increases over time, economic growth is taking place. It is defined as the increase in the market value of the goods and services produced by an economy over time. It is measured as the percentage rate of increase in the real gross domestic product (GDP). To determine economic growth, it is necessary to compare the GDP to the population. This is also known as the per capita income. A growing economy produces goods and services in each successive time period, showing that the economy's productive capacity is on the increase. The total output of the economy can be measured in two distinct ways —GDP, which adds consumption, investment, government spending, and net exports; and Gross Domestic Income (GDI), which adds labor compensation, business profits, and other sources of income. Jhingan (2004) considers economic growth as the elevation of the standard of living of the people and reduction of inequalities in income distribution. It is the expansion of an economic system in one or more dimensions without changes in its structure. Economic growth is related to a quantitative sustained increase in the countries per capital income or output accompanied by the expansion in its labor force, consumption, capital and volume of trade. An economy on the other hand can be said to be developed when there is a quantitative and qualitative increase in the amount and quality of goods and services produced in the country. In its widest aspect economic growth and development implies raising the standard of living of the people and reducing inequalities in income distribution.

## 2.2 Theoretical Framework

Monetary theory has undergone a vast and complex evolution since the study of the economic phenomenon first came into limelight. It has drawn the attention of many researchers that hold different views on the role and dimensions of money in attaining macro-economic objectives. Consequently, there are quite a number of theories that aim at describing the relationship between monetary policy and economic growth. Prominent among them are the Keynesian theory, monetarism theory, endogenous growth theory and classical theory of growth. This study shall be anchored on classical school of thought.

According to Ufoeze, Dimgbe, Ezeabalisi and Alajekwu (2018), the classical school theory evolved through the concerted efforts and contributions of economists like Jean Baptist Say, Adam Smith, David Ricardo, Pigou and others. The classical model attempts to explain the determination of savings and



investment with respect to money. The classical model on Say's law markets states that supply creates its own demand. Thus classical economists believe that the economy automatically tends towards full employment level by laying emphasis on price level and on how best to eliminate inflation. The classical economists consider the quantity theory of money as the determinant of the general price level. The theory shows how money affects the economy. It may be considered in terms of the equation,  $MV = PT$ , where M is the quantity of money, V is the velocity of money in circulation, P is the price level and T is the volume of transactions. Two very similar quantity theory formulations were used to explain the level of price viz; the transactions formulation and the Cambridge equation. In the transaction version – associated with Fisher and Newcomb - some assumptions were made: that the quantity of money (m) is determined independently of other variable; velocity of circulation (V) is taken as constant, the volume of transactions (T) is also considered constant. Thus of price (p) and the assumption of full employment of the economy, the equation of exchange is given as  $MV = PT$ , which can readily establish the postulation that the level of price is a function of the supply of money; that is,  $p = F(m)$ . This implies that any change in price changes money supply. In the cash balances version – associated with Walras, Marshall, Wicksell and Pigou - the neoclassical school (Cambridge school), changed the focus of the quantity theory without changing its underlying assumptions. This version focuses on the fraction (K) of income, held as money balances. The Cambridge version can be expressed as:  $M = KPY$ , where K= Fraction of income, M =Quantity of money, P= price level, Y=value of goods and services.

The K in the Cambridge equation is merely the inverse of V, the income Velocity of money balances, in the original formulation of quantity theory. This version directs attention to the determinants of demand for money, rather than the effects of changes in the supply money (Anyanwu, 1993).

### 2.3 Empirical Review

The extent to which monetary policies influence the macroeconomic variables, especially price stability and ultimately economic growth in the economy, has been under discussion over the years.

Salisu (1999) using OLS to investigate the role of interest rate in the determination of the demand real cash balances, concluded that there existed no significant relationship between the duo, and that any attempt by the policy makers of the Nigerian Economy to influence this kind of money demand through the use of interest rate will not yield any positive result.

Asogu (2001) adopted a general econometric approach to identify and assess the relative contribution of the factors responsible for inflation, notably money supply in the Nigerian economy. He employed the single equation approach and expressed inflation as a function of money supply and its lagged values. The result of the empirical investigation confirmed that monetary policy alone cannot be an effective means of controlling inflation in Nigeria as long as the government fiscal discipline, especially with regard to deficit expenditure, is not incorporated into the entire stabilization policy package. Further analysis revealed that changes in income and food prices explain the presence of inflation in the country. Judging from the results, it follows that the monetarist model does not adequately explain inflationary process in Nigeria.

