# THE IMPORT OF MONETARY POLICY ON ECONOMY OF AGGREGATE NEXUS IN NIGERIA ECONOMY

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**Abstract**
*This work examined the import of monetary policy on economy of aggregates in Nigeria. The impact of monetary policy on aggregate economy in Nigeria has always been subject of controversy owing to its implementation coupled with conflicting empirical finding. Specifically, this study examined the effect of monetary policy rate; cash reserve ratio, liquidity ratio and money supply which are the independent variables on the dependent variables (inflation and employment rate). The study adopted an ex-post facto research design using the Error Correction Mechanism (ECM) Model as a method of estimation. The result of the analysis revealed that there is a negative insignificant relationship between monetary policy instruments: monetary policy rate, cash reserve ratio, liquidity ratio and money supply on selected macro-economic variables: inflation and unemployment rate. The study concludes that Central Bank of Nigeria's monetary policy adjustments have not facilitated improved macroeconomic variables in Nigeria. The work recommended among others that more awareness should be created in rural areas to boast financial inclusion; and that there should be synergy between the monetary policy and the fiscal policy managers. Equally Government should direct effort towards improving the level of development of both the money and capital market.*
**Keywords:** *Monetary policy, cash reserve, liquidity, inflation.*

## Introduction

Monetary Policy refers to the specific actions taken by the Monetary Authority to regulate the value, supply and cost of money in the economy with a view to achieving predetermined macroeconomic goals. The Central Banks in developing countries, seek to achieve price stability through the management of money supply. Generally, monetary policy is a tool of general macroeconomic management, under the control of the monetary authorities, designed to achieve government economic objectives. Monetary policy aims at achieving certain national goals which have historically included full employment (or a low unemployment rate), high output (or a high output growth), a stable price level (or a low inflation rate), and a stable exchange rate (or a desirable balance of payments). These are often referred to as the "ultimate goals" of monetary policy. These goals are usually achieved indirectly by the monetary authorities (Central Banks) through its use of monetary policy instruments. These instruments, though different from country to country, usually

include open market operations (OMO), changes in discount/bank rate (both of which determine the monetary base), and required reserves (the minimum reserves the commercial banks must hold against the public's deposit with them) (CBN, 2011).

Since the CBN Act of 1958, there have been various regimes of monetary policy in Nigeria (tight and loose monetary policy) and these have been used to influence growth and price stability. The economy has also witnessed business cycles (periods of booms or expansion and recession or contraction). However, there has been the argument that the growth reported has not been sustainable and encompassing as there is evidence of growing poverty among the populace. The Nigeria government in collaboration with its monetary authority still adopts monetary policy to regulate the economy. Thus adopting monetary policy in manipulating the fluctuations experienced so far in the economy, Central Bank of Nigeria (CBN) undertake both contractionary and expansionary measures.

Despite these measures undertaken, the target objectives of the various monetary policy regimes employed has failed to achieve its desired objectives of reducing inflation, stabilising exchange rate, reducing unemployment among others. A major problem militating against the effectiveness of monetary policy in Nigeria is inconsistent policies. In Nigeria, successive government refuse to understand that government is a continuum rather they change all the policies introduced by their predecessors whether those policies are good or not thus hampering economic growth. The impact of monetary policy on economic growth of Nigeria has always been a subject of controversy owing to its implementation.

Various studies on the relationship between monetary policy and macroeconomic fundamentals in Nigeria shows mixed effect by different researchers. The results of various researchers have continued to be inconsistence as result they are unreliable for any policy making; these problems prompted me to research further. Therefore, the gap created is that this work incorporated employment rate as part of macroeconomic variables so as to determine how it is affected by monetary policy.

Against this background, this research investigated the effects of monetary policy on selected macroeconomic variables in Nigerian economy from 1986 to 2019.

This study is structured into segments with introduction as section one. Section two reviewed related literature. The methodology was detailed in section three, while result of estimation and discussion was captured in section four. Concluding remarks and policy implications were stated in section five.

**Review of related Literature**

Monetary policy can be defined as the process by which monetary authorities (specifically, Central Banks) use monetary settings in an effort to attain several specified objectives for an economy. Such a simple definition encompasses a range of possibilities and choices. Nwankwo (1991) states that the objectives might be referred to economic growth, employment, price stability, or some other attributes. Collectively, monetary components seek to condition the supply of money, and less often, the demand in a structural market. Ibeabuchi (2007) observed that monetary policy is a set of policies governments use to deal with monetary issues, such as money supply policy, interest rate policy, exchange rate policy, and the like. Frameworks can be differentiated in terms of their specified objectives, as well as the interrelationships or mechanisms presumed in models analysis and underlying theories.

Monetary policy frameworks have been modified around the world as conditions which have evolved .The choice of framework reflects the goals and objectives that each government aims for. The popular objective of monetary policy in the1970s was economic growth; thus, most Central Banks used monetary aggregates as the preferable framework. The high inflation of the 1970s saw many preoccupied with its control, and price stability was therefore considered the primary objective, with Central Banks shifting to inflation targeting via interest rate‒controls. In 2000,a comprehensive survey of 94 Central Banks, conducted by the Bank of England, showed inflation targeting and a desired level of exchange rate to be the most important goals of their monetary  policies (Mahadeva & Sterne,2000).Five other objectives were identified to be financial stability, money targeting, balance of payment, output growth, and interest rate. Each of these objectives is now considered. In determining monetary policy, the Central Bank has a duty to maintain price stability, full employment, and the economic prosperity and welfare of the people. To achieve these statutory objectives, the Central Bank has an inflation target and seeks to keep consumer price inflation in the economy to 2–3percent, on average, over the medium term. Controlling inflation preserves the value of money and encourages strong and sustainable growth in the economy over the longer term.

