

The Critical and Logical Analysis of the Impact of Monetary Policy on Macroeconomic Aggregates

Ajaude, Edward Nkamare, Stephen Ekpo* James, Godwin Bassey
Department of Banking and Finance, University of Calabar, Cross River State, Nigeria

* nkamares@yahoo.com

Abstract

The study critically and logically analyzed the impact of monetary policy on macroeconomic aggregates (inflation and interest rate). The objectives were; to examine the effect of money supply, interest rate, cash reserve requirement on inflation. To ascertain the effect of monetary policy instruments on macroeconomic aggregate (inflation), secondary source of data was employed and extracted from Central Bank statistical Bulletin. Ordinary least square of multiple regression technique was used to statistically analyze the relationship between dependent and independent variables. The findings revealed that monetary policy had a positive impact on macroeconomic aggregate (inflation), also shown that monetary policy affected interest rate positively. The study recommended that effective monetary policy should focus on manipulating instruments and emphasis should be placed on the use of interest rates and inflation to manage the economy.

Keywords: Inflation, Interest rate

1. Introduction

The monetary policy of a country deals with control of money stock (liquidity) and therefore interest rate; in order to influence such macro-economic variables as inflation, employment, balance of payment, aggregate output in the desired direction. There is no standard and ideal structure of monetary policy target and instrument, the instrument varies from country to country, depending on the size and stage of development of the financial market (Maddale, 2008).

Over the years, the objective of monetary policy has remained the attainment of external balance. However, emphasis on techniques to achieve this objective has change over the years. There have been two major phases in the pursuit of monetary policy namely, before and after 1986. The first phase placed emphasis on the direct monetary control while the second relies on market mechanisms (Nzotta, 2004).

The monetary policy before 1986; the economic environment that guided monetary policy before 1986 was characterized by the dominant1 of the oil sector, the expanding role of the public sectors in the economy, and overdependence on the external sector. In order to maintain price stability and a healthy balance of payment position, monetary management depend on the use of direct monetary instrument such as credit ceiling, selective credit controls, administered interest and exchange rate, as well as the perception of cash reserve requirement and special deposits (Starr, 2005).

1.1 Statement of the problem

Many attempts being made by the Nigeria authorities to attain higher rate of economic growth and development have generally being accompanied by certain degree of price increase in recent years, the phenomenon developed into several and prolonged inflation and stagflation. Indeed, it is increasingly being recognized that a process of economic growth is likely to provoke inflationary pressures. However, whether the problem of inflation in this country is due to mismanagement of monetary policy tools or structural deficiencies still remain a controversial matter

1.2 Objectives of the study

The general objective of the study is to critically examine the impact of monetary policy on macroeconomic aggregate. The specific objectives of the study are:

1. To examine the effect of money supply on inflation.
2. To examine the impact of interest rate on inflation.
3. To establish the relationship between cash reserve requirement on inflation.
4. To ascertain the effect of monetary policy instruments on macroeconomic aggregate.

1.3 Research questions

The formulated questions of the study are:

1. How does money supply affect inflation?
2. How does interest rate affect inflation?
3. What is the relationship between cash reserve requirement and inflation?
4. To what extent do monetary policy instruments affect macroeconomic aggregate?

1.4 Research hypotheses

The formulated hypotheses are tested in null form.

H₀1: There is no significant relationship between money supply and inflation.

H₀2: There is no significant relationship between interest rate and inflation.

H₀3: There is no significant relationship between cash reserve requirement and inflation.

H₀4: There is no significant relationship between monetary policy instruments and macroeconomic aggregate.

1.5 Significance of the study

On completion of the study, the research result would be beneficial to policy makers, government and its agent, ministers of finance, investors – both foreign indigenous and the entire Nigeria populace.

The study will also study the type of inflation, causes and ways of controlling it and its impact on the economy.

1.6 Scope of the study

The study is concerned with the analysis of the impact of monetary policy on macroeconomic aggregate. In particular, the years under review will be from 1990-2013.

1.7 Organisation of the Study

This study is divided into five sections. Section one introduces the background to the study, the objectives of study, the statement of problem, research questions, the hypotheses to be tested, the significance of the study and the scope. Section two reviews literature relating to the study. Section three examines the research methodology used in this study. Here, the model, method of data analysis and others are specified. Section four examines the data analysis results interpretation. Section five deals with the summary of the study, conclusion and recommendations.

