Impact of Monetary Policy on Economic Growth in Nigeria: Vector Error Correction Mechanism Approach

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ABSTRACT

Monetary policy as a technique of economic management to bring about sustainable economic growth and development has been the pursuit of many nations. Using annual data over the period 1981 to 2016, this paper examined the impact of monetary policy on the Nigerian economy. In doing this, Augmented Dickey-Fuller unit root test, Vector error correction mechanism (VECM) and the ordinary least squares (OLS) method, were employed to analyze the time series data for the period between 1981 and 2016. The result of the analyses shows that monetary policy represented by money supply exerts a positive impact on GDP growth with negative impact on rate of inflation. The recommendations are that monetary policy should facilitate a favourable investment climate through appropriate interest rates, exchange rate and liquidity management mechanism and the money market should provide more financial instruments that satisfy the requirements of the ever-growing sophistication of operators.

Keywords: Monetary policy; economic growth; transmission mechanism; liquidity management mechanism; favourable investment and vector error correction mechanism.

1. INTRODUCTION

Monetary policy generally describes the actions taken by the Central Bank to influence monetary conditions in the economy with a view to achieving some defined macroeconomic goals. Monetary policy as a technique of economic management to bring about sustainable economic growth and development has been the pursuit of nations. Formal articulation of how money affects economic aggregates dates back the time of Adams Smith and later championed by monetary economists [1].

Since the expositions of the role of monetary policy in influencing macroeconomic objectives
The role of the Central bank in regulating the liquidity of the economy which affects some macroeconomic variables such as the output, employment and prices cannot be over-emphasised. The Central Bank of Nigeria over the years has adopted different monetary policy management techniques to keep the economy in a stable state. Before the structural adjustment of 1986 which ushered in a period of financial deregulation, it adopted a system of direct control through the issue of credit guidelines and interest rate fixation but from the later part of the 1980s, it adopted indirect control system of management by resorting to open market operations, adjustment of legal reserves requirement and the rediscount rate. But in all these, the attainment of the desired objectives of monetary policy has been affected by domestic and external environments which include fiscal dominance, underdeveloped nature of the financial markets, external debt overhang and volatility in oil price [4].

There have been various regimes of monetary policy in Nigeria. Sometimes, monetary policy is tight and at other times it is loose but mostly used to stabilize prices. The economy has also witnessed times of expansion and contraction but evidently, the reported growth has not been a sustainable one as there has been evidence of growing poverty among the populace (NBS, 2014).

Therefore, the questions which this study would attempt to answer are:

- Could the growth be attributed to appropriate monetary policy?
- Could the periods of economic downturn be blamed on factors other than monetary policy ineffectiveness?
- What measures are to be considered if monetary policy would be effective in bringing about sustainable economic growth and development?

The objective of this study therefore, is to assess the impact of monetary policy on economic growth in Nigeria and specifically, to determine if monetary policy facilitates growth or not and examine the effects of other co-operant factors in bringing about the desired sustainable economic growth in Nigeria

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Monetary policy got its root from the works of Irving Fisher [5] who laid the foundation of the quantity theory of money through his equation of exchange. In his proposition money has no effect on economic aggregates but price. However, the role of money in an economy got further elucidation from Keynes [6] and other Cambridge economists who proposed that money has indirect effect on other economic variables by influencing the interest rate which affects investment and cash holding of economic agents. The position of Keynes is that unemployment arises from inadequate aggregate demand which can be increased by increase in money supply which generates increase spending, increase employment and economic growth. However, Keynes recommends a proper blend of monetary and fiscal policies as at some occasions, monetary policy could fail to achieve its objective. The role of monetary policy which is of course influencing the volume, cost and direction of money supply was effectively canvassed by Friedman [7], whose position is that inflation is always and everywhere a monetary phenomenon while recognising in the short run that increase in money supply can reduce unemployment but can also create inflation and so the monetary authorities should increase money supply with caution.

