Effect of Monetary Policy on Economic Growth in Nigeria (1986-2017)

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Abstract

The study assessed the effect of monetary policy on economic growth in Nigeria from 1986 to 2017. It used quarterly time series data spanning the period between 1986Q1 and 2017Q4. The structural vector autoregression (SVAR) analysis was used to assess the effect of monetary policy following the framework of inflation targeting (IT) on economic growth in Nigeria. It further employed the Granger causality test to ascertain the direction of causation between monetary policy and economic growth in the country. Findings from the study revealed that monetary policy had a positive effect on economic growth in Nigeria. The monetary policy rate (MPR) positively affected growth through the periods under investigation. Its effect was however minimal only accounting for a maximum of 3 per cent of changes in the growth. Also, the broad money supply (M_2) had a positive effect all through the period on economic growth, also only accounting for a maximum of 7 per cent of changes in economic growth. This result was supported by the causality test that found causation running from MPR and M_2 to economic growth, and also causation running from MPR and the M_2 to inflation. The study concluded that the inflation targeting (IT) framework was however a good monetary policy tool, but there is need for other instruments which combines quantity-based and price-based nominal anchors that the central bank can control effectively to improve the policy targets, while deepening financial intermediation for seamless pass through from policy rate to the economy.

Keywords: Monetary policy, Economic Growth, SVAR and Effect

Introduction

The employment of different instruments to achieve stability and long-term growth is the nucleus of macroeconomic management in any economy (Michael, 2012). A sustainably high growth rate of output and a low inflation rate are the two main goals of macroeconomic policies. In addition, price stability is a key factor in determining the growth rate of an economy.

The International Monetary Fund (IMF) assistance place special emphasis on monetary policy as a tool to reach such intents; the trusted mechanism behind this approach, as in the classical monetary policy transmission mechanisms - is that monetary authorities should manage money growth and policy interest rates to impact credit conditions in the economy (and the aggregate demand) to reach programmed targets of single digit inflation and pre-determined levels of net external reserves (IMF 2010, IMF 2012). Monetary policy is without doubt an important tool for enhancing growth in the economy (Sulaiman and Migiro, 2014).

Statement of the Problem

Growth over the years in Nigeria has been largely unstable and low. Per capita GDP was only USD2,980 in 2013, ranking 131st in the world compared to South Africa which had a per capita GDP of USD6,886 at 88th, according to the World Development Indicators (World Bank 2015). In 2015, The Nigerian economy has experienced modest growth. Over the last decade, it recorded an average growth rate of 6.8 percent (CBN, 2016). Real gross domestic product (GDP) growth was estimated at 6.23 per cent in 2014 compared to 5.49 per cent in 2013. The rebasing of its GDP in April 2014 by the National Bureau of Statistics to better reflect the size and structure of the economy, saw it surge past South Africa to become Africa's largest economy with a rebased GDP estimate of USD454 billion in 2012 and USD510 billion in 2013 (Olu, Afeikhena, David and Olufunke, 2016). However, given the country's high population, per capita GDP was only USD2,980 in 2013, ranking 131st in the world compared to South Africa which experienced a per capita GDP of USD6,886 at 88th, according to the World Development Indicators (World Bank 2015). In 2015, the Nigerian economy was adversely affected by external shocks, in particular a fall in the global price of crude oil. Growth slowed sharply from 6.2% in 2014 to an estimated 3.0% in 2015. Inflation increased from 7.8% to an estimated 9% (African Economic Outlook, 2016). Targeting a growth rate of 7%, the goal of the present government is to have an economy with low inflation, stable exchange rates, and a diversified and inclusive growth (Reuters, 2017). As such, the role of appropriate policy cannot be overemphasised.

Nigeria's financial system is relatively underdeveloped, shallow, bank dominated and characterized by a dearth of market instruments and securities (African Economic Outlook, 2016). This can impede the pass-through from policy rate changes to market rates; thus, diminishing policy effectiveness. Besides, the fact that banks may be more willing to hold risk-free government securities rather than lend to private investors implies that monetary policy interest rate changes may not affect aggregate demand as suggested by the NCM. This further undermines the effectiveness of monetary policy. The objective of this paper is to determine the effect of monetary policy on economic growth in Nigeria.

Literature review

Conceptual Literature

Monetary Policy

Monetary policy may either be defined in a broad or in a narrow sense. Defined in a broader sense, monetary policy not only includes monetary measures but also non-monetary measures which have monetary effects (Smitha, 2010). In this sense, monetary policy covers a wide range of policies and measures. It includes not only monetary measures which influence the cost and availability of money but also those non-monetary measures which influence monetary situations. Thus, non-monetary measures such as control of prices or wages, physical control, budgetary measures, income policy measures, etc., would be included within the scope of monetary policy defined in broader sense as far as their primary aim is to influence the monetary situation.

