
Economic and demographic effects of monetary policy instruments on growth

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Abstract: Using vector error correction model (VECM), the paper answers two questions: Is there a long-run relationship between monetary policy instruments and economic growth? What is the nature of the relationship and what other factors influence it? Results of Johansen and Juselius multivariate co-integration procedure suggests a long run equilibrium relationship between monetary policy rates, money supply; cash reserve ratio, financial development and economic growth. Increased monetary policy rate (MPR) in one period contracts economic growth *ceteris paribus*. It is found, however, that due to demographic factors and existence of informal sector, monetary policy instruments are less effective. It is recommended that concerted effort be made towards effective allocation of credits to economic activities linked directly to the productive base of the economy for sustainable economic growth. In addition, concessionary tax instruments and incentives – like holidays and credits – for emerging SMEs are recommended. Given additional demographic data, it will be interesting to show how the results relate to the size of the informal sector and the population. This opens up the discourse and justifies the need for further empirical analysis of this issue.

Keywords: demography; economic growth; monetary policy instrument; informal sector; Nigeria.

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1 Introduction

Monetary policy instruments are used to manage an economy towards economic growth. They could also be aimed at achieving price stability, financial development, favourable cash reserve ratio (CRR), and reduction of unemployment. Such achievements are vital for the attainment of internal and external balance, as well as, promoting sustainable economic development. Monetary policy measures are designed for regulating and

controlling the volume, cost, availability and direction of money and credit in the economy towards achieving some specified macroeconomic policy objectives (Anyanwu et al., 1997).

In Nigeria, monetary policy encompasses actions of the Central Bank of Nigeria (CBN) that affect the availability and cost of commercial and merchant banks' reserve balances and thereby the overall money and credit conditions in the economy (Akatu, 1993). Monetary policy instruments are crucial components of pro-growth strategy employed by CBN. It involves controlling the direction and volume of money or credit in pursuance of stable price and economic growth in the Nigerian economy (CBN, 1992).

There are two major techniques of monetary policy, namely direct (which includes credit ceilings, regulation of deposit, exchange controls and stabilisation of securities) and indirect (which includes open market operations (OMO), cash reserve requirements, liquidity ratio, minimum rediscount rate (MRR) and selective credit policies). The former is used extensively in more developed market economies and the latter in less developed economies with undeveloped money markets and centrally planned economies. Oke (1993) noted that monetary policy was first initiated by the CBN in 1987 and the shift from direct to indirect monetary and credit controls was due to government policy of deregulation of the Nigerian economy. In this regard, greater reliance was placed on market forces and reduction in complex administrative controls since the adoption of the structural adjustment programs (SAP) in 1986. No matter how good a monetary policy may look, it generates adverse consequences. More so, as the Nigerian economy is beset with high level of unemployment, low investment, high rate of inflation and undeveloped money markets. There is no known single or set of monetary policy measures that can address all issues in Nigeria. Chimezie (2012) highlights that uncertainty exists in the monetary policy process and no set of measures is suitable for all situations that could arise.

Against the above background, this paper examines the growth-effectiveness of monetary policy measures in Nigeria. It highlights some demographic factors that underlie the relationship between monetary policy measures and growth. Consequently, it proposes strategies for reducing monetary policy uncertainties in Nigeria.

1.1 Statement of problem

The effectiveness of monetary policy in ensuring the attainment of economic stability and growth in developing countries is an empirical issue that has been extensively investigated in the literature. Monetary policy, especially in a developing economy like Nigeria, plays important role in accelerating development by influencing the cost and availability of credit, controlling inflation and by maintaining balance of payments equilibrium. Good monetary policy indicates the direction of economic investment both locally and internationally. However, tight monetary environment, as well as, policy uncertainties discourage potential investors. In Nigeria, good monetary policies are needed to stimulate or attract investments towards diversifying from oil. The challenges that inhibit the effectiveness of monetary policy in Nigeria is the motivation for this study. These challenges include policy inconsistency, relatively underdeveloped financial system, fiscal indiscipline and weak regulatory authority.