Coenan, Orphanides, and Wieland (2003) carried out a study on price stability and monetary policy effectiveness when nominal interest rates are bounded at zero for the European Central Bank. The paper employed stochastic simulations of a small structural rational expectations model to investigate the consequences of the zero bound on nominal interest rates. The result of the study showed that if the economy is subject to stochastic shocks similar in magnitude to those experienced in the U.S over the 1980s and 1990s, the consequences of the zero bound are negligible for target inflation rates as low as 2 percent. However, the effects of the constraint are non-linear with respect to the inflation target and



produce a quantitatively significant deterioration of the performance of the economy with targets between 0 and 1 percent. The variability of output increases significantly and that of inflation also rises somewhat. Also, the study found that the asymmetry of the policy ineffectiveness induced by the zero bound generates a non-vertical long-run Philips curve. Output falls increasingly short of potential with lower inflation targets.

Moreover, Nkoro (2005) on a topic monetary policy and macroeconomic instability in Nigeria (1980-2000) concluded that factors responsible for excess liquidity and inflationary pressure in Nigeria included; instability of the financial sector, which was attributed to bank distress and lack of managerial efficiency, resulting to financial institution failures, non-harmonization of fiscal -and monetary policies and increase in government expenditure.

Folawewo and Osinubi (2006) used rational expectation approach to conclude that the effort of Monetary Authority in Nigeria at using its credit and reserves as monetary tools in checking inflation and the rate of exchange has affected the volatility of the two variables over the years. Thus monetary policy, if not well targeted could yield negative results. This is because the speculations of the private agents may frustrate monetary effort. They concluded that monetary policy should be set in such a way that the objective it set to achieve is well defined, in a way that efforts at stabilizing exchange rate will not generate inflation and vice versa.

Orji (2006) examined the efficacy of monetary policy in ensuring price stability using consumer price index and inflation rate as price measure in Nigeria. The analysis used data from 1980 – 2004 and applied the Ordinary Least Squares (OLS) techniques. The results of the research reveal that only money supply and domestic credit have significant effects on consumer price index. The study concluded that for monetary authority to achieve its objective of price stability, its policies should be geared towards targeting the consumer price index, which remains a viable measure for price stability in Nigeria.

In his research on the monetary policy and macroeconomic management, Udah (2008) used 3SLS estimation technique and carried out policy simulation experiment to investigate how monetary variables interact with aggregate supply, demand and prices in order to aid stabilization policies. The results show that monetary variables and government finance are linked through the government's net indebtedness to the banking system. The simulation results show that a 20 percent monetary squeeze would reduce inflation rate faster than if the reduction in money supply were 10 percent. This reduction in money supply also leads to a reduction in output, employment and government expenditure, which may hurt the domestic economy. Thus, the study concludes that there is a trade-off between high GDP growth and inflation in Nigeria.

Chukuigwe (2008) analyzed the impact of monetary and fiscal policies on non-oil exports in Nigeria from 1974 to 2003. Using Ordinary Least Squares estimation, the study revealed that both interest rate and exchange rate, being proxies for monetary policy, negatively affect non-oil exports. Budget deficits – proxy for fiscal policy also had a negative effect on non-oil exports. Based on the findings, the study recommended that there is need to formulate a new strategy to address the identified challenges. This would be anchored on macroeconomic stability, export promotion, rationalization of the role of government, fortification of infrastructural facilities and stimulation of demand for goods and services. since it would create an enabling investment climate.

Migeul and Liviantan (2008) examined the effectiveness of adopting stabilization measures in managing inflation for selected Latin American countries. Their findings failed to show any relationship between money supply and inflation. Therefore, they concluded that the use of nominal variables, notably money



supply, is necessary but not sufficient condition for successful inflation management. They recommended the inclusion of fiscal restraints in the policy package.

