

Effectiveness of Monetary Policy on Inflation Targeting in Nigeria (1990 – 2013)

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ABSTRACT: This study examined the effectiveness of monetary policy on inflation targeting in Nigeria between 1990 and 2013, employing Johansen co-integration and Error Correction Model as estimation techniques. The data for the variables were sourced from Central Bank of Nigeria (CBN) statistical Bulletin. The results of the study showed that, monetary policy rate and money supply have positive relationship with inflation while exchange rate and budget deficit have negative relationship with inflation. These imply that, contractionary monetary policy rate as well as reduction in money supply will lead to attainment of inflation targeting while productive use of budget deficit will achieve the desired and targeted inflation in Nigeria. Based on these findings, the study recommended that, government should demonstrate a high sense of transparency in its monetary and fiscal operations in order to curb high prevalence of money supply in order to reduce the incidence of inflation in Nigeria. Moreover, government should intensify more effort on checking corruption, misappropriation of funds both in public and private sectors for proper deficit financing.

KEYWORDS: *Monetary Policy, Budget Deficit, Inflation Targeting and Johansen Co-integration.*

I. INTRODUCTION

Monetary policy is a deliberate action of the monetary authority to influence the quantity, cost and availability of money credit in order to achieve desired macroeconomic objectives of internal and external balances (CBN, 2011). One of the main objectives of monetary policy for most monetary authorities all over the world is the attainment of price stability. Monetary authority had regarded high rate of inflation as harmful to the economy, therefore, aim at putting it under control through the application of various monetary instruments. For instance, the monetary authority in Nigeria has introduced several measures through monetary policy strategies aiming at achieving the macroeconomic objectives such as price stability, reduction in the rate of unemployment, ensure economic growth and so on. Some of these policies measure put-in-place by the monetary authority include exchange rate targeting, inflation targeting, monetary targeting and the likes.

The monetary authorities all over the world have adopted a methodological framework known as inflation targeting aimed at controlling the general price level often confronted by instability in the price level. CBN (2011) described inflation targeting as a framework for monetary policy in which the Central Bank makes an explicit commitment to conduct monetary policy to meet publicly announced numerical inflation target within a particular time frame. It can also be referred to as a framework in which the primary goal of monetary policy is to achieve price stability in the form of an inflation targeting. On his own part, Mason (1997) argued that inflation targeting as a monetary policy framework containing an explicit quantitative target for future inflation, a commitment to that target as an overriding objective, a model for predicting future inflation and an operational procedure for adjusting monetary instrument in case forecast inflation differs from its target.

Over the years, monetary authority in Nigeria has been embarking on various monetary policy regimes with the core objective of price stability. Price stability is said to exist if the price level rises by just 2 per cent or below per year in the medium term. This has not been the case in Nigeria. Over the years, inflation rate in Nigeria were in double digits especially in 1990s except 1990 and 1997 when the rate of inflation stood at 7.4 and 8.5 per cent respectively. While in 1995, inflation in Nigeria hit the roof when the rate of inflation stood at 72.8 per cent but later declined to 29.3 and 8.5 per cent in 1996 and 1997 respectively. For all the periods under the scope of this study, inflation rate in Nigeria does not satisfy 2 per cent standard for measuring price stability. Despite the various monetary policies strategies adopted in Nigeria by the monetary authority, the least value of inflation rate recorded in Nigeria was 5.4 per cent in 1986 and 2007. Based on this, it is obvious that price has not been stable and targeted level of inflation is yet to be achieved in Nigeria.