Meanwhile, there are impacts on the poor and key concerns of private and informal sectors persist. More so, economic growth is still far from sustainable and there is chronic poverty amongst the masses. Indicators of perception of well-being are very low for Nigeria with living standards of only 40.4% and 62% of her population below income poverty line of ppp \$1.25 a day (HDR, 2015). There are controversies as to whether these monetary interventions have impacted on the economy vis-à-vis the living conditions of the masses. Hence, this paper is set to ascertain whether or not a significant relationship exists between monetary policy instruments and economic growth in Nigeria.

The study provides baseline information on ways of adopting monetary policy instruments towards enhancing economic growth. In addition, it also serves as a guide to policy/decision makers towards monetary policy initiation and implementation.

1.2 Objective and research questions

The main research objective is to examine the relationship between monetary policy and economic growth. Specifically, the paper seeks to examine the relationship between monetary policy and economic growth in Nigeria. In addition, it determines if the performances of CRR significantly influence gross domestic product (GDP) level in the economy. Finally, the study ascertains whether there is a relationship between monetary policy instruments and economic growth in Nigeria.

Towards achieving the research objective, three underlying research questions are pertinent. Is there a relationship between monetary policy instruments and economic growth in Nigeria? Does CRR significantly influence the Nigeria's GDP? What other factors could possibly affect the relationship between monetary policy and GDP? So as to answer the above sub-research questions, it is hypothesised that in Nigeria: there's no long-run relationship between aggregate money supply and economic growth, as well as, CRR does not significantly influence GDP.

2 Literature review and framework for analysis

2.1 Theoretical framework

The theoretical framework has been developed based on the Keynesian theory and Monetarist theory. Both theoretical settings relate to the influence of monetary policy on economic growth. On one hand, Keynesian macroeconomics focuses on output, rather than prices, as being responsible for changing economic conditions. His work assumes a closed economy and a perfectly competitive market with fairly price-interest aggregate supply function. In Keynesian theory, monetary policy operates through changes in interest rates. Here, a change in the money supply will result in a change in the interest rate which affects the demand for money. According to Akatu (1993), the new level of interest rate influences both consumption and investment spending, thereby, affecting the level of output. The position of Keynes, rightly put by Onyeiwu (2012), is that unemployment arises from inadequate aggregate demand which can be increased by increasing money supply which generates additional spending, increased employment and economic growth.

On the other hand, the Monetarists believe that 'money matters', thereby advocating the use of monetary policy in influencing vibrant economic growth. They argue that there

is a direct link between the monetary sector and the real sector of the economy. Monetarists opine that in order to ensure steady growth rate, the money supply should grow at a fixed rate, instead of being regulated and altered by the monetary authorities. More so, since money supply is substitutive not just for bonds but also for many goods and services, changes in money supply will, therefore, have both direct and indirect effects on spending and investment respectively such that demand for money will depend upon the relative rates of return available.

2.2 Empirical framework

There is an extensive literature on the relationship between monetary policy and economic growth, as well as, the influence of monetary policy instruments on economic growth. Findings in the literature are mixed and conflicting. Fasanya and Onakoya (2013) examined the impact of monetary policy on economic growth using time series data covering the period 1975–2010. They revealed a long run relationship among the variables and further that inflation rate, exchange rate and external reserve are significant monetary policy instruments that drive growth in Nigeria. Falade and Folorunso (2015) examined the relative effectiveness of fiscal and monetary policy instruments on economic growth sustainability in Nigeria using annual data from CBN for the period 1970–2013. The results revealed that all fiscal and monetary policy variables of interest co-integrated with the economic growth series in the country, which suggests that there is a long run relationship among fiscal variables, monetary variables and economic growth. Chuku (2009) examined the effect of monetary policy innovations in Nigeria using a structural vector auto-regression approach to trace the effects of monetary policy shocks on output and prices in Nigeria with a sample data spanning from 1986 to 2008.

The study was conducted using three alternative policy instruments: broad money (M_2), MRR and the real effective exchange rate (REER). The study assumed that the Central Bank cannot observe unexpected changes in output and prices within the same period. This places a recursive restriction on the disturbances of the structural vector auto regressive (SVAR) model and helped to generate impulse response functions that tracked the effects of monetary policy innovations on output and prices. The study finds evidence that monetary policy innovations have both real and nominal effects on economic parameter depending on the policy variables selected.