In other word, monetary policy is the process by which the monetary authority of a country, like the central bank or currency board, controls the supply of money, often targeting an inflation

rate or interest rate to ensure price stability and general trust in the currency. Further goals of monetary policy are usually to contribute to economic growth and stability, to lower unemployment and to maintain a stable exchange rates with other currencies (Roger, 2010).

It involves how central banks manage liquidity to create economic growth. Liquidity is how much there is in the money supply. That includes credit, cash, checks and money market mutual funds. The most important of these is credit. It includes loans, bonds and mortgages (Kimberly, 2016).The primary objective of central banks is to manage inflation. The second is to reduce unemployment, but only after they have controlled inflation (Kimberly, 2016).

Central banks use contractionary monetary policy to reduce inflation. They employed many tools to do so. The most common are raising interest rates and selling securities through open market operations. They use expansionary monetary policy to lower unemployment and avoid recession. They lower interest rates, buy securities from member banks and use other tools to increase liquidity.

i. **Objective of Monetary Policy –** These include between other things full "employment" and "balanced economic growth*"*. Maintaining stable prices on a sustained basis is a crucial pre-condition for increasing economic welfare and the growth potential of an economy. The natural role of monetary policy in the economy is to maintain price stability.

ii. **Instruments of Monetary policy** – the policy instruments used to achieve price and financial stability objectives in Nigeria are the Monetary Policy Rate (MPR), and other intervention instruments such as Open Market Operations (OMO), Discount Window Operations, Cash Reserve Ratio (CRR), Liquidity Ratio (LR) and Foreign Exchange Net Open Position (NOP) limit. These policy instruments are elucidated below with the view to providing more understanding. They include;

a. Monetary Policy Rate (MPR) – This is an interest rate at which the CBN lends to commercial banks and other clients.

b. Open Market Operation (OMO*)* – This refers to the buying and selling of government securities in the open market in order to expand or contract the amount of money in the banking system, facilitated by the CBN.

d. Cash Reserve Ratio (CRR) – This is a specified minimum fraction of the total deposits of customers, which commercial banks have to hold as reserves either in cash or as deposits with the central bank.

e. Liquidity Ratio (LR) – This is the ratio between the liquid assets and the liabilities of a bank or other institution as set by the central bank.

f. Foreign Exchange Net Open Position (NOP) – This is the net sum of all foreign currency assets and liabilities of a bank or financial institution inclusive of all currency, security or other asset.

Economic Growth

Economic growth has long been considered an important goal of economic policy with a substantial body of research dedicated to explaining how this goal can be achieved (Fadare, 2010).

Economic growth represents the expansion of a country's potential GDP or output. For instance, if the social rate of return on investment exceeds the private return, then tax policies can encourage growth rate and levels of utility. Growth models that incorporate public services, the optimal tax policy lingers on the characteristic of services (Olopade and Olopade, 2010). Moreover, economic growth has provided insight into why states grow at different rates over time; and this influence government monetary stance, her choice of tax rates and expenditure levels that will engender the growth rates.

Economic growth is the increase in the market value of goods and services produced by an economy over time (African Economic Outlook, 2016). It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP (IMF, 2012). Of more importance is the growth ratio of GDP to population (GDP per capita), which is also called per capita income. An increase in per capita income is referred to as intensive growth. GDP growth caused only by increases in population or territory is called extensive growth (Gordon, 1999).

Growth is usually calculated in real terms i.e., inflation-adjusted terms to eliminate the distorting effect of inflation on the price of goods produced. In economics, economic growth or economic growth theory typically refers to growth of potential output, i.e., production at full employment (Bogdanov, 2010).

Monetary Policy in Nigeria

Throughout Nigeria's existence, the CBN has been tasked with the responsibility of implementing monetary policy in accordance with the macroeconomic policy objectives of the federal government of Nigeria (CBN, 2009). These objectives, as contained in the various Acts of the CBN, are broadly defined as the maintenance of internal and external balance. Consequently, monetary policy has been designed, over the years, with a view to attaining price, interest rate and exchange rate stability, maintaining a viable balance of payments position, and achieving accelerated growth of the economy (Nnanna, 2001). The policy framework in Nigeria has evolved over time, depending on political regimes and/or international best practices. Currently, the country targets inflation loosely with plans to migrate to a strict version eventually.

