Monetary Policy, Inflation and Economic Growth in Nigeria

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Abstract: The study investigated the influence of monetary policy tools on economic growth of Nigeria from 1980 to 2016. Data for the study was sourced from Central Bank of Nigeria statistical Bulletin of various years. Augmented Dickey-Fuller test (ADF) was used to ascertain the time series property. The nature of the order of integration of the dependent variable and the independent variables led to the application of Johansen co-integration test. A long-run relationship between the variables was established from the test. Error correction model was employed and the result showed a low speed but a significant adjustment back to equilibrium. The result also revealed that narrow money supply, exchange rate, interest rate and inflation rate at a certain time frame significantly impact on real gross domestic product. Broad money supply and reserve requirement have inverse relationship with real gross domestic product at the period of study. On the basis of the results, we made the following recommendations among others: proper monetization of Nigeria economy and stipulate laws that should put to an end of people keeping large sum of money outside the banking institution; interest rate should not be made general for all sectors, preferred sectors should be given a low interest rate in order to encourage economic activities and investment so as to increase the harnessing of societal resources for production.

Keywords: Economic growth, inflation, monetary policy, money supply, real gross domestic product

I. INTRODUCTION

Since after the establishment of the Central bank of Nigeria in 1958, different activities and policies have been put in place to ensure relative economic stability and improvement in economic activity. Central Bank of Nigeria (1996) posits that one of the major functions of the Central Bank of Nigeria is to formulate and implement monetary policy which is aimed at promoting monetary stability and a sound financial system. Operation of the economy is influenced by the monetary policy as desired by the government. The living standard of an economy is determined by the purchasing power of money, price stability, level of income, availability of resources and efficient distribution of goods and services. Societal level of employment, output and income is directed by monetary policy. Broadly speaking, monetary policy refers to the combination of measures put in place to regulate the value, supply and cost of money in an economy, in agreement with the expected level of economic activity.

Many scholars over the years have examined the efficiency and stabilization role of monetary policy as an important tool of achieving desirable macroeconomic position in both developing and developed countries. The results in different economies are not completely in agreement. For instance, Bernanke et al (2005), Rafiq and Mallick (2008) amongst other studies on monetary policy influence on few advanced economies confirmed reasonable and desirable impacts. On the other hand studies in developing economy such as Nigeria by Fasanya et al (2013), Falawewo and Osinubi (2006) among others pointed out that monetary policy instruments have not play significant roles in revamping macroeconomic variables in view of the economic instability, high unemployment rate in both rural and urban areas, persistent poverty cum inflation and low living standard. But Anowor and Okorie (2016); Nasko (2016) study showed a significant influence of monetary policy on Nigeria economy. This controversy on efficacy and influence of monetary policy coupled with the state of the Nigerian economy in spite of regular application of monetary policy compel the researcher to delve into this study.

The poor and the low income earners are seriously affected when there is increase in prices of goods and service, thereby retarding their ability to fulfill physiological needs. High cost of goods, especially input prices affects employment of resources thereby, raising unemployment and a decline in economic activity which is reflected in low income. Every economy has different approaches of regulating, distributing and sustaining productivity with a view to reduce to a great extent poor standard of living. But over the years, Nigeria has been confronted with low living standard due to the persistent rise in poverty level notwithstanding central bank roles. This implies existence of problems in the use/application of the tools of monetary policy.

The National Bureau of Statistics (2012) points that in 1980, poverty incidence was 27.2%, it rose to 46.3% in 1985 and fell slightly to 42.7% in 1992, but skyrocketed to 65.6% in 1996, then it fell again to 54.4% in 2004 and rose sharply to 69.0% in 2010 and in 2011, it stood at 71.5%. It can be inferred that, poverty has risen so high given the current economic recession cum persistent uprising of prices of goods and services. This is plausible in consideration of the prevailing situation in the country. Official exchange rate has been fluctuating between ₦320 to ₦360 per dollar, prices of all inputs of production and outputs in Nigeria have
doubled. Central Bank of Nigeria (1998) showed that the annual consumer price index in Nigeria was 42.4 in 1980, it rose to 293.2 in 1990, disgustingly, in 1995, it was 2040.9 and has been rising over the years. This situation has persists in spite of various monetary authority stabilization policies.