Using money supply as a measure of monetary policy, Nouri and Samimi (2011) examined the impact of monetary policy on economic growth in Iran adopting ordinary least squares (OLS) technique and data covering the period 1974–2008. A positive and significant relationship between money supply and economic growth was established in the study. In a recent study on the impact of monetary policy instruments on the economic development of Nigeria, Akujuobi (2010) finds that CRR has a significant impact on the economic development of Nigeria at both 1% and 5% levels of significance, treasury bill at 5.6%, MRR at 7.4% and liquidity ratio at 7%, while interest rate was not significance at all. The study, however, did not consider the demographic perspective of the monetary policies. Onyeiwu (2012) using the OLS on data between 1981 and 2008, found that monetary policy represented by money supply exerts a positive impact on GDP growth and balance of payment but negative impact on rate of inflation. Amassoma et al. (2011) examined the effect of monetary policy on macroeconomic variables in Nigeria for the period 1986 to 2009 by adopting a simplified

OLS technique finds that monetary policy has a significant effect on exchange rate and money supply but has an insignificant influence on price instability.

Ajisafe and Folorunso (2002) assessed the relative effectiveness of monetary and fiscal policy on economic activity in Nigeria using co-integration and error correction modelling techniques and time series data for the period 1970–1998. They observed that monetary rather than fiscal policy exerts a great impact on economic growth in Nigeria though they conclude that both monetary and fiscal policies should be complementary. Adefeso and Mobolaji (2010) 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 (M_2). Anna (2012) examined the relative effectiveness of monetary and fiscal policies on economic activity in Zimbabwe. The study shows that monetary policy influence was relatively stronger and more predictable than fiscal policy in determining economic activity in Zimbabwe.

In line with the earlier observations, Sanusi (2002) posits that 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. It becomes necessary, therefore, to determine the nature and extent of relationship which exists between monetary policy instruments and economic (GDP) growth.

2.3 Methodology

The vector error correction modelling (VECM) has been employed in the course of this study as the technique for data analysis. This approach allows for the determination of the short and long-run relationship between the system of equations through the normalisation of the variables at one point or the other.

Although regression analysis based on the classical linear regression model, otherwise known as OLS technique could be applied in the study. This choice of this technique is based on its computational simplicity and optimal properties such as linearity, un-biased estimate, minimum variance, and zero mean value of the random terms (Gujarati and Porter, 2009). However, given the stochastic nature of the variables identified with this study as shown in the unit root result with their levels of stationary at first differencing and all integrated at order 1, the application of OLS technique could lead to biased estimates. Hence, the VECM was employed with related econometric tests. Apart from providing us with the information about the short run and long-run behaviour of the model, the VECM techniques further helps us in determining the nature of the systemic adjustment in the model through the process of the error correction term (ECT). In its scope, this paper focuses on selected macroeconomic variables (GDP and monetary policy indicators) and financial market indicators.

The estimation period covers the period 1981 and 2015 – incorporating current realities and making the study useful for policy formulation and analysis. The data were mainly secondary in nature – sourced from the central bank statistical bulletin, 2015. The data choice is predicated on availability and reliability of the source. Furthermore, the data cuts across different periods in Nigeria's economic history and captures key factors that could have affected the phenomenon of interest. The variables considered are described accordingly:

- a Monetary policy rate (MPR) represents the CBN lending rate to commercial bank – expressed as a ratio.
- b Money supply (M_2) is used to capture the broad money supply which measures the total money in circulation plus demand and time deposit liabilities.
- c CRR is a ratio of total deposit of the commercial banks to their reserves at the CBN.
- d Financial development is an index which measures the proportion of broad money supply to GDP. As such, it is intended to measure the volume of money supplied in relation to goods and services available within the economy. If unchecked, increased money supply creates inflationary pressure. Therefore, financial developments captures the effectiveness of money creation towards the real sector and provides an economic measure for controlling excess supply of currency relative to actual goods and services.

2.3.1 Model specification

GDP is used as a measure of the productivity of Nigeria's economy. The model is specified based on the assumption that GDP is explainable by some performance variables. GDP growth is, therefore, expressed as a function of MPR, money supply (MS_2), CRR and financial development (FINDEV) as the explanatory variables. Hence the functional model in its implicit form is expressed as follows:

$$GDP = f(MPR, M_2, CRR, FINDEV) \quad (1)$$

where

GDP gross domestic product

MPR monetary policy rate

M_2 money supply

CRR cash reserve ratio

$FINDEV$ financial development.