2.1 Monetary Policy Transmission Mechanism

There are different transmission mechanisms through which monetary policy affects economic activities and these channels of transmissions have been broadly examined under the monetarist and Keynesian schools of thought. The monetarist postulates that changes in the money supply leads directly to a change in the real magnitude of money. Describing this
transmission mechanism, Friedman and Schwartz [8] indicated that an expansive open market operations by the Central Bank, increases stock of money, which also leads to an increase in Commercial Bank reserves and ability to create credit and hence increase money supply through the multiplier effect. In order to reduce the quantity of money in their portfolios, the bank and non-bank organisations purchase securities with characteristics of the type sold by the Central Bank, thus stimulating activities in the real sector. This view is supported by Tobin [9] who examined transmission effect in terms of assets portfolio choice in that monetary policy triggers asset switching between equity, bonds, commercial paper and bank deposits and further indicates that tight monetary policy affects liquidity and banks’ ability to lend which, therefore restricts loan to prime borrowers and business firms to the exclusion of mortgages and consumption spending thereby contracting effective demand and investment.

Likewise, the Keynesians posit that change in money stock facilitates activities in the financial market affecting interest rate, investment, output and employment. Piana (2012) supports this view but introduced the concept of capital rationing and said willingness of banks to lend affects monetary policy transmission.

In their analysis of use of bank and non-bank funds in response to tight monetary policy, Oliner and Rudebush [10] observe that there is no significant change in the use of either but rather larger firms crowd out small firms during such times; and in like manner Gertler and Gilchrist [11] supports the view that small businesses experience decline in loan facilities during tight monetary policy and they are affected more adversely by changes in bank related aggregates like broad money supply. Further investigation by Borio [12], on the structure of credit to non-government borrowers in fourteen industrialised countries indicates that it had been influenced by factors such as terms of loan, interest rates, collateral requirement and willingness to lend.

### 2.2 Nigeria’s Monetary Policy and Economic Growth

The primary goal of monetary policy in Nigeria has been the maintenance of domestic price and exchange rate stability since it is critical for the attainment of sustainable economic growth and external sector viability [13].

Adefeso and Mobolaji, [14] employed Johansen maximum likelihood co-integration procedure to show that there is a long run relationship between economic growth, degree of openness, government expenditure and broad money supply while Ajisafe and Folunso, [15] observe that monetary policy exerts significant impact on economic activity in Nigeria.

Soludo [16] examined the relationship between financial innovations and monetary control and concludes that in a changing financial structure, Central Banks cannot realize efficient monetary policy without setting new procedures and instruments in the long-run, because profit seeking financial institutions change or create new instruments in order to evade regulations or respond to the economic conditions in the economy.

Examining the evolution of monetary policy in Nigeria in the past four decades, Nnanna [17] observed that though, monetary management in Nigeria had been relatively more successful during the period of financial sector reform which was characterized by the use of indirect rather than direct monetary policy tools; yet, the effectiveness of monetary policy has been undermined by the effects of fiscal dominance, political interference and the legal environment in which the Central Bank operates.

Busari et al. [18] assert that monetary policy stabilizes the economy better under a flexible exchange rate system than a fixed exchange rate system and it stimulates growth better under a flexible rate regime but it is often accompanied by severe depreciation, which could destabilize the economy, meaning that, monetary policy would better stabilize the economy if it is used to target inflation directly than be used to directly stimulate growth. It was therefore suggested that other policy measures and instruments were required to complement monetary policy in macroeconomic stabilization.

Okafor [19] indicates that the ability of the CBN to pursue an effective monetary policy in a globalised and rapidly integrated financial market environment depends on several factors which include, instituting appropriate legal framework, institutional structure and conducive political environment which allows the Central Bank to operate with reference to exercising its instrument and operational autonomy in decision-making, the degree of coordination between monetary and fiscal policies to ensure
consistency and complementarity, the overall macroeconomic environment, including the stage of development, depth and stability of the financial markets as well as the efficiency of the payments and settlement systems, the level and adequacy of information and communication facilities and the availability of consistent, adequate, reliable, high quality and timely information to Central Bank of Nigeria.

In the same vein, Batini [20] stressed that in the 1980s and 1990s monetary policy was often constrained by fiscal indiscipline. Monetary policies financed large fiscal deficit which averaged 5.6 percent of annual GDP and though the situation moderated in the later part of the 1990s it was short lived as Batini, described the monetary policy subsequently as too loose which resulted to inflation and worst exchange rates record.