Nigeria government had made several efforts toward the achievement of economic growth by ensuring price stability in the country through the monetary authority by adopting a methodological framework called inflation targeting in order to bring inflation under control. The monetary authority over the years has been working round the clock to ensure that targeted rate inflation is achieved by implementing some of the monetary policy instruments such as monetary policy rate, money supply, and so on. Despite these efforts, inflation rate has been on increase and targeted rate of inflation over the years remained at largely unachieved. This has emanated a question of how effective is monetary policy in targeted rate of inflation in Nigeria. In line with this question, a lot of studies have been carried out on the effectiveness of monetary policy towards the achievement targeted rate of inflation in the country. However, there are controversies from the findings of the studies about the effectiveness of monetary policy on inflation targeting in Nigeria. Some researchers argued that, monetary policy is an effective policy measure to achieve inflation targeting, these researchers include Gbadebo and Muhammed (2015), Herberger (1978), McCallum and Nelson (2010), Graude and Polan (2005). While some researchers such as Savastano and Shatan (1997), Minsky (2000), Bernanke (2005) were of the opinion that monetary policy is not an effective instrument to achieve inflation targeting. Most of these studies suffer from several setbacks, such as Akosah (2015) and Kumo (2015) who made use of VECM and GARCH respectively to establish the effectiveness of monetary policy on inflation targeting. The estimation techniques adopted by the researchers are grossly inadequate. Hence, applying the finding of these studies to the issues at hand may also lead to misconceptions. It is against this background that this study seeks to investigate the effectiveness of monetary policy on inflation targeting in Nigeria. This study also wishes to achieve robust results by including exchange rate which also fuels inflation that was missed in all previous studies.

II. REVIEW OF EMPIRICAL LITERATURE

The effectiveness of monetary policy in achieving price stability has become a major issue in literature, most especially in the developing countries where most of these countries are taking serious measures to achieve stable prices in the local economies in order to stimulate the needed economic growth and development. Aikaeli (2007) investigated the relationship between money supply and inflation in Tanzania. The study shows that money supply is effective in curtailing inflation but it will take up to a period of seven (7) months before the effect of money supply could be felt on inflation in Tanzania. Gbadebo and Muhammed (2015) examined the effectiveness of monetary policy as an anti-inflationary measure in Nigeria, using Co-integration and Error Correction Model (ECM). The results indicate that, money supply is one of the major causes of inflation in Nigeria. Kumo (2015) assessed the impact of inflation targeting monetary policy, inflation volatility and economic growth in South Africa between 1960 and 2013, using GARCH model on quarterly data. The results show that monetary policy is an effective policy in achieving targeted inflation in South Africa. Also, Akosah (2015) examines the effectiveness of monetary policy transmission mechanism in Ghana using Vector Error Correction Model (VECM) and VAR Granger Causality Test on the collected data from 2002 to 2014. The study shows that monetary policy plays an important role in achieving targeted inflation in Ghana. Oladipo and Akinbobola (2011) used pair-wise granger causality test in determining the causal relationship among the variables. The results showed that no causal relationship from inflation to budget deficit was found. However, causal link from budget deficit to inflation was established in Nigeria. Again, Chimobi and Igwe (2010) examine the casual-link among budget deficits, money supply growth and inflation, using vector error correction model (VECM) and pair-wise granger casualty test. They found that, inflation and budget as a proxy for increase in money supply have bilateral/feedback link.

However, Adebisi (2009) determined the relationship between inflation and monetary policy instruments in Nigeria and Ghana, the study employed Vector auto-regressive model and the results indicate that money supply did not really have strong impact on inflation when compare it with the impact of stock price on inflation in both Nigeria and Ghana.

2.1 Theoretical Framework and Methodology

Fisher's Quantity Theory of Money

The Fisherian approach was developed by classical economist but was well developed and expanded by Irvin Fisher in 1911. He summarized a given economy in what is known as equation of exchange. From the equation, the circulation of money stock is related to the amount of money expended in the economy during a given period of time.

According to the theory assuming that average price of a given commodity say the *ith* commodity is p_1 and the quantity sold of the same commodity is q_1 , the total expenditure on that commodity is equal to $p_1 q_1$. Suppose we have k commodities in the economy.

$$\sum pq = p_1 q_1 + p_2 q_2 + \dots + p_k q_k \dots \dots \dots eqn.1$$

$$\Sigma p_1q = PQ \dots \dots \dots \text{eqn.2}$$

Where p is index of price of goods sold, q is index of quantity of goods sold and PQ is the total monetary expenditure on goods. The average turnover of money in the process of exchange these goods will be equal to:

$$V = \frac{PQ}{M} \dots \dots \dots \text{eqn.3}$$

Where V is the velocity of circulation and M is total money stock.

$$MV = PQ \dots \dots \dots \text{eqn.4}$$

It is assumed that an increase in the supply of money (M) will in general not affect the velocity of circulation (V) or the volume of transaction (Q) at full employment level.