2.3.2 Econometric specification

The explicit representation of model is as shown in equation (2) below:

$$GDP = \beta_0 + \beta_1 MPR + \beta_2 M_2 + \beta_3 CRR + \beta_4 FINDEV + \mu_t \quad (2)$$

where

β_0 is constant term

$\beta_1, \beta_2, \beta_3$, and β_4 are the parameters of the model

μ_t is the error term.

Following the statement of hypothesis, and model specification in Subsection 2.3.1, econometric analysis is employed to determine the nature of the relationship between economic growth (GDP) as the dependent variable and the independent variables

consisting of MPR, money supply (M_2), CRR and financial development (FINDEVP) as the explanatory variables. The estimated equation represents the relationship between the variables included in the model.

2.3.3 Inferential statistics and measurements

- 1 Student *T*-test was utilised to ascertain the significance of the parameter estimates individually. The null hypothesis is that parameter β_i is equal to zero. If '*t*' computed is greater than '*t*' tabulated, the estimate of parameter β_i is significant. As such, a failure to accept the null hypothesis but the alternative hypothesis is accepted – that is, β_i is not equal to zero.
- 2 Co-efficient of determination (R^2) shows the percentage of the total variation of the dependent variable (GDP) as explained by the exogenous variables included in the model. In other words, this shows the extent to which the explanatory variables (i.e., monetary policy indicators and financial market development indicator) influence the dependent variable. A high value of R^2 depicts that the explanatory variables influence the dependent variable to high degree and vice versa.
- 3 Correlation coefficient (*R*) measures the existence or strength of relationship between the dependent and independent variables. This strength of relationship can either be low, moderate or high, depending on the value of *R*.
- 4 *F*-test was used to determine the significance of the economic growth model, which is the same as testing the significance of the entire regression model. If probability (*F*) < 0.05, then the model is considered significantly better than would be expected by chance and the null hypothesis of no linear relationship of GDP with the independent variables is rejected.

3 Data analysis

3.1 Unit root test

The test for stationarity was conducted to determine the order of integration among the variables. The Phillip Peron (PP) test was used to test for the stationarity of the series. The results presented in Table 1 were found satisfactory. Furthermore, Johansen and Juselius (1990) cointegration was conducted to find out the long run relationship between economic growth and the exogenous variables in the model including MPR, money supply, CRR and financial development. The results of the unit root tests are shown in Table 1.

The critical value for the PP test using 1% level of significance is -2.954021 while the critical value for the first difference is -2.957110 . Furthermore, it is observable that all the variables exhibit non-stationary characteristics at 1% and 5% significance level. The variables were all non-stationary showing that the presence of unit root cannot be rejected at 1% and 5% level. The null-hypothesis which suggests there is unit root present for the variables at levels – is ascertained. As such, the variables were differenced once to achieve stationarity and the series were all integrated to order 1 before any further empirical analysis to avoid spurious result.

Table 1 Stationarity result

<i>Variables</i>	<i>Philip Perron (PP) at levels</i>	<i>Philip Perron (PP) first difference</i>	<i>Order of integration</i>
<i>lnGDP</i>	2.304606	-3.336547**	<i>I</i> (1)
<i>lnMPR</i>	-2.843859	-6.762493***	<i>I</i> (1)
<i>lnM₂</i>	0.115420	-3.327975**	<i>I</i> (1)
<i>lnCRR</i>	-2.101167	-4.395470***	<i>I</i> (1)
<i>lnFINDEV</i>	-1.854067	-5.288024***	<i>I</i> (1)
<i>Critical values at 5% level of significance</i>			
Levels	-2.954021	-2.957110	

Notes: Stationary trend is achieved at PP values that are greater than the critical value in absolute terms; while **, *** indicate significance at 5% and 1%, respectively.

Source: Computed by Authors (2017)

3.2 Cointegration test

On evidence of the stationarity of two or more series consisting of variant order of integration *I*(0) and one *I*(1), the necessary procedure is to ascertain the long run relationship of these series such that a linear combination of two or more series would result to co integrated series of the higher order 1. Hence this paper employs Johansen and Juselius (1990) multivariate cointegration procedure to verify if there is a long run relationship among the variables of the growth model as presented in Table 2.