Chuku (2009) examined the effect of monetary policy innovations in Nigeria. The study used a structural vector auto-regression approach to trace the effects of monetary policy shocks on output and prices in Nigeria with a sample data spanning from 1986 to 2008. The study conducted the experiment using three alternative policy instruments i.e. broad money (M2), Minimum Rediscount Rate (MRR) and the real effective exchange rate (REER). The study made the assumption that the Central Bank cannot observe unexpected changes in output and prices within the same period. This places a recursive restriction on the disturbances of the SVAR and helped to generate impulse response functions that tracked the effects of monetary policy innovations on output and prices. The study found evidence that monetary policy innovations have both real and nominal effects on economic parameter depending on the policy variable selected.

Ojo (2009) emphasized mutual dependence of fiscal and monetary policies. He opined that monetary policies can be integrated through the use of the technical financial programming. Financial programming involves the design of comprehensive packages of policy measures to achieve some specified macroeconomic objective. Prior to the Structural Adjustment Program (SAP) in June 1986, monetary management depended on the use of direct money controls like credit ceiling, direct control of interest and exchange rates, selective credit control as well as cash reserve requirement.

Chuku (2009) carried out a controlled experiment using a structural vector autoregressive (SVAR) model to trace the effects of monetary policy shocks on output and prices in Nigeria. They made the assumption that the Central Bank cannot observe unexpected changes in output and prices within the same period. This places a recursive restriction on the disturbances of the SVAR. They conducted the experiment using three alternative policy instruments i.e. broad money (M2), Minimum Rediscount Rate (MRR) and the real effective exchange rate (REER). Overall, they found evidence that monetary policy innovations carried out on the quantity-based nominal anchor (M2) has modest effects on output and prices with a very fast speed of adjustment, while, innovations on the price-based nominal anchors (MRR and REER) have neutral and fleeting effects on output. They concluded that the manipulation of the quantity of money (M2) in the economy is the most influential instrument for monetary policy implementation. Hence, they recommended that central bankers should place more emphasis on the use of the quantity-based nominal anchor rather than the price-based nominal anchors.

Jekumber and Mustapha (2010) examined the relative effectiveness of monetary policy in promoting economic growth in Nigeria. Using time series analysis, the authors found that the impact of monetary policy could be analyzed in terms of the behaviors of the intermediate targets of consumer price index and inflation rate in promoting economic growth in Nigeria. Their analysis was expressed using time series, which provided evidence that the income elasticity of demand for money is inversely related to the state of development of the money and capital market. They concluded that the effect of monetary policy on price levels is however doubtful because, of the negative impact on the macroeconomic objective during 1970. They attributed this negative trend to the difficulty in linking monetary policy directly with overall economic performance.

Bakare (2011) examined the determinants of money supply growth and its implications on inflation in Nigeria. The study employed quasi-experimental research design approach for the data analysis. This design combined theoretical consideration (a priori criteria) with empirical observations and extracted maximum information from the available data. The Nigeria's secondary data were processed using E-view windows econometric packages. The results of the regression showed that credit expansion to the



private sector determines money supply growth by the highest magnitude in Nigeria. The results also showed a positive relationship between money supply growth and inflation in Nigeria. It demonstrated that a one (1) percent rise in money supply in the current period leads to 5.6 percent rise in inflation. All in all, the findings indicated that changes in money supply are concomitant to inflation in Nigeria and strongly support the need for regulating money supply growth in the economy. This affirms the usual argument of the Monetarist school of thought that says money matters.

Adesoye, Maku and Atanda (2011) analyzed the determinants of real monetary balance as an indicator of financial repression resulting to low investment. High interest rate and rising inflation rate were examined in Nigeria between 1980 and 2008 by adopting the MacKinnon model. The incorporated factors- real output, real investment, nominal interest rate, and consumer price index-as determinants of monetary balance were decomposed and regressed pair-wise to formulate three variants of the McKinnon model, The times series properties of the incorporated variables were examined using the Augmented Dickey-Fuller unit root test. The error correction mechanism (ECM) model was employed to re-structuralize the long-run relationship which was determined using the Engle-Granger co-integration test among a set of determining factors incorporated in the McKinnon models. In the long-run, real output and nominal interest rate were found to be the significant factors that determine monetary balances and dictate the extent of financial repression in Nigeria during a time horizon independently. It was observed that price stability is the only significant factor that determines monetary balances in the short-run. This strengthens the argument of McKinnon that inflation occurs as a consequence of financial repression such that the underlying value of currency and monetary balance are distorted.