Folawewo and Osinubi, [21] investigated how monetary policy objective of controlling inflation rate and intervention in the financing of fiscal deficits affect the variability of inflation and real exchange rate, using a rational expectation framework that incorporates the fiscal role of exchange rate. The paper reflects that the effort of the monetary authority to influence the finance of government fiscal deficit through the determination of the inflation-tax rate affects both the rate of inflation and the real exchange rate, thereby causing volatility in their rates; meaning that inflation affects volatility of its own rate as well as the rate of real exchange. It was therefore recommended that monetary policy should be set in such a way that the objective it is to achieve is well defined.

Nwoko, Ihemeje and Anunadu [22] examined the extent to which the Central Bank of Nigeria monetary policies could effectively be used to promote economic growth, covering the period of 1990-2011. The influence of money supply, average price, interest rate and labour force were tested on gross domestic product using the multiple regression models as the main statistical tool of analysis. Studies showed that CBN monetary policy measures were effective in regulating both the monetary and real sector aggregates such as employment, prices, level of output and the rate of economic growth. Empirical findings from the study indicated that average price and labour force had significant influence on gross domestic product but money supply was not significant while interest rate was negative and statistically significant. It was therefore, concluded that Central Bank monetary policy could be an effective tool to encourage investment, reduce unemployment, reduce lending rate and stabilize the economy of Nigeria.

Bodunrin, [23] investigated the impact of fiscal and monetary policy on Nigeria’s economic growth from 1981 to 2015, with the interest of exploring which of fiscal or monetary policy had been effective in propelling economic growth in Nigeria and how GDP growth responds to the monetary and fiscal policy shock using time series data collected from the central bank of Nigeria (CBN), the international monetary fund (IMF) and the World Bank and employing vector autoregressive (VAR) model and the vector error correction (VEC) model. The VAR model revealed that fiscal policy distorted real GDP but died out after one year, while monetary policy had no significant impact on real GDP. Of the total government expenditure, the impact of capital expenditure was found to have a significant impact on real GDP while the impact of recurrent expenditure was insignificant. With the introduction of VEC model, the study found an unexpected shock on money supply, real effective exchange rate and taxes to have a negative permanent effect on real GDP, while an unexpected shock on recurrent expenditure and capital expenditure to have a positive effect on real GDP. The study recommended fiscal policy leadership and harmonization between the fiscal and monetary authority, with emphasis on channeling resources to where they are most needed.

Ajayi and Aluko [24] evaluated the relative impact of monetary and fiscal policy in Nigeria from 1986 to 2014 using a modified St. Louis equation. Employing the ordinary least squares estimation method, the study revealed that growth in money supply and export had a positive and significant effect on growth in output of the economy while growth in government expenditure had a negative and insignificant effect and provides evidence that monetary policy had a greater growth-stimulating effect on the economy than fiscal policy. It was recommended that monetary policy rather than fiscal policy should be relied upon by the Nigerian government as an economic stabilisation tool.

Aliyu and Mahmood [25] examined the impact of monetary and fiscal policy on economic growth in Nigeria to establish the relationship between monetary and fiscal policy with economic growth in Nigeria and determine the suitable percentage
mix of the policies using money supply, tax revenue generated and GDP as element of monetary, fiscal and economic growth respectively, for the period 2006 -2015. Pearson correlation technique was used to establish the relationship between the dependent and independent variables. Results indicated that; money supply made the most significant contribution to prediction of GDP in Nigeria than tax revenue generated. Results of the findings were however translated to proportion of percentage mix as 87% and 13% for monetary and fiscal policy respectively thereby indicating that if government increases expenditures, it should also adopt the necessary measures that will necessitate income generation, as well provide governing policies to lower the expense of income on consumable goods.

3. MATERIALS AND METHODS

This research is designed to examine the impact of monetary policy in Nigeria in the light of macroeconomic performance of the country. Data on liquidity ratio, money supply, cash ratio and inflation rate as independent variables and the gross domestic product as the dependent variable, covering 1981 to 2016 obtained from the Central Bank of Nigeria statistical bulletin and the National Bureau of Statistics, publications for various years were utilized for the study.

The Augmented Dickey Fuller (ADF) unit root test was applied to determine the stationarity and order of integration of the variables while the Johansen maximum likelihood cointegration method with its vector error correction mechanism (VECM) to determine the existence of long-run relationship among the variables and adjustment mechanism towards equilibrium was also employed.