The New Consensus Macroeconomic

An amalgamation of some of the key assumptions of the new-Classical (rational expectations) and the new-Keynesians (short-run rigidities and long-run flexibility) constitutes the bedrock of the NCM model, the policy conclusion of which is that price-stability is the main objective of monetary policy. According to Setterfield (2006), the key elements of the NCM model are the assumption of real wage bargaining, monetary neutrality, supply-driven equilibrium and demand-determined inflation. Following Clarida, Galí and Gertler (1999) and Meyer (2001), these elements are typically summarized by three equations – IS-type AD, PC, and monetary rule (MR) – with micro-foundations in agents' optimisation procedure (Gali, 2008; Walsh, 2003; Woodford, 2003). The views of the NCM are parallel to those of the new-Keynesians and new-Classical in arguing that a Central bank cannot engage in real output stabilisation in the long-run, since the combination of rational expectation and continuous market clearing ensures the emergence of inflationary pressures without output gains. The CB should thus concentrate on long-run price-stability and short-run output stabilisation (Fontana & Palacio-Vera, 2007).

Empirical Literature

The operation of monetary policy in Nigeria is dependent on the use of short term interest rate (which is the monetary policy rate (MPR)), and also the core of inflation targeting (IT) which represents the theoretical framework of this study and also depends on the use of short term interest rate as monetary policy tool. An analysis of the previous studies revealed that majority of the Nigerian based studies did not include this variable in their analysis, however, the studies by Ufoeze, Odimgbe, Ezeabalisi and Alajekwu (2017), Iheanacho (2017), and Musa and Asare (2013) did capture the MPR in their analysis. But however, the work by Iheanacho (2017) had its scope extended to 2017 and using the VECM model. It however used annual data. Similarly, the work of Musa and Asare (2013) used the Vector Error Correction Model (VECM), their study terminated at 2010. Ufoeze, Odimgbe, Ezeabalisi, and Alajekwu (2017) on the other hand had its scope terminating at 2016, their study however used the Multiple regression model in the analysis. In filling the study gap, this work used structural Vector Autorgerssion (SVAR) model which is guided by economic theory in its analysis, while using a higher frequency data to capture the impact of monetary policy on economic growth in the country.

Therefore, as Meyer (2001) puts it- 'the NCM-PC pins down the degree to which prices are sticky in the short-run, allowing scope for both short-run movements in actual output relative to potential and for stabilization policy, while providing a mechanism that ensures a transition to the long-run classic equilibrium'.

By postulating a continuous supply-side equilibrium, the NCM model assumes that inflation is demand driven. Accordingly, the model suggests that supply shocks – $\eta_{PC} \sim iid(0, \sigma^2_{\eta PC})$ are transient, stochastic and neither affect inflation nor inflation expectations (Arestis and Sawyer, 2006). In essence, the NCM assumes that inflation can be controlled by AD management and that the interest rate is the appropriate monetary policy instrument. It further suggests that at the equilibrium rate of interest the output gap is zero (implying also that AD equates AS) and inflation constant. Consequently, deviation of the interest rate from its natural level impacts on the output gap which in turn influences the level of inflation. The assumption of random supply shock with zero mean complements the premise of a constant NAIRU (Non

accelerating inflation rate of unemployment) so that the natural level of output is unaffected by monetary policy shocks (Gali, 2008). Expansionary monetary policies are, thus, steered at demand shocks in order to increase economic activity thereby raising the rate of inflation (Smith and Wickens, 2007). Hence, the final impact of monetary policy is on the rate of inflation and as such this should constitute the policy target. The fundamental trust of the NCM is that the short-term interest rate management would only be effective (i.e. affect inflation rate) if it affects the level of AD (Bain and Howells, 2009). By assuming that inflation is a demand phenomenon, the NCM critically undermines other sources of inflation particularly cost related factors (Gnos and Rochon, 2007).

Methodology

Type and Sources of Data

Secondary data was employed for this study using time series particularly quarterly data spanning 1986: Q1 to 2017: Q4. The data were sourced from the annual statistical bulletin of CBN 2017 edition.

Model Specification

This study adopted the empirical work of Micheal (2012) and as such the variables included in the SVAR model for this study are the Gross Domestic product (*GDP*), the monetary policy rate (*MPR*), inflation rate (*INF*), and the broad money supply (M_2).

$$GDP = f(MPR, INF, M_2) \quad \textbf{3.1}$$

$$LnGDP = \alpha_0 + \alpha_1 LnMPR + \alpha_2 LnINF + \alpha_3 LnM_2 + \varepsilon \quad 3.2$$

where in ε is the error term and assumed to be a white-noise process where $\varepsilon \approx ii(0, \delta^2 \varepsilon)$ since the mean is equal to zero and variance is constant (Bollerslev, 1986). Meanwhile, α is the coefficient of the respective estimated variables, *LnGDP* is the natural log of real GDP, *LnMPR* is the natural log monetary policy rate, *INF*is inflation rate (proxied by the consumer price index), while LnM_2 is the natural log of broad money supply.