In order to promote economic growth, it is the role of the Central Bank to sustain and maintain price stability. Adelina-Geanina (000) points out that monetarist economist have the conviction that monetary policy is a stronger tool than fiscal policy in controlling inflation and it involves changes in the base rate of interest to influence the rate of growth of aggregate demand, the money supply and finally on price. This is because much money in circulation can lead to inflation due to insufficient goods and services vis à-vis money supply; insufficient money in circulation gives rise to deflation which retard production and income generation. So, it is imperative that the monetary authority must keep the level of money supply at a suitable rate required to ensure sustainable economic growth and the maintenance of internal and external stability. Monetary tools are essential to ensure effective regulation of the economy so as to attain desirable goal of economic growth. Central Bank on-line publication points that monetary policy has enormous effect in the economy which is not just on costs, but inclusive of making credit available and stimulating banks to take adequate actions capable of achieving desirable results in the economy. It plays so much role in influencing expectations in respect of future direction of various economic activity and inflation which impacts on prices of goods, assets prices, exchange rates, consumption and investment in the economy (https://www.cbn.gov.ng/Out/EduSeries/Series11.pdf).

It is obvious that Nigeria recorded 3.1% annual real gross domestic product (gdp) growth rate in the period 1960-70, but from 1970-1978, real gdp grew by 6.2% annually. A negative growth rate was experienced in 1980 which Structural Adjustment Programme introduction helped to revive, thereby giving rise to 4% annual gdp growth rate in the period 1988-97. However, since the discovery of oil in Nigeria, the average annual growth rate is less than 3%. In recent times 2009, 2010, 2011, 2012 and 2013, the real gross domestic product growth rate was respectively 6.27%, 7.57%, 7.38%, 6.3% and 6.2% while real per capita income was 2.78% in 2008, which rose to 3.76% in 2009 and 4.78% in 2010 (Cheta et al, 2015; Index Mundi, 2014; NPC, 2004). These growth rates have not been able to lessen the ever growing poverty situation over the years.

However, given the growth rate, it is pertinent to examine the extent of monetary policy application on the economic growth of the country. What accounts for continuously unemployment and poverty increase in spite of the monetary policy application? Disgustingly is the two digit inflation which has been dominant in Nigeria economy, for instance, in 2001, inflation rate was 18.9%, it fell to 17.9% in 2005, by 2008, it was 11.6%, it rose to 13.7% in 2010, in 2011, it was 10.8%, 12.2% in 2012 by 2015, it came to 8.5% . Besides, the level of unemployment has been fluctuating over the years. Monetary policy and good economic environment suppose play significant role in economic activity direction for improvement. However, in 2000, unemployment rate stood at 13.1%, it went up to 14.8% in 2003, but in 2007 it rose to 14.9% and 19.7% in 2008, it rose again in 2009 to 21.1% , by 2010, it was 23.9%, it fell to 10.6 in 2013 and by 2014 and 2015 it was respectively 7.8% and 9% (CBN, 2017; IMF, 2015, www.Knoema.com). This incessant fluctuation of these indicators has been ongoing in spite of the application of monetary policy. The growth rate over the years has never been satisfactory in view of the country’s population, poverty level and poor socio-economic environment of Nigeria. The unemployment rate vis-à-vis annual growth rate of gross domestic product and two digit inflation gives room to worry about the role of monetary policy on stability and economic development of Nigeria.

In view of the foregoing, it is the aspiration of the authors to empirically ascertain the influence of the monetary policy on stability and economic development of Nigeria. On this basis, the study is streamlined thus: section two is the review of theoretical and empirical literature; section three focuses on methodology, data analysis and discussion of results is section four while section five is recommendations and conclusion.

II. THE REVIEW OF THEORETICAL AND EMPIRICAL LITERATURE

Undoubtedly, the main aim of monetary policy centered on the maintenance of domestic price and exchange rate stability given its crucial role in sustainable economic growth and the achievement of external sector progress. On this note, it is imperative for the apex monetary authority to aspire to pursue efficient monetary policy in a globalized economy with fast unified markets which necessitates proper manipulation and management of relevant factors capable of attainment of goals within and outside the economy.