Policy makers must make choices when setting monetary policy. They may take into account a wide range of factors ,such as:(1)short-term and long-term interest rates; (2)quantities and velocity of money in circulation;(3)inward and out-ward capital flows;(4) exchange rates;(5) government versus private sectors pending/savings of firms ,households ;and (6) quantities and quality of credit supply. Perceptions as to the significance and interrelations of each will guide thinking. In practice, different objectives might clash with each other.  Therefore, it is important for a Central Bank to choose appropriate objectives for the monetary policy and leave other objectives to other policy institutions. Normally, objectives of monetary policy are selected by the monetary authority, keeping in view the specific conditions and requirements of

the economy. Nwoko et.al (2016) observes that some of the most important objectives of monetary policy are: **Output Growth (Economic Growth)**: This is the ultimate objective of every monetary policy framework. Monetary policy can influence economic growth is at variance to real interest rates, which in turn affects the aggregate level of investment .For some emerging economies where the financial system is still under-developed, economic growth can be achieved by expanding total investment ,so that the framework of money targeting proves to be useful. In the more advanced economies where a financial system is already comprehensively developed the Central Bank might consider economic growth to be the implied objective after success in maintaining income and price stability. Hence, inflation targeting is more appropriate for these economies. **Price Stability**: The emergence of inflation and deflation are both harmful to the economy. Thus, monetary policy has an objective of price stability, which aims to keep the value of the currency stable. It also helps reduce income and wealth inequalities. When the economy suffers from recession, the monetary policy should be an expansionary one; while in an inflationary situation, there should be a contractionary policy. **Exchange Rate Stability**: If the exchange rate is very volatile leading to frequent ups and downs in the value of the currency, this complements the business condition; however, the international markets might also lose confidence in the domestic economy. Therefore, monetary policy aims to maintain the relative stability of the exchange rate. This is even more crucial for economies that depend significantly on imports and exports; in that case, exchange rate targeting might be the most appropriate approach. **Balance of Payments (BOP) Equilibrium**: The BOP has three positions: balance, surplus, and deficit. A surplus reflects an excess money supply in the domestic economy, while a deficit reflects stringency of money. The persistence of surplus or deficit in the long term both cause negative impacts on the economy. Therefore, it is important for the monetary policy to aim to maintain BOP equilibrium. **Full Employment**: In a simple definition, full employment is a situation in which everybody who wants to work gets a job .An economy in full employment is considered able to achieve its potential development. In theory, expansionary monetary policy will increase credit supply and total investment, and this helps create more jobs in different sectors of the economy. Full employment was referred to in Keynes's (1936)–General Theory. However, this objective did not receive much attention from monetary policy makers until very recently, when both the Federal Reserve Bank (FED) and European Central Bank found their current monetary stances in sufficient to recover economic growth and reduce the unemployment rate. A country that considers employment status the prior objective would choose unemployment targeting in its monetary policy framework (Bernanke, 2003)

Trying to attain these objectives is a considerable challenge, as economic history

attests. Policy makers and analysts use preferred theories or other–explanations, explicitly or implicitly, to frame their thinking and actions. Many may develop only a limited understanding of such supports and rely upon conventional or organisational wisdoms rather than any critical appreciation.

**Theoretical Framework**

Traditional Keynesian and IS-LM Model, Phillips's Curve and Monetarism theory are the theory used in the study while Monetarism theory was the theory guiding the study.

**Traditional Keynesian and IS-LM Model**

In the 1930s, Keynes was concerned with trying to develop a framework to evaluate the real impacts of monetary positions on an economy. His well-known contribution can be found in the book —The General Theory of Employment, Interest and Money" (Keynes, 1936). The central argument of the theory is that the level of employment is mainly determined by the spending of money (aggregate demand). This is entirely different from the argument of neoclassical economics that price of labour is the key factor influencing employment.

Hicks (1937) and Hansen (1953) visualised the explanation of the impact of monetary adjustment in traditional Keynesian macroeconomic theory in their well-known IS-LM model. The model demonstrates the specified combination of interest rates and real output $(Y, r)$, given the equilibrium achieved in the goods and services market $(I=S)$ and the money market $(L=M)$. Figure 2.2 depicts the case where the Central Bank implements expansion monetary policy by increasing the money supply in the IS-LM model. As a result, the real money balance $M/P$ will increase (given that P is unchanged in the short run), The LM curve will shift to the right (from $LM_0$ to $LM_1$), which implies that the demand for money is lower than the supply. As bonds would now be preferred to cash, the market interest rate will be lower (from $r_0$ to $r_1$).This in turn reduces the capital cost of production, which bolsters investment and later expands total output ($Y_0$ to $Y_1$).
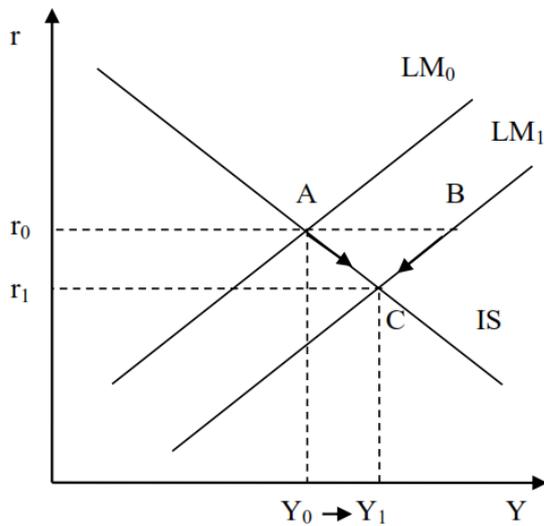
*Figure 1: Monetary Expansion in IS-LM Model*

However, the role of monetary policy was restricted through a contrary stance that money supply has no impact on real output in the long run. Fiscal policy was seen as the more powerful tool in boosting the aggregate demand of the whole economy. The sole objective of the monetary authority should then be to use its influence over the interest rate to raise the economy out of its long-period equilibrium position characterised by unemployment and Propel it toward along-period equilibrium position characterised by full employment (Dickens, 2011).As an explanation for this bias, in the 1930s,few Central Banks were independent of government and there was an associated assumption that a Central Bank had to be independent for monetary policy to function properly.

**Phillips's Curve**
Keynesian economics was the dominant economic model during the Great Depression aftermath, World War II, and the post-war economic expansion (1945-1973). However, the failure of demand-driven fiscal policies to restrain inflation and produce growth in the 1970s put the approach in doubt, paving the way for monetarist economics to become the new approach in policy-making. It should be noted that, during this earlier time, Phillips (1958) found the inverse relationship between rate of changes in wages and the unemployment rate in the United Kingdom. His idea was later developed by Samuelson and Solow (1960) for the case of the United States with the relationship between inflation rate and unemployment rate. Samuelson and Solow suggested that a 3-4% rise of inflation was effective to keep unemployment stable at 3%. The relationship was graphed into the famous Phillips curve, which implied the motivation in keeping the inflation rate at reasonable value in order to bolster the employment status.