Technique of data analysis

Unit Root Test

Since most of the macroeconomic time series are non-stationary (Nelson and Plosser, 1982) and thus conducive to spurious regression, stationarity is first tested. For this purpose, theAugmented Dickey- Fuller (ADF) test is done by carrying out a unit root test based on the following structure;

$$\Delta X_t = \kappa + \phi t + \Theta X_{t-1} + \sum_{i=1}^{n} \varphi_i \Delta X_{t-1} + \varepsilon_t, \quad 3.15$$

VAR

Here, a VAR reduced form specification shall be presented to enable specification of the SVAR; the SVAR model exhibits the features of a reduced-form statistical model of the data generating process. The starting point of SVAR analysis is the reduced form of VAR (Gottschhalk, 2001).

Reduced VAR

$$\begin{bmatrix} LnGDP \\ LnINF \\ LnMPR \\ LnM_2 \end{bmatrix} = \begin{bmatrix} \psi_1 \\ \psi_2 \\ \psi_3 \\ \psi_4 \end{bmatrix} = \sum_{i=1}^{k} \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{bmatrix} \begin{bmatrix} LnGDP_{t-1} \\ LnINF_{t-1} \\ LnMPR_{t-1} \\ LnM_{2t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}$$

The variables *LnGDP, LnINF, LnMPR,* and LnM_2 represents economic growth (growth of gross domestic output), inflation rate (proxied by consumer price index), the monetary policy rate, and the broad money supply respectively. Where the column vector on the left hand side of each equations denotes the vector of policy and non-policy variables, the optimal lag order of the VAR specification is *k*, the intercept is $\Psi's$, that is, vectors of constants, $\alpha's$ are the coefficients of the variables of the model that is, the matrix of coefficients on the variables lagged *j* periods, $v's$ are the VAR errors, that is, vectors of serially uncorrelated disturbances that have zero mean, unit-variance and zero-co-variance matrix. Following Granger (1986), the study re-specifies the general VAR model in an error correction representation.

There are basically two tools of analysis under the SVAR model as outlined above and as asserted by Enders (2014), they are:

i. **Impulse Response Function (IRF)**: This is a tool which allows the tracing out of the time path of various shocks on the variables contained in the VAR system. It shows the time path response of variable to shock in itself and shock to other variables in the model.
ii. **Forecast Error Variance Decomposition (FEVD)**: This shows the proportion of movement in a sequence that occurs due to its own shocks versus shocks to other variables in the model. In other words, it shows the apportionment of forecasting errors of a variable to itself and other variables in the system.

Table 1: *Augmented Dickey-Fuller Unit Root Test Result*

Variable	Order	ADF Calculated	ADF Critical value	Order of integration	Remark
LnGDP	At levels	-2.485375	-3.445590		.
	1st difference	-12.59508	-3.445877	1(1)	Stationary
LnINF	At levels	-3.207928	-3.445590		.
	1st difference	-11.93759	-3.445877	1(1)	Stationary
LnMPR	At levels	-2.672659	-3.445590		.
	1st difference	-11.18130	-3.445877	1(1)	Stationary
LnM_2	At levels	-0.060158	-3.445590		.
	1st difference	-11.87261	-3.445877	1(1)	Stationary

Source: Author's Computation using E-views.

The result of the ADF unit root test on Table 1 showed that the variables of *LnGDP*,*LnINF*, *LnMPR*, and LnM_2were all non-stationary at levels, but at 1st difference they were all found to be stationary because their computed ADF absolute values were greater than their critical values at the 5% level. From this test, all the variables were thus found to be stationary at 1st difference, meeting the stationarity condition.

Table 2:*VAR Lag Order Selection Criteria Result*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-340.0987	NA	0.003023	5.549980	5.640956	5.586936
1	381.9405	1385.849	3.43E-08	-5.837750	-5.382866*	-5.652965*
2	402.9306	38.93329	3.16E-08*	-5.918235*	-5.099444	-5.585623
3	406.3477	6.117734	3.88E-08	-5.715286	-4.532587	-5.234846
4	423.9319	30.34683*	3.80E-08	-5.740836	-4.194230	-5.112569

* indicates lag order selected by the criterion

Source: Author's Computation using E-views.

Where LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion the VAR lag order selection test result on Table 2 showed that the SIC selected 1 lag. As such, this study used 1 lag to carry out the VAR estimation.

Impulse Response Test

The Impulse Response Function (IRF) is a tool used to trace out the time path of the various shocks on the variables contained in the VAR system. It shows the time path of the response of variable to shocks in itself and shocks to other variables in the model. The IRFs are very useful in analyzing the interactions among variables in a VAR model. The impulses represent the reactions of the variables to shocks hitting the system. The interpretation for the IRFs are split into 10 periods to effectively trace the effect of shocks to variables, it particularly uses period 3 and 10 to represent the short and long-run periods respectively. The responses of the variables of interest of this study are presented and interpreted on Fig. 5.