There are so many theories on economic growth and also on monetary policy which impacts on the economy. Monetary policy refers to those rules and regulations of the apex monetary authority such as Central Bank of Nigeria in collaboration with the Federal Ministry of Finance with the motive of adequate control of aggregate money supply, interest rate and credit availability so as to achieve certain desirable macroeconomic objectives of the government. Monetary policy relies so much on the relationship between the rates of interest rate (the price of capital) and the aggregate money supply. It makes use of various tools in controlling either one or both variables so as to affect and direct results like economic growth, inflation, exchange rates and unemployment. An important tool of reviving an economy toward a path of growth is monetary policy because of its ability to impact on macroeconomic variables. Reductions of poverty, controlling income inequality, creation of employment for societal resources are important issue when considering economic growth. Chipete...
and Makhetha-Kosi (2014) articulated the relevance of monetary policy as it plays significant role in affecting economic growth which motivates many resource managers (the governments) to use it foremost among others.

To the Classical economists, money does not matter in an economy as it directly impacts on the prices only. In their view, money plays a catalytic role in the real sector or economic activity. Money is seen as a veil and does not play active role in the economic system. This implies that monetary forces do not influence real income, output and employment in an economy. However, the classical has it that money is determined by labour, capital stock, state of technology, availability of natural resources, saving habits of the populace among others. And also, the major role of money is to act as a medium of exchange and as such determines the general level of prices at which exchange of goods and services are done. Their belief is that increase in money supply will lead to a direct and proportional increase in price level. This can be seen in Fishers quantity theory causation. \( MV = PT \) (\( M = \)money supply, \( V = \)Velocity, \( P = \)Price level and \( T = \)transaction level. The classical believe that money supply increase does not impact on the real GDP rather it increases price. This implies that adjustment in money supply will not change the macroeconomic variables (Jhingan, 2005; Mason, 1996; Anyanwu, 1993). However, Keynes disagree with this believe, but pointed that increase in money supply influences price but not directly and proportionately. Keynes asserted that money does play active role in the economic system by affecting the real sector, particularly when we consider Keynesian Quantity theory of money.

The classical posits that \( \uparrow MS \rightarrow \uparrow P \)

\( \uparrow MS \rightarrow \uparrow YON \rightarrow \uparrow COST \rightarrow \uparrow PRICE \)

where: \( MS \) is money supply; \( P = \)Price level.

Keynes: \( \uparrow MS \rightarrow \downarrow i \rightarrow \uparrow i \rightarrow \uparrow YON \rightarrow \uparrow COST \rightarrow \uparrow PRICE \)

In this, the relationship is not direct but money supply affects price through chain of causation as shown above. This means an increase in money supply (MS) will lead to a decrease in interest rate (i) given liquidity preference and in turn increase investment due to the marginal efficiency of capital (MEC), this will in turn increase income, output and employment through the multiplier (k) and in turn leads to increase in cost due to elasticity before increasing the price level (Keynes, 1936).

The neo-Keynesian (modern monetary policy) focuses on the portfolio adjustment process. At the purchase of securities in the open market by the Central Bank, it sets in motion substitution and wealth effects, given the fact that public portfolio is made up of various types of assets like bonds, equities, savings, mortgage among others. The influence will raise aggregate money demand and enlarges output. The neo-Keynesian view expanded to a great extent the portfolio of assets to include both the government and industrial bonds, equities, savings, mortgage among others. Suppose the government purchase securities through open market operation, it will bring about a rise in prices of securities leading to a fall in its yield. In other words, securities holder sells their assets to the Central Bank because they make more profit. Consequently, they have more money than desired which leads to readjustment of portfolio composition so as to lessen their money holdings. This substitution and adjustment effects made the neo-Keynesian to argue that financial assets are the closest substitute for money. This implies increase in supply of money impacts on the level of economic activity as it raises the output of capital goods industries.

The protagonist of monetarists, Friedman has it that excess money balances are employed to obtain both financial assets and real assets like houses, land, and consumers’ durables among others. So, any time the Central Bank buys securities, their prices increase and their yield decline and demand for financial and real assets increases. As demand increases, their prices rise, and the rise in prices of real assets encourages production which on the other hand increases the demand for resources required for their production. Demand for services also rises with increase in the prices of real assets. Hence, it can be pointed that an expansionary monetary policy raises demand, prices and spending for financial and real assets and for services via substituting effect.