Table 2 Unrestricted cointegration rank test

<i>Hypothesised no. of CE(s)</i>	<i>Eigenvalue</i>	<i>Trace statistics</i>	<i>0.05 critical value</i>	<i>Prob.**</i>
None	0.692654	78.44927	69.81889	0.0087
At most 1	0.432792	40.69628	47.85613	0.1985
At most 2	0.318495	22.55133	29.79707	0.2688
At most 3	0.261668	10.28089	15.49471	0.2597
At most 4	0.017756	0.573309	3.841466	0.4489
<i>Hypothesised no. of CE(s)</i>	<i>Max-eigen statistic</i>	<i>0.05 critical value</i>	<i>Prob.**</i>	
None	37.75298	33.87687	0.0164	
At most 1	18.14495	27.58434	0.4831	
At most 2	12.27044	21.13162	0.5212	
At most 3	9.707582	14.26460	0.2319	
At most 4	0.573309	3.841466	0.4489	

Notes: **MacKinnon-Haug-Michelis (1999) *p*-values

Source: Computed by Authors (2017)

From the cointegration result in Table 2, the trace statistic and maximum eigenvalue test indicates the existence of at least one co-integrating relationship among the variables. It also suggests a long run equilibrium relationship exists between MPRs, money supply;

CRR, financial development and economic growth. To further ascertain the nature and extent of the relationship, in terms of magnitude and direction, among these variables the study proceeds to estimate a VECM with GDP normalised as the endogenous variable and monetary policy instruments as determining factors.

Table 3 Long-run coefficient estimates

<i>LRGDP</i>	<i>Normalised co-integrating coefficients (standard error in parenthesis)</i>			
<i>C</i>	<i>LMPR (-1)</i>	<i>LM2 (-1)</i>	<i>LCRR (-1)</i>	<i>LFINDEV (-1)</i>
-10.34069	0.021634	-0.146950	0.050886	-0.607904
R-squared = 0.548155	(0.09393)	(0.00858)	(0.02035)	(0.05635)
T-statistics	[-0.23033]	[17.1275]	[-2.49996]	[10.7877]

Notes: Standard error and *T*-statistics are stated in parenthesis as () and [] respectively.

Source: Authors' Compilation (2017)

The result of the error correction model is presented in Table 3. The VECM was employed to determine the error correction mechanism in the cointegration relationship, as well as, to test for long and short-run causality among co integrated variables. The error correction process within the system is obtained by the mean of the ECT.

3.3 Error correction model

The VECM is essential in determining the short run adjustment mechanism in the system. It further portrays the short run dynamics between the variables in the long-run co-integrating equation as evidenced in the Johansen maximum likelihood estimation. Table 4 shows the estimated model with ECT. The results show that the coefficient of the normalised growth model well signed and in magnitude it is between zero and one at significance level of 5%. The significance of the error correction model provides further evidence of a co-integrating relationship which signifies a long-run co-movement between economic growth and the explanatory variables – MPR, money supply, CRR and financial development.

Table 4 Vector error correction result

<i>Variable</i>	<i>D(LRGDP)</i>	<i>D(LMPR)</i>	<i>D(LM2)</i>	<i>D(LCRR(-1))</i>	<i>D(LFINDEV)</i>
ECM(-1)	-0.176289	0.026399	0.534158	1.084980	0.695599
Standard error	(0.05264)	(0.35955)	(0.11444)	(0.64597)	(0.24523)
T-statistic	[-3.34874]	[0.07342]	[4.66753]	[1.67961]	[2.83657]

Notes: Standard error and *T*-statistics are stated in parenthesis as () and [] respectively.

From Table 4, it is notable that the magnitude of the ECT is negative, correctly signed, and its absolute value significantly lies within the magnitude of zero and one. The ECT, therefore, implies possible existence of a long-run convergence in the growth model. In the event of external shock, the model is expected to still converge to its state of equilibrium – overtime. In this regard, the error correction estimate indicates a relatively slow speed of adjustment in the model at -0.176. This implies that 17.62% of current error in the model would be corrected in the long-run. As such, for any exogenous shock to the system, there is possibility of systemic re-adjustment to establish long-run equilibrium at the given the speed of adjustment.