Response of GDP (*LnGDP*) to shocks from Inflation (*LnINF)*

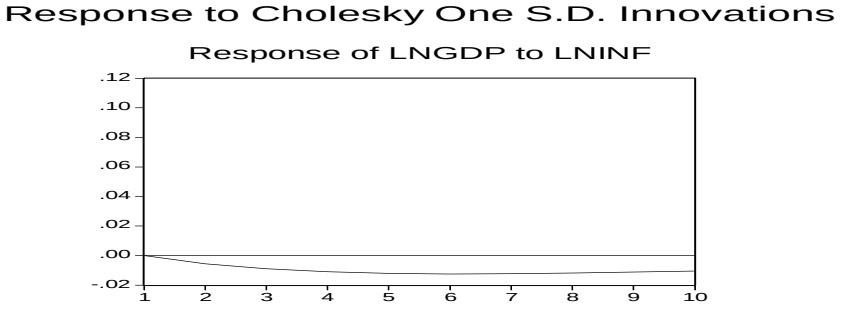

Fig. 1: *Response of GDP (LnGDP) to shocks from Inflation (LnINF)*

Figure 1 shows the response of GDP (*LnRGDP*) to shocks from inflation (*LnINF*). From period 1 to 10, the graph shows a steady and consistent negative slope of *LnGDP* to shocks from *LnINF*. The graph shows *LnINF*negatively affecting *LnGDP* over the 10 periods. This indicates that in both the short-run period and the long-run period *LnINF* negatively affected *LnGDP*. The inflation variable followed apriori expectation, indicating that inflation is detrimental to economic growth necessitating the NCM framework of inflation targeting so as to keep it at manageable levels.

Response of GDP (*LnGDP*) to shocks from Monetary Policy Rate (*LnMPR)*

The Monetary Policy Rate (MPR) for this study represents the variable of interest that basically captures government's monetary policy stance as it relates to inflation targeting and its subsequent transmission to the economy. The *LnMPR* positively affected growth through the 10 periods under investigation. Its effect was however minimal considering that both in the short-run and in the long-run it maintained a value that was a little below 0.02. This result is in conformity with the inflation targeting framework (IT) framework that sound inflation targeting at manageable levels ultimately should have a positive impact on economic growth.

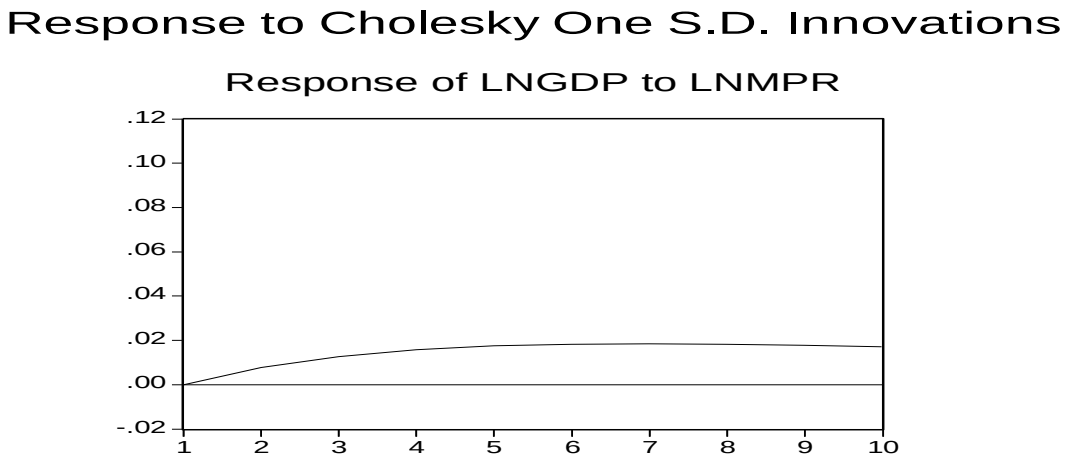

Fig. 2: *Response of GDP (LnGDP) to shocks from Monetary Policy Rate (LnMPR)*

Response of GDP (*LnGDP*) to shocks from Money Supply (*LnM$_2$)*

The broad money supply variable (*LnM$_2$*) represents M_1, plus time savings, and foreign currency deposits of resident sectors other than the central government. The M_2 quantifies the amount of money in circulation and it is also used to explain the different economic monetary conditions. This variable represents the use of other monetary policy instrument other than the MPR in this study, and this is based on the fact that monetarists' argue that there is stable relationship between the intermediate target M_2 on one hand and output, inflation, unemployment, and other relevant economic variables on the other; and government is able to control M_2. The slope of *LnGDP* responding to shocks from *LnM$_2$*maintained a steady upward positive relationship all through the 10 periods. With a value of about 0.02 in the short-run period, it shows

*LnGDP*growing as a result of shocks from *LnM₂*to a little below 0.04 in the long-run period. This result points to the fact that broad money supply represents an important monetary policy instrument in monetary policy design in Nigeria. Its complementary role helps to achieve a stable inflation and output level in the economy.