From the view of the Classical economist, money supply impact mostly on price whereas Keynes using its causation effects showed the transmission effect of money supply and associated changes in other macroeconomic variables thereby repositioning output, income, employment and price. The neo-Keynesian expanded this by incorporating the changes associated with portfolio adjustment at the exercise of monetary policy action by the monetary authority. Monetarist believes that the application of monetary policy such as buying securities impacts on the financial and real assets. This means expansionary and contractionary monetary policy have influence both financial and real assets. The classical believes in the full employment of resources and as such any change in the money supply impacts directly on price but the view that money supply raises inflation is supported by monetarists but on the contrary, the monetarists agree with Keynes that the economy does not operate at full employment in the short-run and concluded that expansionary monetary policy work positively in the long-run. So, in Keynes view expansionary and contractionary monetary policy indirectly impacts on economic growth and finally on prices. In this study, it is our intention to adopt Keynesian causative mechanism because of its chain of effects on the economy.
Empirical Literature

In their study of linkage between monetary instrument and economic growth in Pakistan, Gul et al (2012) employed ordinary least square method using gross domestic product as the dependent variable while money supply, interest rates, exchange rates and inflation were the explanatory variable and covering the period 1995 to 2010. The findings showed among others that interest rate has a significant negative effect on output, exchange rate has a negative effect on output, and money supply has positive significant impact on output, inflation rate impacted adversely and insignificantly on output while interest rate impacted negatively but insignificantly on output.

In a related empirical study of monetary policy and economic growth in Nigeria, Anowor et al (2016) adopted the method of Error Correction model. Real gross domestic product was the dependent variable while cash reserve ratio, interest rate and monetary policy rate where the independent variables. The study covered the period 1982 to 2013. The study revealed a positive and significant effect of cash reserve ratio on economic growth while interest rate and monetary policy rates relate negatively and insignificantly impacted on the real gross domestic product.

Nasko (2016) investigated the effects of monetary policy on economic growth in Nigeria from 1990 to 2010 using the method of ordinary least square involving multiple regressions. The variables were money supply, interest rate, financial deepening (broad money divided by gross domestic product) and the dependent variable was gross domestic product. The study reveals a positive and significant effect of financial deepening on economic growth, interest rate and money supply showed negative relationship with gross domestic product. All the explanatory variables showed significant effect on economic growth at 5% significant level.

Njoku and Dike (2016) used the method of ordinary least square and co-integration in their study of monetary policy and economic stability in Nigeria covering the period 1986 to 2013 using inflation as the dependent variable and liquidity ratio, exchange rate, interest rate and cash reserve requirement as the explanatory variables. The result showed a long-run relationship between variables and only exchange rate impacted significantly on inflation while the other variables showed an insignificant effect on inflation at the period of study.

Srithilat and Sun (2017) investigated the effect of monetary policy on economic development in Lao PDR using co-integration and Error Correction Model approach covering the period 1989 to 2016. The study revealed amongst others that money supply, interest rate and inflation rate have negative effect on real gross domestic product per capita in the long-run and only real exchange rate has a positive sign.

In a similar study, Adegbite and Alabi (2013) empirically investigated monetary policy and economic growth in Nigeria from 1970 to 2010. The method of ordinary least square involving multiple regressions was employed in the data analysis. In the first equation output of the manufacturing was the dependent variable while money supply, inflation, exchange rate and interest rate were the independent variables. In the second equation, money supply was the dependent variable while inflation rate, exchange rate and gross domestic product were the explanatory variables. However, interest rate has significant effect on the output of manufacturing while interest rate impacted significantly on money supply. The result also showed that the joint effect of the variables have significant effect on the respective dependent variables.

However, Ayub and Shah (2015) studied the impact of monetary policy on gross domestic product in Pakistan covering a period of 2005 to 2014. The method of ordinary least square was used. Gross domestic product was the dependent variable while money supply, inflation and interest rates were the independent variables. The result revealed amongst others that the explanatory variables impact greatly on gross domestic product and concluded that monetary policy has been playing significant role in promoting economic growth in Pakistan.

Most of the studies have inconsistent results although period of study vary. Each study centered on examination of monetary policy on economic development or stabilization of the economy. In this study, it is our intention to examine both development and stabilization effects of monetary policy in Nigeria and considering recent happening in the country.