The main or target equation from the VECM estimates were converted to systems of equation and analyzed via the OLS estimation method and the result used to explain the impact of monetary policy on Nigeria’s economic growth.

3.1 Unit Root Test

Unit root test was implemented by Fuller (1976) and Dickey and Fuller (1979, 1981) to test the null hypothesis of different stationarity to make results more perfect with the null hypothesis of non-stationarity.

Following the work of Umar and Tahir [26], the unit root equation is specified thus:

Assume $X$ to be any variable and the Augmented Dickey-Fuller (ADF) model can be defined as follows:

$$\Delta X_t = \beta_1 + \beta_2 t + \delta X_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta X_{t-i} + \varepsilon_t$$

Where $\varepsilon_t$ is a pure white noise error term and $\Delta X_{t-1} = (X_{t-1} - X_{t-2})$, $\Delta X_{t-2} = (X_{t-2} - X_{t-3})$, $\Delta X_{t-3} = (X_{t-3} - X_{t-4})$, and $i$ represents the number of recent time and $j$ as the number of previous times or years. The hypothesis of Augmented Dickey Fuller ADF is

- $H_0 : \delta = 0$, $X_t$ is non-stationary, (unit root)
- $H_1 : \delta \neq 0$, $X_t$, is stationary, (no unit root)

The first differencing in unit root test is to be tested if non-stationary time series $Y$ need to be “differenced” at the times to make it stationary. Then the result can be stationary and correct, hence one can proceed to test for the co-integration.

3.2 Johansen Co-Integration Test

3.2.1 VAR lag length selection criteria

In order to avoid reporting unauthentic causal relations; for example to avoid reporting of spurious presence or absence of causal relations, it is important to determine the optimal lag length to be used for the estimation in the Johansen cointegration and the Vector error correction models. A combination of Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SC), Likelihood Ratio (LR), Hannan-Quinn (HQ), Final prediction error (FPE) were adopted and ran for the optimal lag length. Determination or selection of the VAR order or lag length was preceded by the estimation of differenced data through the unrestricted VAR. VAR estimation enabled the determination of the optimal lag length selection.

3.2.2 Cointegration model/equation

Asliiya and Tahir [27] note cointegration is a statistical property possessed by some time series data that is defined by the concepts of stationary and the order of integration of the series. A stationary series is one with a mean
value which will not vary with the sampling period. For instance, the mean of a subset of a series does not differ significantly from the mean of any other subset of the same series. Further, the series will constantly return to its mean value as fluctuations occur. In contrast, a non-stationary series will exhibit a time varying mean.

Consider a VAR model of the order p:

\[ X_t = A_1 X_{t-1} + \ldots + A_p X_{t-p} + B_t + \varepsilon_t \]  \hspace{1cm} (2)

Assume that the vector has a VAR representation of the form:

\[ X_t = \Pi X_{t-1} + \varepsilon_t \]  \hspace{1cm} (3)

Where \( z \) is a \((n \times 1)\) vector of deterministic variables, \( \varepsilon \) is a \((n \times 1)\) vector of white noise error terms and \( \Pi \) is \((n \times n)\) matrix of coefficients.

Where \( X_t \) is a vector of \( I(1) \) variables, \( \Delta X_t \) are all \( I(0) \) variables, \( \Delta \) indicates the first difference operator, \( B \) is a \((n \times n)\) coefficient matrix and \( \Pi \) is a \((n \times n)\) matrix whose rank determines the number of cointegrating relationships.

### 3.2.2.1 Decision rule

\( H_0: = 0 \) (there is no co-integration among the variables)

\( H_1: \neq 0 \) (there is co-integration among the variables)

If the trace or max-eigen test statistics value is greater than its critical value in absolute terms at 5% level of significance, we reject \( H_0 \) and accept \( H_1 \). This means that there is co-integration among the variables of study.