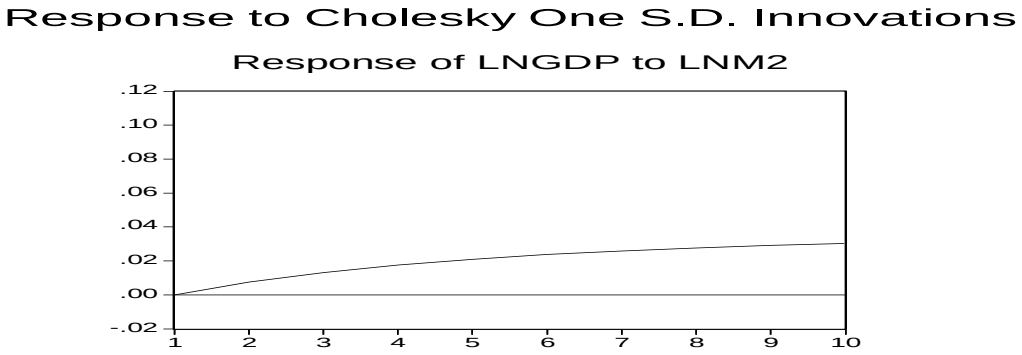

Figure 3: *Response of GDP (LnGDP) to shocks from Broad Money Supply (LnM₂).*

Response of Inflation (*LnINF*) to shocks from Monetary Policy rate (*LnMPR)*

The impulse response function of Inflation (*LnINF*) to shocks from Monetary Policy rate (*LnMPR)*in this study assesses the efficacy of an inflation targeting (IT) type monetary policy in Nigeria which represents the use of short term interest rate to achieve price-stability. Over the 10 periods, the slope of *LnINF*remained below 0.04. Although the ideal situation was to keep inflation at negative levels (which indicates a reduction in inflation), the MPR however kept inflation at manageable levels at all times represents the core of an IT policy; This study, therefore concluded that although the MPR did not reduce inflation, it however kept the inflation rate below the 0.04 threshold over the 10 period.

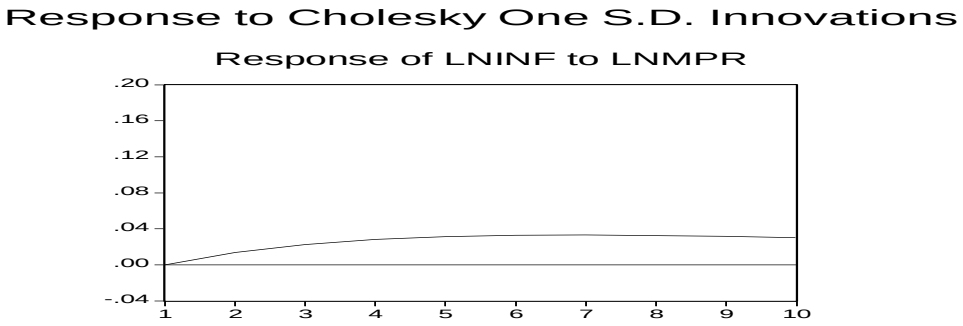

Figure 4: *Response of Inflation (LnINF) to shocks from Monetary Policy Rate (LnMPR).*

Response of Inflation (*LnINF*) to shocks from broad Money supply (*M₂*)

The impulse response function of Inflation (*LnINF*) to shocks from broad money supply (*M₂*) presented in Figure 5 indicated that the response of *LnINF*to shocks from *M₂* kept inflation at much more lower level in comparison with the impulses from MPR. The lower the impulse the

better the monetary policy tool, since the target is on keeping inflation at lower levels, As such result points to the fact that the M_2 had more efficacy than the MPR at keeping inflation at manageable levels.

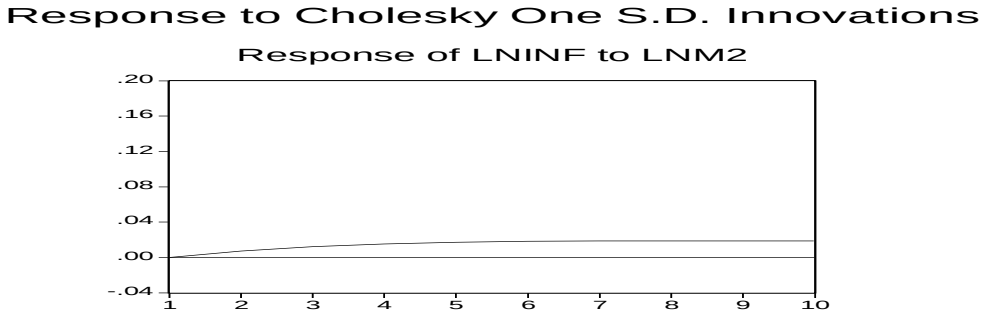

Figure 5: *Response of Inflation (LnINF) to shocks from Monetary Policy Rate (LnMPR).*

Variance Decomposition Test

The Forecast Error Variance Decomposition (FEVD) is used to determine the proportion of movement in a sequence that occurs due to its own shock versus shocks to other variables in the model. In other words, the variance decomposition shows the apportionment of forecasting errors of a variable to itself and other variables in the system. For analysis, this study used period 3 and 10 to represent the short and long-run periods respectively.