Analysis Procedure and Methodology

This study involves empirical examination of long-run relationship between monetary policy and inflation on economic growth. This will enable us ascertain how regulation of activities of the monetary authority has over the years impacted on economic activity. The variable of concern is based specifically on this study. So, we shall start with sources of data and scope, model specification, stationarity test and method of data analysis.

Sources of data and scope: The data type for this study is mainly time series which are obtained from Central Bank of Nigeria (1998, 2009, 2012, 2014, 2015 & 2016) statistical bulletin. The study period covered from 1980 to 2016. The reason for this span of period is because of the situation of the economy over the years characterized by rising poverty, instability and low living standard in spite of the application of monetary policy.
Model specification

Monetary policy encompasses those rules and regulation of the apex monetary authority (Central Bank of Nigeria) that is targeted on regulation and stabilization of the economy with a view to control macroeconomic variables and thereby promote economic activity as desired by the government. The main instruments of monetary policy are money supply, interest rate, reserve requirement among others. Efficient regulation and timely control of these variables is expected to reposition economic activity and promote living standard other things being equal. In Keynes view and his circular causation, money supply has chain effect of changing interest rate which lessens cost of capital and consequently raises investment. Increased investment impacts desirably in promoting aggregate economic activity, thereby raising output, income and employment. It is the responsibility of the Central Bank of Nigeria to adjust or review monetary policy instruments with a view to achieve economic stability and development. In other words, a monetary policy instrument is expected to stabilize price and encourage production, thereby improving living standard.

On this note, the first model is stated thus; real gross domestic product (rgdp) is a function of monetary policy instruments [ narrow money supply (ms1), broad money supply (ms2), interest rate (intr), exchange rate (excr), reserve requirement (rr) and inflation rate (infr)]. It is our conviction that changes in any of the variable impacts either positively or negatively on economic growth.

So, the functional form of model one is RGDP = f (MS, IR, EXR, CRR, INF). Mathematically, RGDP(t) = \alpha_0 + \sum_{i=1}^{p} \alpha_i MS(t-i) + \sum_{j=1}^{n} a_j \Delta Y_{t-j} + \epsilon_t.....1

Where RGDP is the real gross domestic product (proxy for economic growth), MS1 & MS2 are narrow and broad money supply in period t; INTR is interest rate in period t; EXCR is the exchange rate in period t; RR is the reserve requirement in period t while INFR is the inflation rate in period t.

In the model, on priori basis, we expect the coefficients \((\alpha_1, \alpha_2, \alpha_3)\) to have positive relationship with the dependent variable if and only if they are suitable in the economy. \(\alpha_0\) is the intercept which show the effect on the economic growth (proxied by real gross domestic product) when all the independent variables are constant; It is the error term or stochastic variable while t is time trend

III. METHODOLOGY

Unit root test

Unit root test is employed to ascertain the stationarity of the variables. Non-stationary series that is series data with unit root undergoes lasting or sustained effects from random shock that is, series follows a random walk. The use of non-stationary variables in analysis gives rise to false and unreliable results, and will not be relevant and authentic in forecasting or making prediction. However, if non-stationary series are co-integrated the regression result is not spurious. In this respect, to examine the data generating process, it is pertinent to assess the time series properties of the variables employing Augmented Dickey-Fuller test (ADF).

The ADF test regression equation with constant is:

\[ \Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{n} a_j \Delta Y_{t-j} + \epsilon_t \]

where \(\Delta\) is the first difference operator \(\epsilon_t\) is random error term, \(n\) = number of lagged differences, \(Y\) = the variable. In the equation above the null hypothesis holds as: Ho: \(\alpha_0 = 0\) (unit root), H1: \(\alpha_0 < 0\) (level stationary).

When the value for the test statistics ADF = \(\frac{\alpha}{SE(\alpha)}\) is calculated, it can now be compared with the relevant critical value for the Dickey-Fuller Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of \(\alpha = 0\) is rejected while \(\alpha < 0\) is accepted, meaning no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model.