Amassoma (2011) appraised monetary policy development in Nigeria and also examined the effect of monetary policy on macroeconomic variables in Nigeria for the period 1986 to 2009. The study adopted a simplified Ordinary Least Squared technique and also conducted the unit root and co-integration tests. The findings of the study showed that monetary policy has witnessed the implementation of various policy initiatives and has therefore experienced sustained improvement over the years. The result also shows that monetary policy has a significant effect on exchange rate and money supply while monetary policy was observed to have an insignificant influence on price instability. The implication of this finding is that monetary policy has had a significant influence in maintaining price stability within the Nigeria economy. The study concluded that for monetary policy to achieve its other macroeconomic objective such as economic growth there is the need to reduce the excessive expenditure of the government and align fiscal policy with monetary policy measures.

Onyeiwu (2012) examined the impact of monetary policy on the Nigerian economy using the Ordinary Least Squares Method (OLS) to analyze data between 1981 and 2008. The result of the analysis shows that monetary policy represented by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. The findings of the study support the money-prices-output hypothesis for Nigerian economy.

Hameed, Khalid and Sabit (2012) presented a review on how the decisions of monetary authorities influence the macro variables like GDP, money supply, interest rates, exchange rates and inflation. The authors found that the foremost objective of monetary policy is to enhance the level of welfare of the masses and it is instrumental to price stability, economic growth and lowering unemployment. The method of least square OLS explained the relationship between the variables under study. Tight monetary policy in term of increase interest rate has significant negative impact on output. Money supply has strong positive impact on output; implying that positive inflation and output are negatively correlated. Exchange rate also have negative impact on output which is show from the values. The study



recommended that central bank can best contribute to a nation's economic health by eliminating the price uncertainties associated with inflation.

Cheng (2012) examined the impact of a monetary policy shock on output, prices, and the nominal effective exchange rate for Kenya using quarterly data from 1997–2005 with economic variables: real GDP, prices, money stock, short-term interest rates, and the nominal effective exchange rate. Based on the vector auto regression technique, the main results suggested that an exogenous increase in the short-term interest rate tends to be followed by a decline in prices and appreciation in the nominal exchange rate, but had insignificant impact on output. His key finding showed that, variations in the short-term interest rates accounted for significant fluctuations in the nominal exchange rate and prices, while accounting little for output fluctuations.

Ajayi and Ojo (2014) emphasized that in developing economies of which Nigeria is a typical example, the emphasis is always on fiscal policy rather than monetary policy. In his study, he estimated the variables of monetary and fiscal policies using the Least Square (OLS) method and found out those monetary influences are much larger and more predictable than fiscal influence; he suggested that greater attention should be placed on monetary action. The response of economic activities to fiscal actions relative to monetary action (represented by GDP, government expenditure and money supply MI respectively) is (a) larger, (b) more predictable and (c) faster. The result of the test was not consistent with any of these proportions. Consequently, either the commonly used measure of fiscal influence does not correctly indicate the degree and direction of such influences. On the other hand, test outcomes are consistent with alternative propositions. The response of GDP to changes in money supply compared with that government expenditure is larger, more predictable and faster.

### 3. Methodology

This study adopted the *ex post facto* research design.

#### Nature and Sources of Data

The annual time series data covering the period from 1985 to 2015 were obtained from sources including the Central Bank of Nigeria (CBN) Statistical Bulletin and the National Bureau of statistics (NBS) data base.

Monetary Policy is the independent variable. It was proxied in this work by interest Rate, discount rate and open market operation, while the dependent variable, economic growth, was proxied by the real Gross Domestic Product (GDP). Exchange rate was included as control variable in the model as it is capable of influencing the level of inflation. Gujarati (2004) states that the inclusion of control variables in a model helps to avoid simultaneous bias in a regression.

#### Model Specification

Following Koutsoyiannis (2001), which asserts that the specification of an econometric model should be based on economic theory and any available information relating to the phenomenon being studied, this study was anchored on the Keynesian Quantity theory of money. In specifying the model, this study adopted the one specified by Folawejiwo and Osinubi (2008) with some modifications. For instance, Exchange rate was introduced as control variable to make the model more robust. In demonstration, one multiple regression model was used. Interest rate, discount rate and open market rate were the independent variables while real Gross Domestic Product (GDP) was the dependent variable.