Johansen’s methodology takes its starting point in the vector auto-regression (VAR) of order p given by

\[ \Delta Y_t = \mu + A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + e_t \]  \hspace{1cm} (4)

Where \( Y_t \) is an \( n \times 1 \) vector of variables that are integrated of order one – commonly denoted \( I(1) \) – and \( e_t \) is an \( n \times 1 \) vector of innovations. This VAR can be re-written as

\[ \Delta Y_t = \mu + \Pi Y_{t-1} + \sum_{j=1}^{p} \Gamma_j \Delta Y_{t-j} + e_t \]  \hspace{1cm} (5)

Following the work of Iliya and Tahir (2017), the equation of the study is written as:

\[ \Delta GDP_t = \mu + \Pi \Delta GDP_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta GDP_{t-j} + e_t \]

\[ \Delta LQR_t = \mu + \Pi \Delta LQR_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta LQR_{t-j} + e_t \]

\[ \Delta CASHR_t = \mu + \Pi \Delta CASHR_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta CASHR_{t-j} + e_t \]

\[ \Delta INF_LR = \mu + \Pi \Delta INF_LR + \sum_{j=1}^{p-1} \Gamma_j \Delta INF_LR + e_t \]

\[ \Delta MS_E = \mu + \Pi \Delta MS_E + \sum_{j=1}^{p-1} \Gamma_j \Delta MS_E + e_t \]  \hspace{1cm} (6)

### 3.2.3 Vector Error Correction Model

Yule (1936) and Granger and Newbold (1974) were the first to draw attention to the problem of spurious correlation and find solutions on how to address it in time series analysis. A vector error correction (VEC) model is a restricted VAR designed for use with non-stationary series that are known to be co-integrated. The VEC has co-integration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics. The co-integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments.

The VECM analysis simply provides the short-run dynamic adjustments of the explanatory variables towards the long-run equilibrium; hence, the VECM is used to indicate how disequilibrium in the explained variable is corrected into equilibrium in each period. If it is statistically significant, it implies that the disequilibrium is corrected at different periods but if otherwise stated, then it is corrected at the same period.

### 3.3 Ols Estimation Equation

The linear form of the model to capture the impact of monetary policy on Nigeria’s economic growth with the independent variables as liquidity ratio, money supply, cash ratio and inflation rate; while the dependent variable is gross domestic product.

\[ GDP_t = \alpha + \beta_1 \text{Liquidity Ratio}_t + \beta_2 \text{Money Supply}_t + \beta_3 \text{Cash Ratio}_t + \beta_4 \text{Inflation Rate}_t + \varepsilon_t \]  \hspace{1cm} (7)
product, proxy for economic growth is specified in equation 1 below:

\[
\text{GDP} = \beta_0 + \beta_1\text{lqr} + \beta_2\text{ms}_2 + \beta_3\text{cashr} + \beta_4\text{Inflr} + U_i
\]  

(7)

Where:

- \(\beta_0\) - Constant
- \(\beta_0, \beta_1, \beta_2, \beta_3\) and \(\beta_4\) - Coefficients of explanatory variables
- GDP - Gross Domestic Product
- \text{Lqr} - Liquidity Ratio
- MS\(^2\) - Broad Money Supply
- \text{Cashr} - Cash Ratio
- \text{Inflr} - Inflation
- \(U_i\) - Error term

VECM estimates were converted to systems of equation and analyzed via the OLS estimation method and the result used to explain the impact of monetary policy on Nigeria’s economic growth.

4. EMPIRICAL RESULT AND DISCUSSION

This section presents results of empirical analyses of the study. Result of the Augmented Dickey Fuller (ADF) unit root test conducted is presented in Table 1.

The unit root test result in table 1 indicate that the null hypothesis of unit root for the five (5) time series variables namely, liquidity ratio (LQR) cash ratio,(CASHR), money supply(MS\(^2\)), gross domestic product (GDP) and inflation rate (INFLR) cannot be rejected at levels but can be rejected in the first and second difference thereby showing that four (4) of the variables (LQR, CASHR, GDP and INFLR) are stationary at first difference and are integrated of order 1(1) while one of the series (MS\(^2\)), is stationary at second difference and integrated of order 1(2). This can be seen by comparing the observed values (in absolute terms) of the ADF test statistics at 5% and 10% levels of significance.

This reveals that some of the variables were stationary at first difference and some were at second difference. On these bases, the null hypothesis of non-stationary is rejected for all the variables and we therefore, conclude the variables are stationary. This further implies that the variables are integrated of order one, I (1) and two I (2).