Under the light of quantity monetary theory, the relationship could be explained as the following: Any increase in money supply M or money velocity V, or an increase in both variables, would lead to higher aggregate demand. It is then expected to find rising output and incomes on the one hand( i.e, increasing Y);rising prices(P)on the other: and as the economy approaches closer to full employment, more increased spending will become more inflationary pressure. Conversely, if an economy is under heavy unemployment with much of its resources staying idle or being unutilised, an increasing M, which leads to rising aggregate demand, will produce increased real output and incomes(in Y),without any significant increase of price level. Therefore, the extent of inflation, or price increases, depends as much on these real factors as on the purely monetary factors.

However, the Phillips curve has lately been criticised, as empirical studies have shown no long-run trade-off between inflation and growth in the data of various countries.In1990s, the Phillips relationship even proved to be negative, with more inflation associated with lower growth in studies such as Barro (1995), Fischer (1993), and Fry(1995).

**Monetarism**

In the 1970s the influence of monetarists increased, most notably that of Milton Friedman, who hailed the importance of monetary policy over fiscal policy. Following Fisher, monetarists argue that variations in the money supply have major influences on national output in the short run and the price level over longer periods. Therefore, the objectives of monetary policy are best met by targeting the growth rate of the money supply (Friedman, 1948). Monetarists strongly emphasise the necessity to control the amount of money in circulation. Monetarism was considered to be successfully applied in controlling the high levels of inflation seen in the United States in the 1970s and early 1980s. Paul Volcker applied the theory in managing US monetary policy when he was the Chairman of the Federal Reserve from August 1979 to August 1987. However, the theory and position were criticised as causing highly unstable relationships between monetary aggregates and other macroeconomic variables (Bernanke, 2006). A modified monetarism theory became the central position in the monetary policy of western governments in the late 1980s and early 1990s, and this focused more on the interest rate than on the quantity of money.

This study is hinged on the theory of monetarism as monetarism has been found to be more favourable to the Nigerian economic and political landscape. Monetarists warn that increasing the money supply only provides a *temporary* boost to economic growth and job creation. Over the long run, it will increase inflation. As demand outstrips supply, prices will rise. Monetarists believe monetary policy is more effective than fiscal policy. That is government spending and tax policy. Stimulus spending adds to the money supply, but it creates a deficit. This adds to the

country's sovereign debt. That will increase interest rates. Monetarists say that Central Banks are more powerful than the government because they control the money supply. Monetarists watch real interest rates rather than nominal rates. Most published rates are nominal rates. Real rates remove the effects of inflation. They give a truer picture of the cost of money.

**Empirical Review**

Nwosa and Saibu (2012) investigated the transmission channels of monetary policy impulses on sectoral output growth in Nigeria. They employed the unrestricted VAR and the Granger causality on quarterly data that spanned the period 1986 – 2009. They found interest rate and exchange rate as the most effective monetary tools to influence sectoral output growth in Nigeria. The interest rate channel was most effective in transmitting monetary policy to agricultural and manufacturing sectors, while the exchange rate channel was most effective for transmitting monetary policy to building and construction, mining, service and wholesale/retail sectors.

Dalhatu (2012) studied the impact of monetary policy on price stability in Nigeria. He examined shocks in monetary policy and its responses on inflation, market interest rate and exchange rate. Monetary policy rate was used as a proxy for monetary policy indicators. Secondary sources of data were collected from December, 2006 to February, 2012. 2006 was chosen because this was when the monetary policy rate was introduced. Structural VAR framework was used to estimate the model. Results from the study revealed that market interest rate and exchange rate are more responsive to shocks in monetary policy rate than inflation in Nigeria. Furthermore, expected changes in inflation cannot be guaranteed by variations in the monetary policy rate. Other instruments mainly reserve requirement and open market operation used along with the monetary policy rate can effectively reduce inflation in Nigeria.

Amassoma Wosa and Olaiya (2011) explored 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 have witnessed the implementation of various policy initiatives and has therefore experienced sustained improvement over the years. The result also shows that monetary policy had 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 economy growth; there is the need to reduce the excessive

expenditure of the government and align fiscal policy along with monetary policy measure.

Ajaude, Nkamare, and James (2015) in their study critically and logically analysed the impact of monetary policy on macroeconomic aggregates (inflation and interest rate). The objectives were; to examine the effect of money supply, interest rate, cash reserve requirement on inflation. To ascertain the effect of monetary policy instruments on macroeconomic aggregate (inflation), secondary source of data was employed and extracted from Central Bank statistical Bulletin. Ordinary least square of multiple regression technique was used to statistically analyse the relationship between dependent and independent variables. The findings revealed that monetary policy had a positive impact on macroeconomic aggregate (inflation), also shown that monetary policy affected interest rate positively.

Acha, Ikoh and Nsien (2016) examined the efficacy of the Nigeria's monetary policy against the backdrop of single digit inflation monetary policy target of the regulatory authorities. Two related questions were constructed to guide the study. Relying on both the Keynesian and Structuralist analyses, data were harvested on inflationary performance for 24 years on Nigeria economy from the World Bank data base and assessed it against achievement of the targeted single digit inflation. Thereafter Nigeria inflationary performance was compared with that of South Africa another leading African economy. It was realized that inflationary pressure on the South African economy was lower than that of Nigeria, even when both countries faced high inflation episodes during the early decade of 1990s. Findings which confirm the structuralist's argument revealed that factors beyond the purview of monetary policy constrained the realization of single digit inflation. These include the existence of various and uncontrolled sources of liquidity in the country, government fiscal operation, which include financing of deficit budget and monetization of deficits, the existence of large informal credit markets, among others.

Ngerebo (2016) examined the effectiveness of monetary policy in controlling inflation in Nigeria. Relationship between variables such as inflation, savings rate, monetary policy rate, prime lending rate, maximum lending rate, treasury bill rate, growth of narrow money supply, net domestic credit, growth of broad money supply, net credit to government and credit to private sector were analyzed and tested using OLS. Secondary source of data from 1985 to 2012 was collected from the statistical report of the Central Bank of Nigeria. The study revealed that monetary policy rate, maximum lending rate, prime lending rate, net domestic credit and treasury bill rate are not statistically significant while growth of broad money supply, credit to private sector, growth of narrow money supply, savings rate, net credit to government are statistically significant in explaining how they affect inflation in Nigeria. Findings

indicate that some monetary policy instruments in Nigeria are effective in managing inflation while others are not.