The co-integration equation is stated in equation 6 as:

**Co integrated equation**

\[ \eta_m \log GDP_t = \alpha_1 + \sum_{i=2}^{p} \alpha_i \eta_m Z_{t-i} - \left[ \eta_m \log GDP_t - \sum_{i=1}^{n} \beta X_{t-i} + v_{2t} \right] \]

\[ \eta_m \log GDP_t - \sum_{i=1}^{n} \beta X_{t-i} \]

is the linear combination of the non co integrated vectors,

\(X\) is a vector of the non co integration variables. The individual influence of the co integrated variables can only be separated with an error correction mechanism through an error correction model as shown below.

http://indusedu.org
**The Error Correction Model Equation**

\[
\eta_m \log GDP_i = \alpha_i + \sum_{i=2}^{p} \alpha_i \eta_m Z_{i-1} - (\lambda ECM_{i-1} + \nu_i) \quad \text{...............(7)}
\]

Where \(-\lambda\text{ecm}\) is the error correction mechanism, \(-\lambda\) is the magnitude of error corrected each period specified in its a priori form so as to restore \(\eta_m \log GDP\) to equilibrium

### Table 1 showing Augmented Dickey-Fuller Unit Root Test Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>RGDP</th>
<th>MS1</th>
<th>INTR</th>
<th>INFR</th>
<th>MS2</th>
<th>RR</th>
<th>EXCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF statistic (1st difference)</td>
<td>-4.243644*</td>
<td>-4.243644*</td>
<td>-4.243644*</td>
<td>-4.252879*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(7.250991)</td>
<td>(7.250991)</td>
<td>(7.250991)</td>
<td>(7.250991)</td>
<td>(7.250991)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ADF statistic (2nd difference)</td>
<td>-4.252879*</td>
<td>-3.548490**</td>
<td>-207004***</td>
<td>-3.207094***</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(12.42631)</td>
<td>(-5.385843)</td>
<td>(-5.385843)</td>
<td>(-5.385843)</td>
<td>(-5.385843)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Order of Integration</td>
<td>I(1)</td>
<td>I(1)</td>
<td>I(1)</td>
<td>I(1)</td>
<td>I(2)</td>
<td>I(2)</td>
<td>I(2)</td>
</tr>
</tbody>
</table>

Source: Authors’ E-view 7.0 results. *(**) *** denote Augmented Dickey-Fuller (ADF) statistic at 1% 5% and 10% level of significant. Figures in parentheses are the critical values of ADF.

From the unit root tests results, considering the ADF Statistic at 1%, 5% and 10% level of significant of RGDP, INTR, INFR and MS1 at the first difference of the variables, we reject the null hypothesis of non-stationarity and accept the alternative hypothesis of stationarity since they are integrated of order one, I(1) as shown by Augmented Dickey-Fuller statistic. However, RR, EXCR and MS2 Augmented Dickey-Fuller statistic at 1% 5% and 10% level of significant shows stationarity at second difference which means they are integrated of order two, I(2) in view of the absolute value of the ADF critical value. Given the nature of the results, we suspect a co-integration (long-run relationship) between the dependent variable and some of the explanatory variables. The dependent variable RGDP and independent variables, MS1, INTR, and INFR are having same order of integration. In this respect, we use a popular Johansen co-integration test to investigate the long-run relationship of the model. This based on Johansen (1998) and Johansen and Juselius (1990)

**Johansen Test for Co-Integration**

Specifically, a necessary but insufficient condition for co-integrating test is that each of the variables be integrated of the same order (Granger, 1986). It is our intention to assess the long-run relationship between real gross domestic product and monetary policy instruments such as narrow money supply (MS1), broad money supply (MS2), interest rate (INTR), reserve requirement (RR), exchange rate (EXCR) and a control variable inflation rate (INFR). It is a test for a linear combination of a series that is stationary or not. In other words, it is a test for joint individual co-linearity. Our intention is to examine the long-run co-movement of the variables. However, we need to confirm this using Johansen co-integration test. The Johansen (1988) co-integration procedure will be used to determine the number of co-integrating vectors. This approach is adopted because it does not suffer from the problem of normalization and it is robust to departure from normality (Gujarati, 2003).