4.1 Test Result for Co Integration

After forming the stationarity of the variables, we proceed to test for the co integration among the variables. The result of the Johansen cointegration test is presented in Table 2.

The maximum Eigen value statistics indicated (3) co integrating vectors at the 5 percent level of significance, suggesting that there is co integration relation between monetary policy tools and Nigeria’s economic growth.

When co integration is present, it means that liquidity ratio, cash ratio inflation rate and money supply share a common trend and long-run equilibrium with economic growth, as suggested in theory.

Having established the existence of long-run relationship between the dependent variable and the independent variables, the estimated vector error correction model (VECM) equation was obtained and specified as equation 8.

<table>
<thead>
<tr>
<th>Variables</th>
<th>DF</th>
<th>Critical value</th>
<th>ADF Test statistics</th>
<th>ADF Test</th>
<th>P-value</th>
<th>Order of lags</th>
<th>ADF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Delta \text{GDP} (c))</td>
<td>5%</td>
<td>-2.9850</td>
<td>3.622099</td>
<td>0.0015</td>
<td>I (1)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>-2.6318</td>
<td>0.0015</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{INFLR} (c))</td>
<td>5%</td>
<td>-2.9798</td>
<td>-2.934405</td>
<td>0.0075</td>
<td>I (1)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>-2.6290</td>
<td>0.0075</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{LQR} (l))</td>
<td>5%</td>
<td>-2.9850</td>
<td>-4.529425</td>
<td>0.0002</td>
<td>I (1)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>-2.6318</td>
<td>0.0002</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{CASHR} (l))</td>
<td>5%</td>
<td>-3.6219</td>
<td>-4.252270</td>
<td>0.0004</td>
<td>I (1)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>-3.2474</td>
<td>0.0004</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{MS} 2 (l))</td>
<td>5%</td>
<td>-3.7497</td>
<td>-4.229205</td>
<td>0.0004</td>
<td>I (2)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>-2.9969</td>
<td>0.0004</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ estimation using E-view 9.0
Table 2. Johansen cointegration test result

<table>
<thead>
<tr>
<th>Likelihood 5 Percent</th>
<th>1 Percent</th>
<th>Hypothesized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eigenvalue</strong></td>
<td><strong>Ratio</strong></td>
<td><strong>Critical Value</strong></td>
</tr>
<tr>
<td>0.935594</td>
<td>213.3558</td>
<td>94.15</td>
</tr>
<tr>
<td>0.899440</td>
<td>144.7921</td>
<td>68.52</td>
</tr>
<tr>
<td>0.836302</td>
<td>87.36713</td>
<td>47.21</td>
</tr>
</tbody>
</table>

Source: Authors’ estimation using E-view 9.0

<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>C</td>
<td>0.601203</td>
<td>55.46384</td>
<td>1.272938</td>
<td>0.2192</td>
</tr>
<tr>
<td>LQR</td>
<td>3.092586</td>
<td>23756.76</td>
<td>0.046837</td>
<td>0.1843</td>
</tr>
<tr>
<td>CASHR</td>
<td>-0.160531</td>
<td>0.000524</td>
<td>-3.697218</td>
<td>0.0018</td>
</tr>
<tr>
<td>INFLR</td>
<td>-0.086291</td>
<td>0.011237</td>
<td>-1.945471</td>
<td>0.0684</td>
</tr>
<tr>
<td>MS²</td>
<td>0.035870</td>
<td>0.017299</td>
<td>2.073592</td>
<td>0.0436</td>
</tr>
<tr>
<td>ECM-1</td>
<td>-0.083271</td>
<td>0.004482</td>
<td>-2.559430</td>
<td>0.0203</td>
</tr>
</tbody>
</table>

R-squared = 0.960247; Adjusted R-squared = 0.941540; F-statistic = 51.33034
Prob(F-statistic) = 0.000000; Durbin-Watson stat = 1.898457
Source: Authors estimation using E-view 9.0

\[
\text{GDP} = -105615.6 + 471.259 \log (\text{LQR}) + 38075.8 \log (\text{CASHR}) + 0.357663 \log (\text{INFLR}) + 4.296 \log (\text{MS}^2)
\]

Where, the variables remain as previously defined and the a priori expectation of the estimated coefficients is; \( \beta_3 > 0, \beta_1 > 0, \beta_2 > 0, \beta_3 > 0 \).