#### Model :

$$Y = f(\text{INTR, DCR, OMR, EXR}) \dots\dots\dots (1)$$

Equations (1) was explicitly transformed into their econometric form thus:



**Model :**  $Y = a_0 + a_1INTR + a_2DCR + a_3OMR + \alpha_4 EXR + \mu_i \dots\dots\dots (2)$

Where;

- Y = Real Gross Domestic Product
- OMR = Open Market Rate
- INTR = Interest Rate
- DCR = Discount Rate
- EXR = Exchange Rate
- $a_0\dots a_3$ , = Parameters
- $\mu_i$  = Error term

To standardize the variables and also interpret the resulting coefficients as elasticities, the equations above were restructured in log form as follows:-

**Model 1**  
 $LnGDP = a_0 + a_1LnINTR + a_2LnDCR + a_3LnOMR + \alpha_3LnEXR + \mu_i \dots\dots\dots (3)$

**Data Analysis**

The time series data collected were analyzed using descriptive and econometric analytical methods. Before doing so, however, pre-test assessments on the time series were carried out. To avert the danger of ending up with spurious regression, the data series were tested in t for stationarity using the Augmented Dickey-Fuller technique(table 1)..

**Table 1: Unit Root Test Result**

Variables	DF	ADF test (CV)	ADF test stationary	P-values	Order of integration	ADF lag
Y	5%	-2.9850	3.622099	0.0015	1(1)	1
	10%	-2.6318				
INTR	5%	-2.9798	-2.934405	0.0075	1(1)	1
	10%	-2.6290				
DCR	5%	-2.9850	2.94227	0.0075	1(1)	1
	10%	-2.6318				
OMR	5%	-3.6219	-4.252270	0.0004	1(1)	1
	10%	-3.2474				
EXR	5%	-2.9643	-2.943315	0.0007	1(1)	1
	10%	-2.9978				

The result in table 1 above shows that none of the variables was stationary at level. This can be seen by comparing the observed values (in absolute terms) of the ADF test statistics at 1%, 5% and 10% levels of significance. The result provides some evidence that none of the variables were stationary at level. There is evidence of non-stationarity which is usual with financial data. However, after first differencing, five variables (GDP, INTR, DCR, XR and OMR) became stationarity. The table therefore revealed that the variables were stationary at first difference (I,1).

After ensuring the stationarity of the variables data, the econometric method of Ordinary Least Square (OLS) method was employed for regression analysis using E-views 7.0. OLS has the advantage of being the Best Linear and Unbiased Estimator (BLUE) (Koutsoyiannis ,2001).

Also, there was the need to ascertain whether the estimated coefficients were theoretically meaningful and statistically satisfactory; that is whether all the results satisfied the economic a-priori criteria,



Statistical Criteria (First Order Test) and Econometric Criteria (Second Order Test). Based on economic theory, the independent variables were expected to have the following signs in relation to the dependent variables For Model 1, the a-priori expectation of the estimate is  $a_0 > 0$ ,  $a_1 > 0$ ,  $a_2 > 0$ ,  $a_3 > 0$ . For model 2, the a-priori expectation of the estimate is  $b_0 > 0$ ,  $b_1 > 0$ ,  $b_2 > 0$ ,  $b_3 > 0$ ,  $b_4 > 0$ .

### **Stage 2 – Statistical Criteria (First Order Test)**

This stage required ascertaining the coefficient of determination, standard error test, f-test and t-test. The coefficient of determination ( $R^2$ ) is the measure of goodness of fit. It is used to measure the power of the explanatory variables on the dependent variable. The  $R^2$  denotes the percentage of the variation in the dependent variable that is accounted for by the independent variables. The value of  $R^2$  lies between 0 and 1. The closer the  $R^2$  is to 1, the better the goodness of fit. If  $R^2 = 1$ , it implies that there is 100 percent explanation of the variations in the dependent variable by the independent variables. This signifies a perfect fit of the regression line. However, if  $R^2 = 0$ , it then indicates that the explanatory variables do not explain any changes in

The formula for  $R^2$  does not take into account the loss of degrees of freedom from the introduction of additional explanatory variables in the function which in fact raises the value of  $R^2$ . To correct this defect,  $R^2$  is adjusted by taking into account the degrees of freedom which clearly decreases as new regressors are introduced in the function.