Variance Decomposition of *LnGDP*

The variance decomposition of GDP (*LnGDP*) for the SVAR estimation is presented in Table 4. The test result showed that own shock constituted the most source of fluctuation in the model followed by shocks from broad Money supply (LnM_2) and then Monetary Policy Rate (*LnMPR*). The variance decomposition of *LnGDP* indicates that a one standard deviation positive shock or innovation to LnM_2 caused *LnGDP* to change by about 1 per cent in the short-run, in the long-run however, it caused *LnGDP* to change by 7 per cent. Shocks from *LnMPR* caused 1 per cent and 4 per cent of fluctuations in *LnGDP* in the short and long-run respectively. While, shocks from *LnINF* caused 0.4 per cent and 2 per cent of fluctuations in *LnGDP* in both the short and long-run respectively. The variance decomposition of *LnGDP* showed that the broad supply had more effect on *LnGDP*than the MPR for the period under analysis.

Table 3: *Variance Decomposition of LnRGDP*

Period	S.E.	*LnGDP*	*LnINF*	*LnMPR*	LnM_2
1	0.108964	100.0000	0.000000	0.000000	0.000000
2	0.146064	99.32391	0.143389	0.274207	0.258492
3	0.170964	98.09383	0.383032	0.745128	0.778010
4	0.189829	96.57609	0.650617	1.288757	1.484541
5	0.205033	94.94316	0.906336	1.830164	2.320338
6	0.217758	93.29760	1.130231	2.329224	3.242944
7	0.228683	91.69506	1.314764	2.768064	4.222108
8	0.238237	90.16201	1.459507	3.141930	5.236557
9	0.246715	88.70779	1.567691	3.453181	6.271334
10	0.254326	87.33245	1.644128	3.707598	7.315824

Source: Author's Computation using E-views.

Variance Decomposition of *LnINF*

The result of the variance decomposition of Inflation (*LnINF*) is presented in Table 5. The result showed that innovation or shock to *LnMPR* caused more fluctuation to *LnINF* in both the short-run and in the long-run after own shock. Shocks from *LnMPR* caused 2 per cents and 5 per cent of fluctuation in *LnINF* in the short and long-run respectively. A one standard deviation positive shock or innovation to LnM_2 caused *LnINF*to fluctuate by 0.22 per cent and 2 per cents respectively in the short and long-run. This result indicated that the MPR remains an important component in the operation of monetary policy in Nigeria, thus supporting the result of the impulse response test on the efficacy of inflation targeting (IT) monetary policy framework.

Table 4: *Variance Decomposition of LnINF*

Period	S.E.	*LnGDP*	*LnINF*	*LnMPR*	LnM_2
1	0.198056	0.926981	99.07302	0.000000	0.000000
2	0.261096	1.275051	98.37229	0.276796	0.075868
3	0.300267	1.577573	97.42639	0.779401	0.216633
4	0.327462	1.819562	96.38920	1.396900	0.394337
5	0.347409	1.999515	95.35644	2.054127	0.589918
6	0.362529	2.123401	94.38171	2.703692	0.791194
7	0.374241	2.200537	93.49063	3.317987	0.990848
8	0.383451	2.241053	92.69146	3.882674	1.184816
9	0.390778	2.254506	91.98250	4.391894	1.371099
10	0.396659	2.249216	91.35685	4.844967	1.548963

Source: Author's Computation using E-views

Post-Estimation Test

Autocorrelation Test Result

The result of the Breusch-Godfrey serial correlation LM test used to test for serial correlation is presented in Table 5. Conducted at the 5% level, the probabilities of its lags were all greater than the 5% level. This study as such, accepts the null hypothesis for this test which states that there is no serial correlation in the model.

Table 5: *The Breusch-Godfrey Serial Correlation LM Test Result*

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	6.601339	16	0.9802	0.408127	(16, 339.7)	0.9802
2	5.879297	16	0.9893	0.363108	(16, 339.7)	0.9894

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	6.601339	16	0.9802	0.408127	(16, 339.7)	0.9802
2	34.87432	32	0.3329	1.095882	(32, 396.2)	0.3337

Source: Author's Computation using E-views.