2. Literature review and theoretical framework

2.1 Theoretical framework

2.1.1 The classical view

Money, according to the classical theorists is a veil. It is neutral in its effects on the economy. It simply affects the price level, but nothing else, an increase in the money supply leads to an increase in the price level, but the real income, the rate of interest and the level of real economic activity remain unaffected (Edame,2000).

The classicalists believed that there was always full employment in the economy. At the same time, they recognized the existence of unemployment in the event of downward rigidity of money wages. Such a situation could be corrected by an expansionary monetary policy.

2.1.2 The Keynesian view

In the Keynesian analysis, monetary policy plays a crucial role in affecting economic activity. It contends that a change in the supply of money can permanently change such variables as the rate of interest. The aggregate demand and the level of employment, output and income. Keynes believed in the existence of unemployment equilibrium. This implies that an increase in money supply can bring about permanent increases in the level of output. The ultimate influence of money supply on the price level depends upon its influence on aggregate demand and the elasticity of the supply of aggregate output.

2.1.3 The modern view

The modern monetary economists' reject the Keynesian view that the link between the supply of money and output is the rate of interest. The Keynesian analysis considered only two types of assets: bonds and speculative cash balance, and their allocation depend on the rate of interest which in turn, resulted in changes in output.

The modern monetary policy is based on the portfolio adjustment process. When the Central Bank purchases securities in open market, it sets in motion substitution and wealth effects, as the public portfolio consists of a wide variety of assets such as bonds, equities, savings, mortgages, etc. These effects will ultimately increase aggregate money demand and expand output. The transmission mechanism is explained under substitution effects and wealth effects.

2.2 Literature review

There were investigations to show whether or not one of the preconditions for a successful inflation-targeting framework is present in Nigeria and Ghana. Monetary variables of narrow money supply (M_1) consumer price index (CPI), nominal exchange rate and interest rates on three months' time deposits (DR) were used and

employing a VAR approach. The study discovered that inflation is an inertial phenomenon in Nigeria and Ghana, and money innovations are not strong and statistically significant in determining prices when compared with price shocks themselves. The study concluded that policy linkage between inflation and monetary policy instruments in Nigeria and Ghana is not strong and predictable in the short run and thus, both countries are not yet candidates for inflation targeting. A controlled experiment was carried out using a structural vector autoregressive (SVAR) model to trace the effects of monetary policy shocks on output and prices in Nigeria. The study employed broad money (M_2), minimum rediscount rate (MRR) and the real effective exchange rate and found evidence that monetary policy innovations carried out on the quantity-based nominal anchor (M_2) has modest effects on output and prices with a very fast speed of adjustment. While, innovations on the price-based nominal anchors (MRR and REER) have neutral and fleeting effects on output and concluded that the manipulation of the quantity of money (M_2) in the economy is the most influential instrument for monetary policy implementation (Lucas, 2002). The impact of monetary policies on inflation and interest rate in Nigeria for the period of 1980-1995 was examined by Chuku (2009). The variables employed in the study were domestic credit, exchange rate, gross domestic product and money supply (M_2). Applying the ordinary least squares (OLS) technique, the findings showed that exchange rate and M_2 had a negative impact on inflation, however while exchange rate was significant in explaining inflation for the period M_2 . On the other hand, both domestic credit and gross domestic product were positively significant in explaining inflation in Nigeria (Zhang, 2009).

3. Research methodology

3.1 Research design

The focus of this study has been on impact of monetary policy on macroeconomic aggregate. Research design is the approach or scheme which defines the tools and strategies of the research. In the study, the exploratory design is employed to identify the factors that contribute of monetary policy success.

3.2 Sources of data

Two major sources of data exist; there are the primary sources and the secondary sources. Primary sources are generated by the research and secondary sources consist of already existing data used for some other work but were found to be useful in this study. Based on the objectives of the study, the secondary sources are employed in this research.

3.3 Methods of data collection

The study employs desk survey. Data were gotten from Statistical Bulletin of the Central Bank of Nigeria, relevant journals and textbooks.

3.4 Techniques of data analysis

In analyzing the data gathered for this work. Multiple regression models were employed to establish the relationship between development variable and independent variables.