Hence, price level (P) will vary directly with the quantity of money (M)

$$P = f(M) \dots \dots \dots \text{eqn.5}$$

2.2 Model Specification

The aim of this is to investigate the effectiveness of the monetary policy on inflation targeting in Nigeria. The study employed the most effective empirical method of single equation model, treating inflation rate as dependent variable while monetary policy is regarded as independent variable, using monetary policy rate, money supply and interest rate as proxy for monetary policy. Inflation which is a continual change in price index is dependent variable while Monetary Policy Rate, Money Supply, budget deficit and Exchange Rate as control variables of monetary instrument are independent variables. The model specification mirrors the work of Adebisi (2009) with little modification which took its root from Fisher Quantity theory of money. The model specification considers the following variables: Inflation (INF), Monetary Policy Rate (MPR), Money Supply (MS), Budget Deficit (BDF) and Exchange Rate (EXR).

The model is specified thus:

$$INF = f(MPR, MS, BDF, EXR) \dots \dots \dots \text{eqn.6}$$

Explicit stated

$$INF = \alpha_0 + \alpha_1 MPR + \alpha_2 MS + \alpha_3 BDF + \alpha_4 EXR + U_t \dots \dots \dots \text{eqn.7}$$

Where α_1 , α_2 , α_3 and α_4 are the coefficient of MPR, MS, BDF and EXR respectively, while α_0 represents the constant value called intercept.

2.3 Sources of Data

Data for the variables were secondary data and variables such as inflation, monetary policy rate, money supply as well as interest rate were sourced from central bank of Nigeria (CBN) while exchange rate was sourced from World Bank Statistical Bulletin. The study makes use of annual data spanned from 1990 to 2013. In order to achieve the objective of the research which is to determine the effectiveness of monetary policy on inflation targeting in Nigeria, the study employs Joselius Johansen co-integration and error correction model as the estimating techniques.

2.4 Result and Discussion of the Findings

Table 1: Descriptive Statistics of the Variable

	INF	MPR	Ms	BDF	EXR
Mean	19.7458	13.78917	4198.013	2.6836	88.6248
Median	12.5500	13.5000	1432.600	-2.6555	114.8900
Maximum	72.8000	26.0000	17307.40	1.1000	157.5000
Minimum	5.4000	6.1300	57.6000	-6.7300	8.0400
Std.Dev	18.8936	4.2091	5511.150	2.2267	57.7238
Probability	0.0005	0.1373	0.0542	0.4726	0.2135
Observation	24	24	24	24	24

Computed from Data 2014

From table 1 the average rate of inflation during the period under review about 20 %, while the minimum rate of inflation 5.4% and the maximum of 72.8%. The average value of monetary policy rate, money supply, budget deficit and exchange rate are 13.79% , 4198.01% , 2.68% and 88.63% respectively. Also the minimum and maximum values of the variables are stated in table 1 above.

Unit Root Test**Table 4.2: Augmented Dickey Fuller (ADF) unit root test result.**

Variables	At Levels			At First Difference			Order of integration
	ADF Test	1%	5%	ADF Test	1%	5%	
INF	-2.8380	-3.6329	-2.9484	-5.5146	-3.6394	-2.9511	I(1)
MPR	-2.8253	-3.6329	-2.9484	5.5146	-3.6394	-2.6143	I(1)
EXR	-0.0952	-3.6329	-2.9484	5.5518	-3.6394	-2.9511	I(1)
MS	-2.1116	-3.6329	-2.9484	-5.5585	-3.6394	-2.9511	I(1)
BDF	-2.8858	-3.6329	-2.9484	-3.1951	-3.711	-2.9810	I(1)

Judging from the unit root result presented in the Table 4.2, all the variables in the model were not stationary at levels but attained stationarity at first difference. This implies that the series co move with each other and does not drift apart from each other. This provides indications that there is possibility that there exists a relationship at both short-run and long- run among the variables. The order of integration at which stationarity is attained determines the estimation technique suitable for each model. This stationary order revealed that co-integration for the series can be estimated with the use of Johansen co-integration as all variables were stationary at integration of order one I(1).