The Eigen value test and Maximum Trace statistic are two basic tests statistic employed by Johansen Co-integration. The decision rule is that if the Trace statistic is less than the 5% critical value, there is no co-integration, otherwise there is co-integration

### Table 2 showing Johansen Co-integration Results

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.966861</td>
<td>381.7236</td>
<td>134.6780</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 1 *</td>
<td>0.940525</td>
<td>262.4772</td>
<td>103.8473</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 2 *</td>
<td>0.890876</td>
<td>163.7004</td>
<td>76.97277</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 3 *</td>
<td>0.703641</td>
<td>86.16595</td>
<td>54.07904</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 4 *</td>
<td>0.489627</td>
<td>43.59955</td>
<td>35.19275</td>
<td>0.0049</td>
</tr>
<tr>
<td>At most 5</td>
<td>0.304591</td>
<td>20.05810</td>
<td>10.97342</td>
<td>0.0533</td>
</tr>
<tr>
<td>At most 6</td>
<td>0.189281</td>
<td>7.344165</td>
<td>4.30034</td>
<td>0.1094</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5% significance level. Trace Statistic test indicates 5 co-integrating variables (s) at 5% level of significance. **MacKinnon-Haug-Michelis (1999) p-value.

Source: E-view 7.0 Result Performed by Authors.
The above results show evidence of co-integration between economic growth, proxied by real gross domestic product (RGDP) and monetary policy instruments such as narrow money supply (MS1), interest rate (INTR), reserve requirement (RR), exchange rate (EXCR), broad money supply (MS2) and control variable, inflation rate (infr) at the period of study. The results show the rejection of null hypothesis of no co-integration and acceptance of the alternative hypothesis of co-integration variables. It can be inferred that the results depict a stable long run relationship between economic growth and some tools of monetary policy in Nigeria.

### Table 3 showing Error Correction Model Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LOG(MS1(-1)))</td>
<td>1.035477</td>
<td>0.863985</td>
<td>1.198490</td>
<td>0.2455</td>
</tr>
<tr>
<td>D(LOG(MS1(-2)))</td>
<td>2.159015</td>
<td>0.765999</td>
<td>2.818563</td>
<td>0.0110</td>
</tr>
<tr>
<td>D(LOG(MS2(-1)))</td>
<td>-1.797393</td>
<td>1.169026</td>
<td>-1.537513</td>
<td>0.1407</td>
</tr>
<tr>
<td>D(LOG(MS2(-2)))</td>
<td>-0.654250</td>
<td>0.900665</td>
<td>-0.726408</td>
<td>0.4764</td>
</tr>
<tr>
<td>D(LOG(INTR(-1)))</td>
<td>-0.388065</td>
<td>0.285273</td>
<td>-1.360330</td>
<td>0.1896</td>
</tr>
<tr>
<td>D(LOG(INTR(-2)))</td>
<td>-0.701627</td>
<td>0.257674</td>
<td>-2.729228</td>
<td>0.0135</td>
</tr>
<tr>
<td>D(LOG((RR(-1)))</td>
<td>-0.407977</td>
<td>0.189047</td>
<td>-2.158076</td>
<td>0.0439</td>
</tr>
<tr>
<td>D(LOG((RR(-2)))</td>
<td>-0.178225</td>
<td>0.187255</td>
<td>-0.951779</td>
<td>0.3532</td>
</tr>
<tr>
<td>D(LOG(EXCR(-1)))</td>
<td>0.539963</td>
<td>0.197791</td>
<td>2.729971</td>
<td>0.0133</td>
</tr>
<tr>
<td>D(LOG(EXCR(-2)))</td>
<td>0.341351</td>
<td>0.222385</td>
<td>1.534955</td>
<td>0.1413</td>
</tr>
<tr>
<td>D(LOG(INFR(-1)))</td>
<td>-0.012243</td>
<td>0.094140</td>
<td>-0.130050</td>
<td>0.8979</td>
</tr>
<tr>
<td>D(LOG(INFR(-2)))</td>
<td>0.036613</td>
<td>0.084042</td>
<td>0.435658</td>
<td>0.6680</td>
</tr>
<tr>
<td>ECM (-1)</td>
<td>-2.16E-06</td>
<td>4.64E-07</td>
<td>-4.651093</td>
<td>0.0002</td>
</tr>
<tr>
<td>C</td>
<td>-0.165376</td>
<td>0.155806</td>
<td>-1.061421</td>
<td>0.3018</td>
</tr>
</tbody>
</table>

From the results above narrow money supply (MS1) and exchange rate (excr) impacted positively on economic growth. Money supply and exchange rate impacted significantly in the subsequent year of its introduction into the economy as depicted by the probability values which are less than 0.05 significant levels. These variables meet our apriori expectation in the sense that regulation of money supply and exchange rate is expected to contribute to aggregate economic activity which repositions output, income and employment.