ThankGod and Tamarauntari (2014) examined the effectiveness of monetary policy on economic growth and inflation in Nigeria over the period 1970 to 2011. The lag selection criteria all indicated an optimum lag length of one, therefore a VAR (1) model was estimated using GDP, INTR, CPI, and M2 as endogenous variables. The model was dynamically stable and showed no evidence of serial correlation. Estimation results showed that in the short run it is output and inflation that drives monetary growth, while output growth is affected by inflation only. Results from the impulse response and variance decomposition showed that monetary policy variables may not have an instantaneous impact on output, but are key determinants of output growth in the long–run. Furthermore, in the short–run the level of production is more important in controlling inflation, but it is monetary policy variables that matter in the long–run. Therefore, there is the need to differentiate between short and long run monetary policy targets. It was recommended that, policy makers should concentrate on short-run output expansion policies and put measures in place to sustain growth in the long run to control inflation. But to maintain longrun output expansion, monetary authorities should aim at adjusting the inter-bank rate but with caution as this can instead cause the problem it is meant to solve.

Danjuma,Jbrin and Success (2012) attempted to examine the impact of monetary policy on inflation in Nigeria over the period 1980– 2010 with the aim of measuring the effectiveness of monetary policy in Nigeria. Using the least squares technique, granger causality they showed that liquidity ratio and interest rate were the leading monetary policy instruments in combating inflation in Nigeria while cash reserve ratio, broad money supply and exchange rate were described as being "impotent" in effective monetary policy decision in Nigeria.

Nenbee and Madume (2011) attempted to examine the impact of monetary policy on Nigeria's macroeconomic stability between 1970 and 2009. Macroeconomic stability was taken to be synonymous to price stability. Employing the Co-integration and Error Correction Modeling (ECM) techniques they showed that only 47 percent of the total variations in the prices was explained by the monetary policy variables-Money Supply (MOS), Monetary Policy Rate (MPR) and Treasury Bills (TRB) in the long-run. They concluded that monetary policy tools therefore have mixed impact on inflation in Nigeria.

Micheal and Ebibai (2014) examined the impact of monetary policy on selected macroeconomic variables such as gross domestic product, inflation and balance of payment in Nigeria using OLS regression analysis. The result shows that the provision of investment friendly environment in Nigeria will increase the growth rate of GDP.

Okwo, et al (2012) examined the effect of monetary policy outcomes on macroeconomic stability in Nigeria. The study analysed gross domestic product, credit to the private sector, net credit to the government and inflation using OLS technique. None of the variables were significant, which suggested that monetary policy as a policy option may have been inactive in influencing price stability.

Onyeiwu (2012) studied the effect of Central Bank of Nigeria's (CBN) monetary policies on selected macroeconomic variables – gross domestic product, inflation rate and balance of payment between 1981 and 2008. Using the Ordinary Least Squares Method (OLS) to analyse data, the result shows that monetary policy proxy by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. He recommended that monetary policy should facilitate a favourable investment climate through appropriate interest rates, exchange rate and liquidity management mechanism.

Ditimi, Wosa and Olaiya (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 study showed that monetary policy have witnessed the implementation of various policy initiatives and has therefore experienced sustained expansion over the years. The results also shows that monetary policy had a significant effect on exchange rate and money supply while monetary policy was observed to have an insignificant influence on price instability. They noted that 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 output performance; there is the need to reduce the excessive expenditure of the government and align fiscal policy along with monetary policy measure.

Gul et al (2012) studies how monetary instruments influence macroeconomic variables such as, inflation, interest rate, real GDP, exchange rate and money supply in Pakistan. OLS was used to analyse and explain the relationship between the above mentioned variables. Secondary source of data from 1995 to 2010 was used. Results from the study showed that money supply has a strong positive correlation with inflation whereas a negative correlation with output. Exchange rate also has a negative impact on output in Pakistan. A tightening monetary policy is expected to reduce inflation but in the case of Pakistan, a positive interest rate shock (contractionary monetary policy) led to an increase in price level.

**Methodology**
Secondary data was the nature of data applied in this study. The data were carefully obtained from the 2019 statistical bulletin of Central Bank of Nigeria (CBN). The

data were gauged in annual bases as confined in the Central Bank of Nigeria (CBN) statistical bulletin.

Based on the objective of this study, a modified model of Ajaude, Nkamare and James (2015) on the effect of monetary policy on macroeconomic aggregates will be used in this study. The original model of Ajaude, Nkamare and James (2015) is stated as:

INF=f (MS, INTR, CRR)....................................1
Where:
$INF$ = Inflation
$MS$ = Money supply
$INTR$ = Interest rate
$CRR$ = Cash reserve ratio

The model of Ajaude, Nkamare and James (2015) was modified by introducing liquidity ratio and two macroeconomic variables: inflation rate and employment rate. As a result the models for this study are thus:

**Hypothesis One (Model 1)**
$EMP = a_0 + a_1CRR + a_2MPR + a_3M_2 + a_4LR$ ...............……….................. 2
$EMP = a_0 + a_1logCRR + a_2logMPR + a_3logM_2 + a_4logLR + e_{it}$ ……..........3

**Hypothesis Two (Model 2)**
$INF = a_0 + a_1CRR + a_2MPR + a_3M_2 + a_4LR$ ...............……….................4
$INF = a_0 + a_1logCRR + a_2logMPR + a_3logM_2 + a_4logLR + e_{it}$ ……..........5

Where: EMP= Employment Rate
INF=Inflation Rate
CRR= Cash Reserve Ratio
MPR= Monetary Policy Rate
M2= Broad Money Supply
LR= Liquidity Ratio
$a_0$ = Intercept of the model
$a_1 - a_4$ = Parameters of the regression coefficients
$e_{it}$ = Stochastic error term

**Data Presentation and Analysis**
Table 1 shows the descriptive statistics of the variables. It provides the total number of observations, mean, median, maximum, minimum, standard deviation, kurtosis, skewness, Jarque-Bera and its p-value. The mean values of the time series data are 18.76127 for INF, 52.79000 for EMP, 13.62853 for MPR, 8.945588 for CRR, 46.86691 for LR and 4399784 for M2. The median was unveiled to be 12.05 for INF, 52.79 for EMP, 13.50 for MPR, 7.90 for CRR, 46.25 for LR and 7537 for M2. The maximum and

minimum coefficients are 72.80 and 5.4 for INF, 71.10 and 51.26 for EMP, 26.0 and 6.0 for MPR, 24.0 and 1.0 for CRR, 75.82 and 29.10 for LR, and 21607680 and 2259 for M2. The standard deviation of the data is 16.89717, 5.44, 3.73, 6.95, 10.27 and 6428450 for INF, EMP, MPR, CRR, LR and M2 respectively.