Table 4.3: Johansen co-integration test result (Trace statistic and Eigen value statistic test)

Hypothesized No of CE(s)	Eigen-statistic	Trace statistics	5% c.v	Prob.
None	0.622123	87.93973	69.81889	0.0009
At most 1*	0.550241	54.85137	47.85613	0.0096
At most 2*	0.403845	27.68393	29.79707	0.0860
At most 3*	0.255954	10.09727	15.49471	0.2733
At most 4*	0.001325	0.045094	3.841466	0.8318

Trace test indicates 2 co-integrating equation at the 0.05 level.

*denote rejection of the hypothesis at the 0.05 level

The result of the trace test in table 4.3 shows that there are 2 co-integrating equations in the series. The presence of co-integrating relationships is accepted as it indicates presence of long-run relationship among variables. We therefore proceed to estimate the long-run coefficient of the variable, having established the existence of long-run relationship among variables.

The Johansen co-integration normalized result shows the magnitude and the direction of the relationship. This is presented as:

$$INF = 6.68986 + 1.03835MPR - 0.008636EXR + 0.331228MS - 0.30198BDF$$

The result of the normalized co-integrating test based on Johansen co-integration test revealed that a positive relationship exists between MPR, MS and inflation while there is negative link between EXR, BDF and inflation.

Table 4.4 :Short- run Error Correction Model

Variables	Coefficient	Std error	t-statistics
D ECM (-1)	-2.00058	-2.72917	-0.73304
D (INF(-1))	-0.04689	-2.47655	-0.01893
D MPR (-1)	0.065022	-2.50705	0.02594
D EXR (-1)	-0.10249	-0.27104	-0.37812
D MS (-1)	0.344228	-1.24412	0.27668
D BDF (-1)	-1.66094	-1.67466	-0.99180

R- Squared 0.3857

F – Statistic 1.20802

The result of the ECM in table 2 indicates that the speed of adjustment of 200% and it is negatively signed indicating that the errors are corrected. The lag of MPR and MS exhibit a positive relationship with inflation. A one percent increase in MPR leads to increase in inflation by almost 7% while one percent increase in money supply bring about 34% increase in inflation. The implication is that MPR and MS are strong factors capable of fuelling inflation in Nigeria. The lag of exchange rate and budget deficit confirm a negative relationship with inflation. A one percent increase in exchange rate and budget deficit will pull down inflation by about 10% and 17% respectively. This indicates that if budget deficit is centred on development projects and productive activities, it is capable of reducing inflation in the country. The R-squared indicates that the variables are able to capture 39% of the factors affecting inflation of the country.

2.5 Conclusion and Policy Recommendations

This study revealed that monetary policy instruments have a very serious impact on price level (inflation) in Nigeria over the period under review. The findings of this study show that monetary policy rate and money supply have positive relationship on inflation target in Nigeria and this finding is in agreement with the a prior expectation of this study. The study concludes that increased money supply and monetary policy rate are responsible factors causing inflation in Nigeria. The result also exhibits negative relationship between budget deficit, exchange rate and inflation. Therefore, the study also concludes that if budget deficit is channelled into productive activities, it is capable of reducing inflation rate in Nigeria while appreciation of Nigeria's currency which will make import to be cheaper and also reduced imported inflation. Based on the findings, Nigerian government should demonstrate a high sense of transparency in its monetary and fiscal operations in order to curb high prevalence of money supply in order to reduce the incidence of inflation in Nigeria. Moreover, government should intensify more effort on checking corruption, misappropriation of funds both in public and private sectors for proper deficit financing.

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