The VECM OLS estimation result is presented in Table 3.

The VECM OLS estimation result shows that in the long-run, a positive but insignificant relationship exists between liquidity ratio (LQR) and economic growth with positive and significant relationship existing between money supply (MS²) and economic growth; while an inverse and significant relationship exist between cash ratio (CASHR) and inflation (INFLR) with economic growth over the period of study thereby indicating that the sign of the co-efficient estimates are rightly assigned, and thus conform to a priori expectation.

The empirical evidence emanating from the study reveals that money supply had a direct and significant relationship with economic growth which suggests increased investment and productivity in goods and services. Liquidity ratio and cash reserve had positive but insignificant relationship with growth hence, little reliance can be built on the result. This can be viewed that the expected transformations of the economy through the monetary instrument of liquidity ratio and cash reserve policies for the periods covered are not being realized.

The error correction coefficient (-0.083271) of the model had the expected negative sign and was significant at 5% confirming the existence of long
run relationship between monetary policy and gross domestic product. The error correction coefficient which is a little error (8%) indicates a very slow speed of adjustment for correcting any deviation(s) of the explained variable to adjust its disequilibrium state.

5. SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

This research work studied the impact of monetary policies on economic growth in Nigeria. The macroeconomic variables used include; gross domestic product, inflation rate and money supply, cash ratio and liquidity ratio between 1981 and 2016. ADF unit root test and the Johansen maximum likelihood cointegration with its vector error correction mechanism (VECM) were employed to analyse the data. The VECM equation was converted to system of equation and estimated via the OLS method.

5.2 Conclusion

An empirical investigation of the effectiveness of Central Bank of Nigeria’s monetary policies was conducted and the major findings of the study are summarised below:

It was found that overall, CBN’s monetary policies play crucial role in influencing the level of productivity in the country. This result gives weight to the place of Central Bank in the national development process of the nation.

The VECM analysis also revealed that with the adoption of various monetary policy measures by the Central Bank of Nigeria, money supply and inflation had positive and inverse but significant impact respectively on the Nigerian economy in the long-run. This suggests that the problem of inflation in Nigeria is not a monetary phenomenon but is rather attributable to the structural rigidity in the country. This is understandable as Nigeria operates far below full employment equilibrium and the increase in GDP does not translate to improved purchasing power because poverty index has continued to worsen over the years. A lot still needs to be done in the areas of creating public awareness, improving operations of the financial market, enhancing the depth and breadth of the market and building regulatory capacity so as to appropriately position the market to face the challenges ahead.

The empirical analysis also revealed that cash reserve have significant negative impact on the gross domestic product which means that the monetary policy has not adequately supported healthy credit system that would encourage local investment and export and discourage frivolous importation.

5.3 Recommendations

Based on the findings made in the course of this study, particularly the results of the regression models, it is clear that the development of the Nigerian economy is highly dependent on the provision of the right environment for investment, which will in no doubt encourage economic growth and development. The following recommendations are hereby made:

Monetary policies should be used to create a favourable investment climate by facilitating the emergence of market based interest rate and exchange rate regimes that attract both domestic and foreign investments, create jobs, promote non-oil export and revive industries that are currently operation far below installed capacity. In order to strengthen the financial sector, the Central Bank should encourage the introduction of more financial instruments that are flexible enough to meet the risk preferences and sophistication of operators in the financial sector.

The government should also endeavour to make the financial sector less volatile and more viable as it is in developed countries. This will allow for smooth execution of the Central Bank monetary policies. Law relating to the operation of the financial institutions could be made a bit less stringent and more favourable for the operators to have room to operate more freely.

The Central Bank should find a way of reducing the level of deficit financing, improve funding of the informal sector and the SMEs and promote their integration into the formal sector while at the same time working with government to improve the tax regime to make the tax capacity to approach the tax potential so as to reduce tax evasion to barest minimum and ensure that there is proper balancing between capital and recurrent expenditures of government.

COMPETING INTERESTS

Authors have declared that no competing interests exist.
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