**Table 4: Data Descriptive Properties**

| | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | P-value | Obs |
|---|---|---|---|---|---|---|---|---|---|---|
| INF | 18.76127 | 12.05000 | 72.80000 | 5.400000 | 16.89717 | 1.835452 | 5.319252 | 26.71050 | 0.000002 | 34 |
| EMP | 52.79000 | 52.79000 | 71.10000 | 51.26000 | 5.444719 | 2.068423 | 5.578840 | 33.66555 | 0.000000 | 34 |
| MPR | 13.62853 | 13.50000 | 26.00000 | 6.000000 | 3.735834 | 0.785583 | 5.334929 | 11.22064 | 0.003660 | 34 |
| CRR | 8.945588 | 7.900000 | 24.00000 | 1.000000 | 6.958517 | 0.939396 | 2.843694 | 5.035244 | 0.080651 | 34 |
| LR | 46.86691 | 46.25000 | 75.82500 | 29.10000 | 10.27086 | 0.579794 | 3.523704 | 2.293454 | 0.317675 | 34 |
| M2 | 4399784 | 753705.0 | 21607680 | 22594.87 | 6428450 | 1.359740 | 3.472073 | 10.79277 | 0.004533 | 34 |

*Source: Output data from E-views 9.0*

With regard to the distribution of the data, it was obvious that the data were normally distributed as evidenced by the p-value of the Jarque-Bera coefficient which were all significant at 5% level of significant except for CRR and LR.

To prevent the occurrence of spurious regression result, the data were subjected to unit root test of Augmented Dickey-Fuller (ADF) and Phillips Perron (PP). The essence of the unit root test is to unveil that the time series data are free from stationarity defect that characterized most time series data due to the nature of data generation. The unit root was first performed at level but due to the fact that stationarity is not normally achieved at level estimation, the first difference was estimated. The criteria for unit root estimation via at intercept were applied in ADF and PP only. The result of the ADF and PP results envisage that the data were stationary at level form and at first difference. The stationarity test provides support that the data are stationary and free from stationarity defects that affects regression output. Tables 2 to 5 present the ADF result and the PP result.

**Table 2: Result of ADF Unit Root Test at level**

| VARIABLES | ADF TEST STATISTICS VALUE | MACKINNON CRITICAL VALUE AT 5% | ORDER OF INTEGRATION | REMARKS |
|---|---|---|---|---|
| EMP | -2.481228 | -2.954021 | I(0) | Non-Stationary |
| INF | -2.511645 | -2.954021 | I(0) | Non-Stationary |
| MPR | -3.213516 | -2.954021 | I(0) | Stationary |
| CRR | -0.380528 | -2.954021 | I(0) | Non-Stationary |
| LR | -2.307798 | -2.954021 | I(0) | Non-Stationary |
| M2 | -1.795348 | -2.954021 | I(0) | Non-Stationary |

*Source: Author's Computation using E-view 9.0*

**Table 3: Result of ADF Unit Root Test at First Difference**

| VARIABLES | ADF TEST STATISTICS VALUE | MACKINNON CRITICAL VALUE AT 5% | ORDER OF INTEGRATION | REMARKS |
|---|---|---|---|---|
| EMP | -6.247998 | -2.957110 | I(1) | Stationary |
| INF | -4.975838 | -2.957110 | I(1) | Stationary |
| MPR | -7.248876 | -2.957110 | I(1) | Stationary |
| CRR | -4.926999 | -2.957110 | I(1) | Stationary |
| LR | -5.787558 | -2.957110 | I(1) | Stationary |
| M2 | -5.997467 | -2.957110 | I(1) | Stationary |

*Source: Author's Computation using E-view 9.0*

Unit root test in table 2 shows that all the variables are not stationary at order level except MPR hence the need to difference the variables further. Table 3 revealed that all the variables (EMP, INF, MPR, CRR, LR and M2) were stationary at first difference. This is because their respective ADF test statistics value is greater than Mackinnon critical value at 5% and at absolute term. In order to confirm the stationarity of these variables Phillips Perron (PP) unit root text will be used. Table 4 and 5 indicates the result of Phillips Perron (PP) unit root text.

**Table 4: Result of PP Unit Root Test at level**

| VARIABLES | ADF TEST STATISTICS VALUE | MACKINNON CRITICAL VALUE AT 5% | ORDER OF INTEGRATION | REMARKS |
|---|---|---|---|---|
| EMP | -2.714209 | -2.954021 | I(0) | Non-Stationary |
| INF | -2.684847 | -2.954021 | I(0) | Non-Stationary |
| MPR | -3.252064 | -2.954021 | I(0) | Stationary |
| CRR | -0.788687 | -2.954021 | I(0) | Non-Stationary |
| LR | -2.426171 | -2.954021 | I(0) | Non-Stationary |
| M2 | -1.795348 | -2.954021 | I(0) | Non-Stationary |

*Source: Author's Computation using E-view 9.0*

**Table 5: Result of PP Unit Root Test at First Difference**

| Variables | ADF test Statistics Value | Mackinnon Critical Value At 5% | Order Of Integration | Remarks |
|---|---|---|---|---|
| EMP | -6.907294 | -2.957110 | I(1) | Stationary |
| INF | -5.235250 | -2.957110 | I(1) | Stationary |
| MPR | -7.889984 | -2.957110 | I(1) | Stationary |
| CRR | -4.961246 | -2.957110 | I(1) | Stationary |
| LR | -6.064971 | -2.957110 | I(1) | Stationary |
| M2 | -5.997043 | -2.957110 | I(1) | Stationary |

*Source: Author's Computation using E-view 9.0*

The result from Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test in table 2 to 5 shows that the variables are integrated at order (1) that is at first difference which allows the use of Error Correction Mechanism as a method of data analysis.