4 Results and discussion

The estimated R -squared (0.5481) statistically indicates the combined explanatory strength of the variables. In other words, about 54.81% of total variations in GDP are due to changes in the lagged independent variables – MPR , money supply (MS_2), CRR and financial development ($FINDEV$). Furthermore, it suggests a high degree of explanatory power of the model. At 1% and 5% level of significance, the estimated model reveals a significant observable relationship between the dependent variable; GDP and the exogenous variables – MPR , LMS_2 , $FINDEV$ and CRR . From the estimated parameters in Table 3, the VECM model is presented in equation (4) below, in reversed coefficient signs.

$$\ln GDP_t = a_0 + \beta_1 MPR_{t-1} + \beta_2 MS_{2t-1} + \beta_3 CRR_{t-1} + \beta_4 FINDEV_{t-1} + \mu_t \quad (3)$$

$$\ln GDP_t = 10.3406 - 0.0216 \ln MPR_{t-1} + 0.1469 \ln M_{2t-1} - 0.0509 CRR_{t-1} + 0.6079 FINDEV_{t-1} \quad (4)$$

$$T - values = \{-0.23033\} \quad \{17.1275\} \quad \{-2.49996\} \quad \{10.7877\}$$

where

GDP gross domestic product

MPR monetary policy rate

M_2 money supply

CRR cash reserve ratio

$FINDEV$ financial development.

4.1 Economic growth and MPR

The result shows a less than proportionate but significant negative relationship between MPR and growth (at 1% level of significance). Equation (4) indicates that if MPR_{t-1} is increased by a percentage point, Nigeria's GDP will be expected to decrease by 2.1%, *ceteris paribus*. As expected, the implication is that the estimated coefficient of MPR has a negative lagged effect on Nigeria's GDP. Theoretically, high MPR is expected to discourage commercial banks borrowing from the apex bank, leading to inadequate credit and retarded growth. This implies that higher MPR in one period increases the cost of loan-able credit for bank transactions and borrowing for investment purposes in the next period. It, therefore, reduces the amount of credit available for productive purposes leading to reduced growth in GDP in the next period, *ceteris paribus*. However, increased MPR could be used as a restrictive monetary measure to control inflation in the economy – leading to price stability essential for growth.

Although the CBN expects that decreasing MPR will lower the cost of borrowing (loanable funds) in the Nigerian economy, our estimate does not capture the semi-formal financial sector. The reason is that young individuals, small and medium-scaled enterprises (SMEs) do not often borrow at the MPR set by CBN but at rates prevalent in the semi-formal financial sector or informal sector. Given the peculiarity of Nigeria's informal sector, it will be misleading to determine the equilibrium interest rate using the

traditional economic model of investment-savings and liquidity preference-money supply (IS-LM). The interest rate ($Rate_{informal}$) on loans offered to the real sector for investments (applicable in the IS curve) is different from MPR_{CBN} which is applicable to the LM equation – stipulated in the monetary policy. As Nigeria endeavours to navigate a recovery from recession, it is notable that demand for goods and services depends on expectations of the future, as well as, on the $Rate_{informal}$ (irrespective of the MPR_{CBN}). The spread between both rates will be very volatile as Nigeria's financial sector evolves.

4.2 *Economic growth and money supply*

The estimated coefficient of money supply (M_2) indicates it has a lagged positive relationship with economic growth. The result further implies that a percentage point increase in money supply in period ' $t - 1$ ', ceteris paribus, will generate a 14.6% increase in GDP in period ' t '. Though the positive sign of the coefficient is expected, its value is a surprise outcome especially because it is a lagged variable. As such, though increasing money supply could create immediate inflationary impacts in the Nigerian economy, it eventually results in GDP growth in the next period. This highlights the need to properly channel incremental money supply towards the productive base of Nigeria's economy – otherwise, it could affect the exchange rate.

Conversely, reduction in money supply results in decrease in loans and advances available to potential borrower (investors and entrepreneurs). Consequently, low credit availability in banks – relative to demand – could push up lending rate, thereby lowering incentive for borrowing and investment by SMEs/manufacturers, as well as, hampering GDP growth. Such contractionary monetary policy measure is ineffective in a recession.