Normality Test Result

The Jarque-Bera normality test result which was used to ascertain the distribution of the residuals in the model is presented on Figure 6. The result of the Jarque-Bera statistics has skewness and kurtosis that matches that of a normal distribution. The probability value of the Jarque-Bera statistics of 0.34is greater than the 5% level. As such the null hypothesis for this test which states that the residuals are normally distributed is accepted.

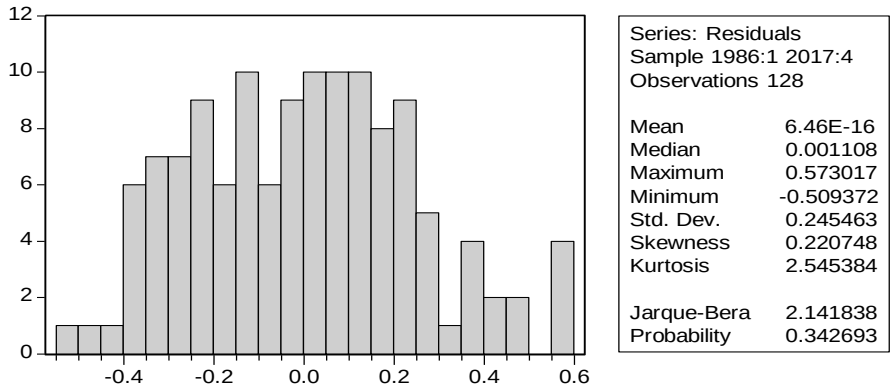

Fig. 6: *Jarque-Bera Normality Test Result*

Stability Test Result

The Inverse roots of AR characteristic polynomial VAR stability test is presented on Figure 6. The Inverse roots of the AR characteristic polynomial graph have roots with modulus which are less than one and they lie within the unit circle. It therefore means that the model is stable and the impulse response standard errors would be valid and the conclusions of the model would also be reliable. Therefore, the VAR model satisfies the dynamic stability condition.

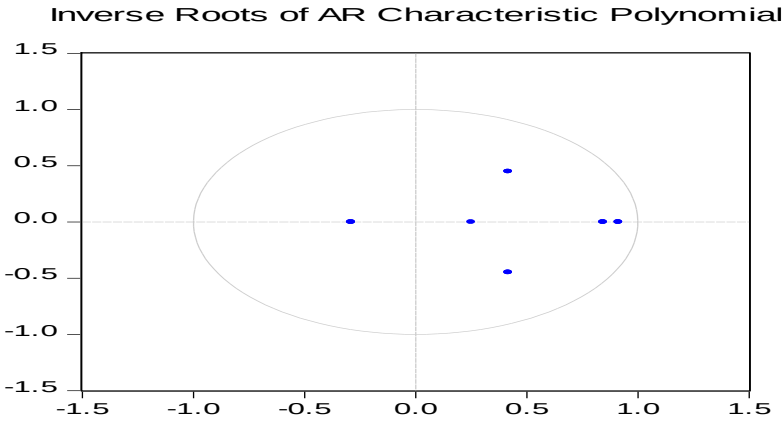

Fig. 7:*Inverse Roots of AR Characteristic Polynomial VAR Stability Test Result*

Conclusion

The study assessed the effect of monetary policy on economic growth in Nigeria from 1986 to 2017. It used quarterly time series data spanning the period between 1986Q1 and 2017Q4. The structural vector autoregression (SVAR) analysis was used to assess the effect of monetary policy following the framework of inflation targeting (IT) on economic growth in Nigeria. The findings of the study show that output and prices respond positively to a positive shock in MPR and real money supply. There is a positive relationship between the MPR and real money shock and growth of real domestic output in Nigeria. Although, the positive responses of output to MPR was less compared to that from the broad money supply, the broad money supply was however a much more effective monetary policy tool to achieve growth and control inflation than the MPR. Despite the result showed that the Nigerian economy responded positively to the IT framework and the use of M_2, their effects were minimal, pointing to the weak institutional features and fiscal dominance; these, jointly debilitate the conduct of monetary policy, and diminishes its reliability The study concludes that the MPR was however a good monetary policy tool, but there is need for other instruments which the central bank can control effectively.

Recommendation

Based on the findings, the study recommends the following;

i. That Central Bank of Nigeria (CBN) should adopt monetary policy instrument which combines quantity-based and price-based nominal anchors, to improve policy targets.
ii. CBN to embark on a comprehensive monitoring of monetary instruments and aggregates. In particular, effective monetary policy implementation should focus on controlling and manipulating instruments such as the lending rates (with more emphasis on the maximum lending rate because it reflects the true cost of borrowing in the economy), as major tool for transmitting monetary impulses for economic performance.
iii. There is need for the country's large shadow economy to be integrated into a formal financial sector. This could further deepen financial intermediation in in the country.
iv. Thus, there is the need to fortify the financial sector reform drive by strengthening its regulatory and supervisory functions. Along this line, the Central Bank of Nigeria should improve on the level of liquidity management.

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