However, unexpectedly, broad money supply (MS2) did not meet our apriori expectation unlike narrow money supply. The coefficient of interest rate (INTR) is negatively related to economic growth but at a significant level in the subsequent period. High interest rates experienced in Nigeria over the years have not completely favoured economic activity. Although inversely related with real GDP but at a significant level in a subsequent period of its operation.

Reserve requirement (RR) as a tool of monetary policy shows inverse relationship with the economic growth variable which is contrary to our expectation but at a significant level at the initial period of its management. The poor banking attitude of many Nigerians has greatly impose a constraint in CBN effective management policy instruments. Inflation rate relates negatively and positively to real gross domestic product depending on the prevailing economic situation and period, but statistically insignificant at 5%significant level. Mild inflation impacts positively on economic growth unlike high inflation rate The result could be attributed to election period and the hiding of large sum of money in places that is not financial institution which gives rise to excess money in the economy without equivalent output, thereby raising cost of production and general prices of goods and services with associated adverse effects on the economy.

The Error Correction Model (ECM) value is very low but the negative sign shows its ability to reposition the economy on deviation from the path of equilibrium. The speed of adjustment is low based on the coefficient but at a statistical significant level considering the probability value.
The R² of 77% and Adjusted R² of 62% showed that the selected variables accounted considerably for the changes and variations in real gross domestic product and while other factors not captured in the model accounted for only 38%. This showed that the regression line is considerably fitted. The joint effects of the explanatory variables (overall regression) is significant given the probability value of F-statistic (0.000842) which is less than 0.05 significant level. Durbin Watson test for autocorrelation approximate to 2 showing absence of serial autocorrelation in the variables.

**Recommendations**

On the basis of the results, we make the following recommendations:

i. It is essential for the monetary authority to intensify action in management of money supply so as to promote economic activity. This necessitate proper monetization of Nigeria economy and stipulate laws that should put to an end of people keeping large sum of money outside the banking institution.

ii. Interest rate should not be made general for all sectors. Preferred sectors should be given a low interest rate in order to encourage economic activities and investment so as to increase the harnessing of societal resources for production.

iii. Conducive environment for production, distribution and consumption ought to be reformed so as to promote production which will play great role in reducing inflation that has always weaken the purchasing power of money and also have adverse effect on the living standard of the people, especially the poor.

iv. The economy should be properly monitored in such a way as to avoid triggering the rise in exchange rate since this affects production, inflow and outflow of demand and supply in the global community. Producers who rely on foreign raw materials have been paralyzed due to high exchange rate in recent time.

v. The monetary authority should collaborate with National Orientation Agency and Ministry of Information in dissemination of information about banking habit improvement. Nigerians must be well educated on the relevance of banking.

vi. Corruption has to be eradicated by putting stringent penalty on culprits so as to achieve goals regarding money allocated to sectors for economic development.

**IV. CONCLUSION**

This study has empirically revealed the extent of the influence of selected monetary policy tools on economic growth of Nigeria from 1980 to 2016 and found that some variables like narrow money supply, interest rate and exchange rate considerably influence economic growth at different periods in Nigeria. Periods of relatively low inflation impacts desirable on economic growth but adversely affect real gross domestic product when at a high rate. The activities of Nigerian with respect to low banking habit and secretly withdrawal of large sum of money from circulation via corruption practices is perceived to have contributed to the difficulty experienced by the monetary authority in achieving goals of effective stability and active revamping of the economy. A good proportion of the study outcome is in line with Gul et al (2012) study in Pakistan. It also agrees with part of the findings of Srithilat and Sun (2017) in a similar study in Lao PDR. To all intent and purposes, it can be inferred that monetary authority in Nigeria have been putting in their best with respect to improving Nigeria economy but still need to reposition a lot of things so as to achieve greater goals.

**V. REFERENCES**