4.3 *Economic growth and CRR*

In this regard, equation (4) portrays an inverse relationship between CRR and economic growth – per a priori expectation. The parameter estimate indicates that a percentage point in CRR_{t-1} , contracts GDP_t by 5%. This further indicates that increasing CRR to combat inflation in one period, could adversely affect economic growth in the next period – ceteris paribus. As such, any contractionary action by the Central Bank to curtail inflation during recession will eventually constrain economic activities – except it is complemented with expansionary fiscal or monetary measures. Notably, from May 2016 to May 2017 during the Nigerian recession, CBN maintained the same MPR and CRR. However, price levels did not stabilise rather inflationary pressures persisted with higher demand in the foreign exchange market, output contraction, and high unemployment rate (CBN, 2017).

The interest rate became ineffective because of three key reasons. First, people's demand for currency became very high due to depreciation of the naira relative to the US dollar, in addition to increasing demand for imports. Second, following from government's anti-corruption measures, looted funds were not deposited in banks – resulting in the reduction of demand deposits and demand for reserves by banks. Third, following from the latter, commercial bank lending (money creation) became restricted to government-supported loans/projects. Despite the implications of the empirical result obtained, the effectiveness of the CRR (and MPR) in Nigeria depends on whether funds are deposited in banks and whether banks are lending.

4.4 *Economic growth and financial development*

The evidence from the estimated coefficient of financial development suggests that the ratio of aggregate money supply in relation to GDP is grossly inadequate in its contribution to economic growth within the scope of this research. Statistically, there is no corresponding increase in economic growth despite increases in financial development rather financial development retards growth by 0.62% notwithstanding the increase in financial deepening. Theoretically, when an economy deepens financially, increase in money supply (M_2) should yield more than proportionate increase in GDP – indicating growth in the real sector. Consequently, an increase in GDP should accompany an increase in M_2 /GDP ratio. However, as the results depicts financial deepening could also result to inhibited growth effect in the long-run perspective. A priori expectation is that additional money supply will be used through the financial sector for creation of loans and credits in the economy.

The result emanating from the test statistics for financial development coefficient indicates a significant inverse relationship with real economic growth. It further suggests inadequate supply of money to the productive and manufacturing sectors of the economy that will lead to increase production of goods and services in the real sector. A greater portion of the aggregate money supply in relation to GDP in Nigeria is being channelled to other activities that are not directly linked to increasing the productive base of the economy. Therefore, financial development variables are significant determinants for real economic growth in Nigeria. The result has relevance for Nigeria's economic diversification endeavours. It shows the relationship between monetary policy instruments and money outside the Nigerian banking sector. It is expected that increased money policy measures should result in money creation and motivate real sector investment – especially when the financial sector is better supervised and developed.

4.5 *Demographic perspective of monetary policy and economic growth*

Given the results discussed above, it will be worthwhile to understand the interactions between MPR and borrowing rate in the informal sector. More so, to see how private savings respond to changes in MPR given Nigeria's demographic and economic stratification. This is particularly relevant as almost 50% of GDP in oil-exporting Sub-Saharan Africa is from the informal economy (IMF, 2017).

The informal sector offers a pathway for appreciating the demographic perspective of monetary policies. Computing from the 2006 census, about 40.36% of the Nigerian population is aged 20–40 years (NPC, 2009).¹ Furthermore, her demography is characterised by an increasing youth population with unemployment of 46.65% as at Q3, 2016 (NBS, 2017). The informal sector plays a significant role in employment because 30% of new entrepreneurs in Sub-Saharan Africa became entrepreneurs out of necessity (IMF, 2017). Moreover, most of the new and emerging entrepreneurs are within the working-age population. As such, the informal sector which is a safety net for young unemployed Nigerians becomes central to the effectiveness of monetary policies. It will be noteworthy to consider the risk averseness of young entrepreneurs (as observable from their saving habits and consumption patterns) relative to the lending policy of commercial banks to firms in the formal sector.