Sampling errors are inevitable in all estimates and so the need to apply tests of significance in order to measure the size of the error and determine the degree of confidence and the validity of the estimates. The standard error test helps one to decide whether the estimates are statistically significant or not.

T-statistic is used to find out or test for the statistical significance of the individual regression coefficient. When this is done, the computed or calculated ratio ( $t_{cal}$ ) will be compared with the tabulated ( $t_{tab}$ ) with n-k degree of freedom.

The F-statistic is a test of the overall significance of the entire regression plane. The f-test is used to test whether or not there is a significant impact between the dependent variable and the independent variables. In the regression equation. If the calculated f is greater than the tabulated f-value, then there is a significant impact between the dependent and independent variables in the regression equation. But, if the calculated f is small than the tabulated f, then there is no significant impact between the dependent and the independent variables.

### **Econometric Criteria (Second Order Test)**

This aims at investigating whether the assumptions of the OLS are met. They determine the reliability of the statistical criteria and establish whether the estimates have the desirable properties of unbiasedness and consistency.

### **Durbin-Watson Statistic**

The Durbin-Watson (D-w) statistic is the common technique for testing the first order autocorrelation. This helps to test the validity of the assumptions of non-auto correlated disturbance. If  $d^*$  is approximately equal to 2, we accept that there is no autocorrelation in the function. If  $d^* = 0$ , there exist perfect autocorrelation. In this case, if  $0 < d^* < 2$ , that is, if  $d^*$  is less than two (2) but greater than zero, it denotes that there is some degree of positive autocorrelation. If  $d^*$  is equal to 4 ( $d=4$ ), there exists a perfect negative autocorrelation, while if  $d^*$  is less than four but greater than two ( $2 < d^* < 4$ ) it means that there exists some degree of negative autocorrelation.

### **Decision Rule**



The hypotheses of this study were tested at 0.05 level of significance. The null hypothesis is to be rejected if the probability at which the t-value is significant is less than the chosen level of significant, otherwise, the alternative hypothesis will be accepted.

1. If the probability (sig) > 0.05, we will accept the null hypothesis and reject the alternative hypothesis.
2. If the probability (sig) < 0.05, we will accept the alternative hypothesis and reject the null hypothesis.

### 3. Data Presentation, analysis and results

**Table 2. Data presentation**

Year	GDP Per Capita (current US\$)	INTR	EXR	OMR	DCR
1985	345.3	11.75	0.673	12.3	27
1986	241.5	12	0.724	16.8	41.3
1987	273.5	19.2	0.765	20.5	36.7
1988	257.3	17.6	0.765	33.3	38.3
1989	261.0	24.6	0.894	8.5	40.9
1990	322.8	27.7	2.02	40.41	7.5
1991	280.3	20.8	4.02	32.74	13.3
1992	292.4	31.2	4.54	49.83	44.5
1993	153.6	18.32	7.39	53.76	57.2
1994	171.7	21	8.04	42.45	57.0
1995	264.3	20.79	9.91	12.75	72.8
1996	316.0	20.86	17.3	16.18	29.3
1997	315.6	20.92	22.33	14.4	8.5
1998	275.0	21.8	21.89	25.72	10.0
1999	300.6	27.2	21.89	29.52	6.6
2000	379.1	30	21.89	48.7	6.9
2001	351.8	24	21.89	26.8	18.9
2002	459.5	25.7	85.98	21.58	12.9
2003	512.7	21.6	102.5	24.11	23.8
2004	648.8	20.4	11	56.97	10.0
2005	807.9	19	120.5	87.45	11.6
2006	1,019.7	18.7	128.5	98.2	8.5
2007	1,136.8	18.8	134	62.33	6.6
2008	1,383.9	19.22	130.15	63.38	15.1
2009	1,097.7	22.90	122.5	85.14	12.6
2010	2,327.3	21.87	117.75	82.0	12.6
2011	2,527.9	5.9	121.2	71.5	13.8
2012	2,755.3	6.9	34.5	71.3	10.9
2013	2,996.9	10.2	87.6	75.2	10.3
2014	3,221.7	11.4	121.6	64.8	8.5
2015	2,655.1	13.6	132		11.3

Source: CBN Annual Reports and Statistical Bulletin-Various issues CBN Statistical Bulletin



**Regression Result**

In this study, mathematical relationships between the variables are established. Available data on Interest Rate (INTR), Exchange Rate, (EXR), Money supply (OMR), realGross Domestic Product (GDP), were collected and used for the purpose of this analysis. Two multiple regression models were formed to capture the assumed relationship between these variables.