**Table 6: Presentation of Johansen co-integration result- model 1**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.617468 | 75.99913 | 69.81889 | 0.0148 |
| At most 1 | 0.553025 | 45.24899 | 47.85613 | 0.0861 |
| At most 2 | 0.251234 | 19.48093 | 29.79707 | 0.4588 |
| At most 3 | 0.205792 | 10.22242 | 15.49471 | 0.2640 |
| At most 4 | 0.085191 | 2.849289 | 3.841466 | 0.0914 |

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

**Table 7: Presentation of Johansen co-integration result- model 2**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.784256 | 108.6302 | 69.81889 | 0.0000 |
| At most 1 * | 0.619913 | 59.55309 | 47.85613 | 0.0028 |
| At most 2 | 0.487834 | 28.59768 | 29.79707 | 0.0683 |
| At most 3 | 0.178495 | 7.186272 | 15.49471 | 0.5561 |
| At most 4 | 0.027567 | 0.894530 | 3.841466 | 0.3443 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

**Long Run Relationship**

The Johansen co-integration approach was used in ascertaining the presence of a long run relationship between monetary policy and selected macroeconomic variables. The data were integrated at order one, hence the justification for Johansen co-integration application. Table 6 and 7 provides the long run relationship between monetary policy and selected macroeconomic variables. Table 6 shoes that there is one co integrating equation between employment rate and macroeconomic variables while table 7 indicates two co integrating equation. This is reflected in the trace statistic of table 6 and 7 which shows a value greater than that of the 5% critical value respectively which shows that there are long run relationship between the variables. Hence the need to determine the short run relationship and the adjustment to the long-run model.

**Short Run Dynamics**

The presence of a long run relationship between employment rate, inflation rate and monetary policy necessitated the determination of the short run dynamics/speed of adjustment to equilibrium for employment rate, inflation rate and monetary policy. From table 8 and 9, the error correction model showed the supposed negative sign. This implies that there is significant error correction taking place as the t-statistic (-

2.78) and (-4.88) is significant at 5% level of significance. This also entails that there is tendency for the model to shift towards equilibrium following disequilibrium in previous period. As depicted by the ECM coefficient (0.388) and (0.790), about 38.8% and 79.0% error in previous year is corrected in present year respectively.

### Table 8: Error Correction Model 1

**Dependent Variable: D(EMP)**
**Method: Least Squares**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(EMP(-3)) | -0.385477 | 0.228344 | -1.688141 | 0.1055 |
| D(MPR) | 0.474259 | 0.206761 | 2.293755 | 0.0317 |
| D(MPR(-1)) | 0.152047 | 0.159519 | 0.953161 | 0.3509 |
| D(CRR) | -0.200754 | 0.216253 | -0.928329 | 0.3633 |
| D(LR(-2)) | 0.083220 | 0.061270 | 1.358252 | 0.1882 |
| D(M2) | 7.04E-09 | 1.26E-07 | 0.055802 | 0.9560 |
| ECM(-1) | -0.388688 | 0.139812 | -2.780084 | 0.0109 |
| C | -0.906039 | 0.528055 | -1.715805 | 0.1002 |
| R-squared | 0.493313 | Mean dependent var | | -0.536000 |
| Adjusted R-squared | 0.332094 | S.D. dependent var | | 3.293135 |
| S.E. of regression | 2.691332 | Akaike info criterion | | 5.041128 |
| Sum squared resid | 159.3519 | Schwarz criterion | | 5.414780 |
| Log likelihood | -67.61692 | Hannan-Quinn criter. | | 5.160662 |
| F-statistic | 3.059896 | Durbin-Watson stat | | 1.981443 |
| Prob(F-statistic) | 0.020854 | | | |

*Source: Output data from E-views 9.0*

### Table 9: Error Correction Model 2

Dependent Variable: D(INF)
Method: Least Squares

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(INF(-1)) | 0.532495 | 0.164542 | 3.236223 | 0.0035 |
| D(MPR) | -0.477806 | 0.639802 | -0.746803 | 0.4624 |
| D(MPR(-1)) | -1.716349 | 0.661239 | -2.595656 | 0.0159 |
| D(CRR) | 0.669573 | 0.799587 | 0.837398 | 0.4106 |
| D(LR) | -0.430012 | 0.228503 | -1.881867 | 0.0720 |
| D(M2) | -3.43E-07 | 4.71E-07 | -0.728913 | 0.4731 |
| ECM(-1) | -0.790684 | 0.161973 | -4.881582 | 0.0001 |
| C | 0.275273 | 1.914844 | 0.143757 | 0.8869 |
| R-squared | 0.573289 | Mean dependent var | | 0.037240 |
| Adjusted R-squared | 0.448831 | S.D. dependent var | | 13.97468 |
| S.E. of regression | 10.37491 | Akaike info criterion | | 7.728975 |
| Sum squared resid | 2583.329 | Schwarz criterion | | 8.095409 |
| Log likelihood | -115.6636 | Hannan-Quinn criter. | | 7.850438 |
| F-statistic | 4.606299 | Durbin-Watson stat | | 1.560900 |
| Prob(F-statistic) | 0.002203 | | | |

*Source: Output data from E-views 9.0*

Table 8 shows that the constant has a coefficient of -0.906039 and probability value of 0.1002 meaning that if all the variables are held constant monetary policy will have negative and insignificant effect on employment rate in Nigeria within the period of the study. The coefficient of monetary policy rate, money supply and liquidity ratio has positive effect while cash reserve ratio has negative effect on employment rate. Monetary policy rate has significant effect on employment rate while money supply, cash reserve ratio and liquidity ratio has insignificant effect. Table 9 shows that monetary policy rate; liquidity ratio and money supply have negative and insignificant effect on inflation rate while cash reserve ratio has positive and insignificant effect on inflation rate in Nigeria within the period of the study.

The F-statistic indicates that the model is well fit for the estimation because F-stat for the models are 3.059896 and 4.606299 which is greater than the F-critical value of 2.68 at a 95 percent significance level. However, the Durbin Watson Statistic value of 1.981443 and 1.560900 shows there are no problem of autocorrelation in the models.

**Variance Decomposition**

Variance decomposition helps to discover monetary policy variables (MPR, CRR, LR and M2) which most impacts macroeconomic variables in Nigeria. The results of the variance decomposition estimates of EMP in Table 10 indicate that monetary policy rate shocks explain about 13.4% of the variation in EMP in the 7th period. This is followed by money supply which explains about 6.2% changes in EMP in the 8th period. However, about 4% and 0.67% of the future changes in EMP were attributable to changes in CRR and LR, respectively, while about 99% of future changes in EMP are explained by present EMP. Table 11 indicates that MPR shocks explains about 36.5% changes in INF in the 4th period and is followed by CRR which explains about 28.4% change in INF in the 10th period. Also about 14.8% and 5.2% of the future changes in INF are explained by present INF. While about 97% of future changes in INF are explained by present INF.