4.5.1 *Risk averseness*

Few banks lend to young inexperienced entrepreneurs who are very adventurous, not averse to risk – due to their age – but lack collateral to secure any loan. This is particularly important because between 55 and 75% of non-agricultural employment in resource-rich countries in Sub-Sahara Africa (like Nigeria) take place in household enterprises (IMF, 2017). Consequently, a key issue for the CBN, and perhaps commercial banks, is how to de-risk loans to young and inexperienced entrepreneurs towards ensuring effective monetary (and fiscal) policies. Addressing this issue will contribute towards increasing the real output productivity per employee in Nigeria's informal sector.

4.5.2 *Propensity to save*

Young people in Nigeria have a lower marginal propensity to save. This situation is further complicated by the level of unemployment and poverty – such that employed youth support unemployed friends and relatives. Invariably, lowering of the CRR is less effective in Nigeria irrespective of the level of financial sector development. Due to the large informal sector in Nigeria, a large part of additional money supply leaves the banking industry. Meanwhile, culturally, older relatives depend on their working children or relatives for subsistence due to lack of or irregular pension payments. Taking these issues into consideration will enhance the effectiveness of monetary policy because the state of the formal economy is one of the factors that drive shadow economy (Schneider et al., 2010).

5 **Conclusions**

In sum, existing literature (Essien et al., 2016; Bhattacharyya, 2012) shows that adjustments in money supply and MPR directly affect money-market rates. In addition, they indirectly affect commercial banks' deposit and lending rates to customers, as well as, consumption and investment decisions (Bassey et al., 2016). However, due to the demographic dynamics and the informal sector in Nigeria, the traditional Keynesian interest rate path is less effective. In other words, it is arguable that the demography of Nigeria's economy significantly determines the extent to which monetary policy measures are effective. Herein lays a major contribution of our work to existing studies on Nigeria.

This paper uniquely approaches the relationship between economic and monetary policy instruments from a lagged perspective. The result shows a positive and significant effect of money supply on economic growth as revealed in the *t*-statistics for broad money supply. It appears from this study that increasing aggregate money supply is the most effective and efficient policy tool for maximising growth in the economy. This does conform to the a priori expectations as is expected that there should be a positive relationship between economic growth and monetary instruments. And the reasons may be due to investment environment and infrastructural deficit. The result of the estimated coefficient of financial development shows a negative and significant relation with economic growth. This implies that an increase in money supply in relation to GDP not channelled to the production of goods and services in the real sector of the economy will

distort economic growth with its associated inflationary pressure which could pose constraint to the effectiveness of monetary policy in Nigeria.

Also, preceding periods' MPR and CRR individually indicate significant inverse relationship with economic growth at 1% and 5% significance levels. Therefore, it is concludable that monetary policy has a significant impact on economic growth in Nigeria.

In addition, the study relied on the work of Goodhart and Pradhan (2016) to consider the demographic implications of monetary policy in Nigeria. However, availability of quality and verified data on the informal sector will ensure further econometric analysis in this regard. Finally, incorporating the highlighted demographic perspectives into monetary policy relative to the employment effects of the informal sector will be a major contribution to the works of Tanzi (1980) and Schneider et al. (2010).

5.1 Policy recommendations

Sequel to the empirical evidences from this study, it is recommend that concerted effort be made towards effective allocation of credits to the economic activities that will significantly increase the productive base of the economy for sustainable economic growth and development. Furthermore:

- a High interest rates which could discourage prospective entrepreneurs and SMEs borrowing from banks should be controlled by the deposit money banks to avoid excessive cost of capital that hinders laudable investments. Where such is not feasible, concessionary tax instruments and incentives – like tax holidays and tax credits – for emerging SMEs is recommended.
- b The required cash reserve and MPR by the CBN should be adequately monitored and maintained within levels that will not compound the issue of bank liquidity and stability challenges.
- c Monetary authorities should better supervise the channelling of money to projects that will not directly increase the production of goods. Commercial banks should devise better means of encouraging private and corporate savings deposit – providing more funds for interested investors to borrow for business expansion and higher profit maximisation.
- d Finally, increased sensitisation and awareness on financial inclusiveness strategies should be mapped out to control for exogenously determined money circulation outside the full control and monitoring of financial institution in Nigeria. This will help to maintain the value of the local currency against unwarranted depreciation which does not promote economic growth and sustainability.

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Notes

- 1 Ignoring deaths (and births) since 2006.