**Table 3: Data Estimation Result**

Variable	Coefficient	Std. Error	T-statistic	Prob.
C	-105615.6	1116194.0	-0.094621	0.9254
INTR	471.2586	23756.76	0.019837	0.9843
DCR	28075.83	66199.74	0.575166	0.5708
OMR	4.295952	0.157122	27.34147	0.0000

$R^2 = 0.971739$ ,  $F(3,27) = 263.6123$  Adj.  $R^2 = 0.968053$ ,  $DW = 1.982416$

**Model Estimation**

$GDP = -105615.6 + 471.259 (INTR) + 28075.8 (DCR) + 4.296 (OMR)$   
 $T = (-0.095) (0.20) \qquad (0.575) \qquad (27.34)$

Where the variables remain as previously defined.

Table 3 presents the results of the regression analysis where real Gross Domestic Product (GDP) was regressed on Interest rate (INTR), Exchange rate (EXR) and Money supply (OMR). The a-priori expectation of the estimate coefficient is  $a_0 > 0$ ,  $a_1 > 0$ ,  $a_2 > 0$ ,  $a_3 > 0$ .

**Analysis of results**

The level of statistical significance chosen for testing the hypothesis was 5% level. The regression result shows there is a linear and proportionate relationship between GDP and the explanatory variables. The signs of the co-efficient estimates reflect a positive relationship with economic growth and thus conforms to a-priori expectations. The statistical evidence emanating from the study of coefficient of determination,  $R^2$  shows that the endogenous variables jointly explained over 97.2 percent of the total variation in the dependent variable (GDP). The value of the adjusted  $R^2$  (0.96805) which is over 96.8 percent re-affirms the goodness of fit and signifies that over 97.2 percent variations did not merely result from the use of multiple variables in the model. The F-statistic (263.6) of the model estimate is statistically satisfactory. The joint influence of the explanatory variables was statistically significant at 5 percent level. The Durbin Watson test of autocorrelation (1.98) indicates that there is no autocorrelation.

Specifically, at 5 percent level of significance, Interest rate and Discount rate have non-significant positive impact on growth while money supply has a significant positive impact on growth. This confirms the hypothesis that monetary policy (Money supply) has a significant impact on Nigeria economic growth.

The empirical evidence emanating from the study reveals that money supply had a direct relationship with economic growth which suggests that it encourages investment and productivity of goods and service

**Analysis of results and discussion**

Our finding from this study is similar to the findings of Orji (2006) in his study on the effects of monetary innovations in Nigeria. Our result is also similar to that of Chukwu (2009) in his study on the effects of monetary policy on price stability in Nigeria.



Thus, from our findings, interest rate, exchange rate, broad money supply, have non-significant influence on GDP in Nigeria. In other words, the application of any of the above -mentioned variables by the monetary authority to control inflation have always produced a non -significant impact. According to Chukwu (2009), the non-significant influence of the above monetary policy instrument on inflation in Nigeria is due to the under developed and inefficient financial and credit sector in Nigeria.

## 5. Conclusion

The study examined the effect of monetary policy measures on Nigeria's economic growth. The natural log of real GDP was employed as the dependent variable against the explanatory monetary policy variables- interest rate, discount rate and open market rate. The time series data used spanned the period from 1985 to 2015. The study adopted an Ordinary Least Squares technique and also conducted the unit root tests. The results of the study suggest that while Money supply (OMR) has significant positive effect on Nigeria's economic growth, the effect of interest rate and discount is positive but non -significant. It also shows that monetary policy explains 98% of the changes in economic growth in Nigeria and can be effectively used as a veritable tool for ensuring price stability and improving economic growth.

Based on the findings of this study, the apex monetary institution in Nigeria is advised to pay more attention on the control of Nigeria's money supply as a veritable monetary policy instrument for enhancing price stability and boosting her economic growth.

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