**Table 10: Variance Decomposition of EMP**

| Period | S.E. | EMP | MPR | CRR | LR | M2 |
|--------|------|-----|-----|-----|-----|-----|
| 1 | 3.323503 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 3.943385 | 99.31652 | 0.001237 | 0.121540 | 0.035560 | 0.525139 |
| 3 | 4.414761 | 91.26453 | 6.270825 | 0.140461 | 0.130560 | 2.193626 |
| 4 | 4.752018 | 85.33408 | 10.33782 | 0.528868 | 0.368582 | 3.430651 |
| 5 | 4.937803 | 82.24789 | 12.23012 | 0.514185 | 0.379685 | 4.628120 |
| 6 | 5.039437 | 80.28987 | 13.16675 | 0.517369 | 0.383518 | 5.642490 |
| 7 | 5.091279 | 79.28864 | 13.41420 | 0.696699 | 0.469603 | 6.130857 |
| 8 | 5.126239 | 78.57066 | 13.27900 | 1.343873 | 0.583982 | 6.222486 |
| 9 | 5.165842 | 77.57672 | 13.08740 | 2.538566 | 0.662002 | 6.135308 |
| 10 | 5.212802 | 76.29355 | 12.89622 | 4.073743 | 0.677083 | 6.059406 |

*Source: Output data from E-views 9.0*

**Table 11: Variance Decomposition of INF**

| Period | S.E. | INF | MPR | CRR | LR | M2 |
|--------|------|-----|-----|-----|-----|-----|
| 1 | 9.509929 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 12.16258 | 97.87907 | 1.778312 | 0.214632 | 0.125182 | 0.002802 |
| 3 | 15.09490 | 63.98985 | 24.70033 | 3.498520 | 7.597813 | 0.213487 |
| 4 | 18.66152 | 42.06870 | 36.50594 | 6.558022 | 14.53715 | 0.330184 |
| 5 | 19.92851 | 37.87615 | 35.18843 | 11.62973 | 14.83694 | 0.468746 |
| 6 | 20.62608 | 36.67686 | 32.95422 | 15.96588 | 13.90574 | 0.497301 |
| 7 | 21.15400 | 35.30267 | 31.36960 | 18.95269 | 13.68937 | 0.685673 |
| 8 | 21.81943 | 33.29196 | 29.58509 | 22.26422 | 12.92594 | 1.932795 |
| 9 | 22.64978 | 30.93208 | 27.46099 | 25.81149 | 12.08858 | 3.706867 |
| 10 | 23.40775 | 28.96531 | 25.76221 | 28.41929 | 11.60790 | 5.245287 |

*Source: Output data from E-views 9.0*

**Table 12: Pairwise granger causality test on input variables (MPR) and (INF)**

| | | HYPOTHESIS | F-STATISTICS | PROBABILITY |
|---|---|---|---|---|
| **A** | $H_0$: - | MPR does not Granger Cause INF | 5.31146 | 0.0113 |
| | $H_1$: - | MPR does Granger Cause INF | | |
| **B** | $H_0$: - | INF does not Granger Cause MPR | 2.30369 | 0.1192 |
| | $H_1$: - | INF does Granger Cause MPR | | |

***Source:*** *Granger Causality test result*
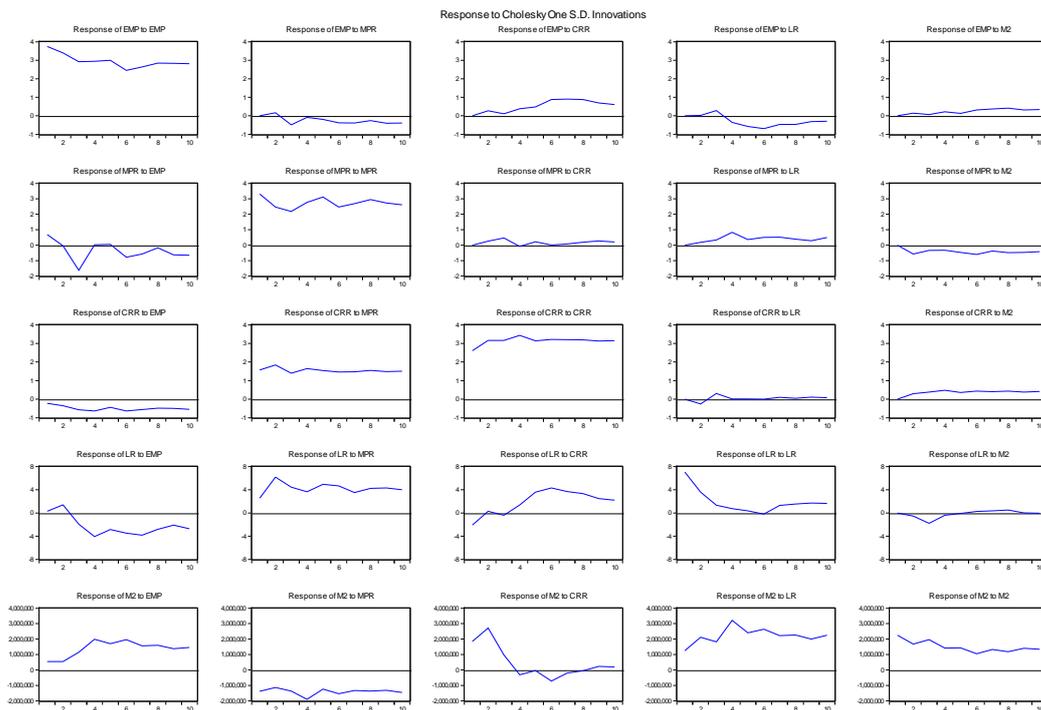


**Fig. 1. Impulse Response Function of EMP to shocks in MPR, CRR, LR and M2**
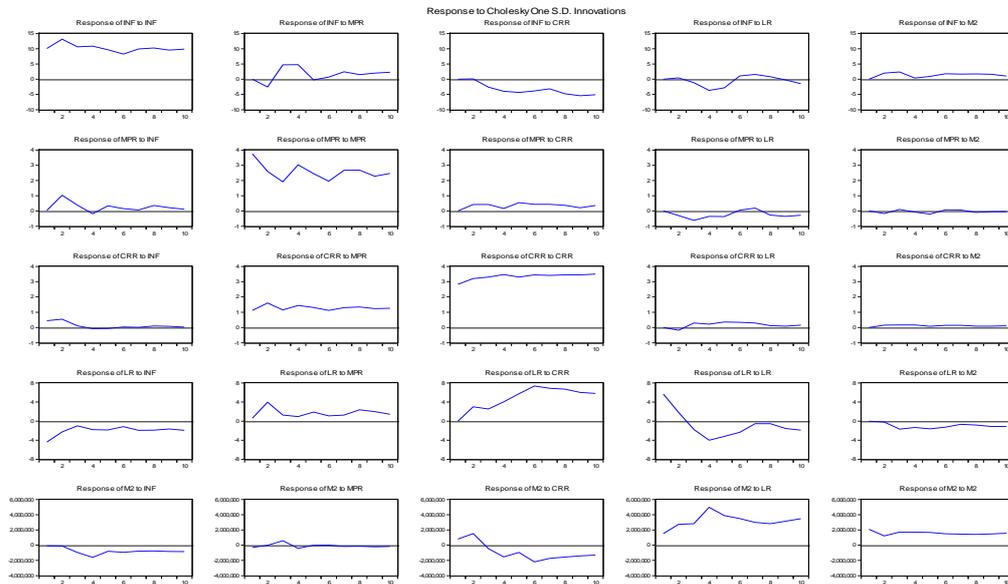
**Fig. 2. Impulse Response Function of INF to shocks in MPR, CRR, LR and M2**

## Granger Causality Test

The work tested the causality of the variables studied on the dependent variables EMP and INF using granger causality test. The output data shown in Table 12 revealed that there exists a unilateral causality between monetary policy rate (MPR) and inflation rate (INF) with causality moving from MPRI to INF. Since the probability value in the Table is less than 5% and the F-statistic is greater than the F-tabulated, therefore, we reject the Null Hypothesis ($H_0$) and accept the Alternate Hypothesis ($H_1$). The unidirectional relationship between MPR and INF in Nigeria shows that higher interest rates will help reduce demand in the economy thereby leading to lower economic growth and lower inflation rate in the country. Equally there is no causal relationship between CRR, LR and M2 on INF. The result of other variables shows that there is no causal relationship between EMP and monetary policy variables.

## Impulse Response Function

The impulse response will be used to trace the responses of the system to the innovations in monetary policy using impulse analysis. This analysis involves shocking the system's disturbances and tracing the sign and magnitude of the system's response to the shocks over time.

Fig.1 shows that cash reserve ratio and liquidity ratio have the highest shock impact on EMP among the variables. The effect of cash reserve ratio impulses is positive on EMP from $2^{nd}$ to $10^{th}$ period while making its full impact on the $7^{th}$ and $8^{th}$ period. Fig.2 shows that cash reserve ratio and monetary policy rate have the highest

shock impact on INF among the variables. Effect of cash reserve ratio is positive on INF on the $2^{nd}$ period while making its full impact on the $10^{th}$ period.

Accumulated impulse response functions for Fig.1 shows that cash reserve ratio and liquidity ratio impact the highest shock on EMP among other variables making its full impact from second period to the tenth period. LR has a positive effect on EMP from the $2^{nd}$ period to the $3^{rd}$ period and M2 has a positive effect on EMP from $1^{st}$ to $10^{th}$ period while MPR has a negative effect from $2^{nd}$ period to $10^{th}$. Fig 2 shows that cash reserve ratio and monetary policy rate impact the highest shock on INF among other variables making its full impact from the third period to the tenth period. CRR has a positive effect on INF on the second period thereafter generates a negative impact INF, LR has a positive effect on the $2^{nd}$ period thereafter it generates negative effect from $3^{rd}$ period to $10^{th}$ period while M2 has a positive effect on INF from second to tenth period.

## Summary, Conclusion and Policy Implication

### Summary and Conclusion
Government in collaboration with its monetary authority adopts monetary policy to regulate and manipulate fluctuations in the economy in order to achieve macroeconomic objective of low inflation, high employment rate and stable exchange rate etc. Although the empirical investigation on this topic in Nigeria remains a conflicting issue and is based on that, the study seeks to discover the effect of monetary policy on selected macroeconomic variables in Nigeria from 1986 to 2019. Descriptive statistics was used to describe the variables used in the study and there after unit root statistics was used to discover the stationarity of the variables. The variables were discovered to be integrated at order one which necessitated the use of Error Correction Mechanism as method of data analysis. Structural analysis was used to discover which variables of monetary policy will impact more on the selected macroeconomics variables in the future. The outcome of structural analysis indicates that monetary policy rate impacts more on the selected macroeconomic variables which show that interest rate can be manipulated by Central bank in order to achieve macroeconomic objectives of lower inflation and unemployment rate in the country. The Johansen co-integration relationship evidence that it is only monetary policy rate that is related with employment rate in the long run, while cash reserve ratio, money supply and liquidity ratio respectively do not in the long run related with inflation rate and employment rate. The result of the analysis indicates that monetary policy has insignificant effect on selected macroeconomics variables in Nigeria within the period of the study. The finding is in line with the empirical studies of Olaiya (2011), Acha, Iloh and Nsien (2016), Ngerebo (2016), Danjuma (2012), Nenbee and Madume (2011) and Okwo, et al (2012) but is inconsistent with the study of Ditimi, Wosa and Olaiya (2011), Onyeiwu (2012). The causality analysis has shown the inadequacy of the Central Bank of Nigeria to using monetary policy

to promote growth and development in the economy as none of its monetary policy instruments were able to significantly affect inflation rate and employment rate within the period studied. The insignificant effect may be because of the existence of a large non-monetized sector which hinders the success of monetary policy. Most of the people live in the rural areas where there is absence of financial institutions and knowledge especially in the Northern part of the country. Thus monetary policy failed to affect the lives and activities of the people in those areas of the economy.

## Policy Implication

The aim of monetary policy is to help the economy achieve high economic growth, stable exchange rate, low inflation(price stability) and unemployment rate but within the period of the study monetary policy has not achieve these objectives as such the study makes the following recommendations. Central Bank should stabilise exchange rate and lending rate through effective monetary policy control. The CBN should appropriately strike a balance between maintaining rapid economic growth, restructuring the economy and managing inflation expectations, so as to achieve sound and rapid economic development with employment-intensive growth. Government should direct effort towards improving the level of development of both the money and capital market. This is because a well-developed money and capital market with wide range of both short and long-term finance are necessary for efficiency of the monetary system. I suggest that awareness should be created in rural areas, encouraging them to invest in treasury bills, bonds and other securities. Central Bank should be made fully independent to purse fully its monetary policy targets without interferences and interruptions arising from political interferences from the executive arm of the government. There should be a synergy between the monetary policy and the fiscal policy managers.

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