3.5 Model specification

The objective of the study is to establish the relationship existing between monetary policy and inflation and interest rate. Based on this, the model has been developed for the study

$$INF = f(MS, INTR, CRR) \text{ ----- (1)}$$

Where;

INF	=	inflation
MS	=	Money supply
INTR	=	Inters rate
CRR	=	cash resave requirement

Therefore, the functional relationship is linearized into ordinary lest square (OLS) model

$$INF = b_0 + b_1 MS + b_2 INTR + b_3 CRR + e$$

Where; Dependent variable	=	INF
Independent variable	=	MS, INTR, CRR
Regression variable	=	b_0
Regression variables	=	$b_1 - b_3$
Stochastic error	=	e

$$INTR = F(MS, INF, CRR) \text{ -----(2)}$$

Where;

INTR	=	Interest rate
MS	=	Money supply
INF	=	Inflection
CRR	=	Cash reserve requirement

Therefore, the functional relationship is linearized into ordinary least square (OLS) model.

$$\text{INTR} = b_0 + b_1\text{MS} + b_2\text{INF} + b_3\text{CRR} + e$$

Where;

Dependent variable	=	INTR
Independent variable	=	MS, INTR, CRR
Regression variable	=	b_0
Regression variables	=	b_1 - b_3
Stochastic error	=	e

4. Data presentation and analysis

4.1 Data presentation

The presentation of data on monetary policy and macroeconomic aggregate

YEAR	INF	INTR	MS	CRR
1990	7.5	27.70	-	2.9
1991	13.0	20.80	-	2.9
1992	44.5	31.20	120,085.5	4.4
1993	57.2	36.09	198,479.2	6.0
1994	57.0	21.00	266,944.9	5.7
1995	57.0	20.79	318,763.5	5.8
1996	72.8	20.86	370,333.5	7.5
1997	29.3	23.32	429,731.3	7.8
1998	8.5	21.34	525,637.8	8.3
1999	10.0	27.19	699,733.7	11.7
2000	6.6	21.55	1,036,079.5	9.8
2001	6.9	21.34	1,315,869.1	10.8
2002	18.9	30.19	1,599,494.6	10.6
2003	12.9	22.88	1,985,191.8	10.0
2004	14.0	20.82	2,263,587.9	8.6
2005	15.0	19.49	2,814,846.1	9.7
2006	17.9	18.41	3,307,667.8	4.2
2007	8.2	18.09	3,911,821.5	4.8
2008	5.4	18.33	4,320,672.3	4.9
2009	7.3	18.51	4,027,901.7	4.4
2010	4.8	18.70	4,798,317.3	2.6
2011	7.9	18.36	5,116,246.7	3.3
2012	8.2	18.75	5,672,622.5	2.5
2013	8.9	18.16	5,809,826.5	2.6

Source: CBN Statistical Bulletin,(2014).

4.2 Data analysis

The regression results of monetary policy on inflation

Table 4.2 (Regression results)

Dependent variable: INF

Variable	Coefficient	Std. error	t-stat	Prob
C	7.660964	1.751076	4.375003*	0.0005
MS	0.554524	0.144179	3.846088*	0.0014
INTR	0.090156	0.021922	0.919436	0.3715
CRR	0.034157	0.019159	1.782834***	0.0936

Source: Eview.

$$R^2 = 0.968934$$

$$R^2(\text{adj}) = 0.961167$$

$$\text{SER} = 0.253020$$

$$\text{F-Stat} = 1.247578$$

$$\text{DW} = 1.164828$$

* = Significant at 1% level

*** = Significant at 10% level

Presentation of results

$$\text{LInf} = 7.660964 + 0.554 \text{ MS} + 0.02015 \text{ INTR} + 0.034 \text{ CRR}$$

$$t\text{-stat} = (4.375003)(3.846088)(0.919436)(1.782834)$$

The coefficient of multiple determinations (R^2) is 0.968934 and an adjusted R^2 of 0.961167. The later indicates that 96% of variation in the observed behavior of inflation is jointly explained by the independent variables. This shows that the model fits the data well and has a tight fit. The model reports an effectively high f-statistic value of 1.247573 when compared with the table value.

This indicates that the high-adjusted R^2 value is better would have occurred by chance; therefore the model is statistically robust. The goodness of fit of the model as indicated by the adjusted R-squared showed a good fit of the model that the model fits the data well.

For the overall significant of the model, the ANOVA on the f-statistic is used. Hence, the model did not occur by chance, it actually confirms that the model fits the data well.

To test for the individual statistical significant of the parameters, the t-statistic of the respective variables were considered considering their probability values. The a priori; expectations about the signs of the parameter estimates are confirmation to economic theory.

The regression result showing the relationship between monetary policy and interest rate

Table 4.2.1 (Regression results)

Dependent variable: INTR

Variable	Coefficient	Std. error	t-stat	Prob
C	11.30272	1.189781	9.499831*	0.000
LMS	1.205602	0.121427	9.928600*	0.000
L INF	0.153842	0.161069	0.953133	0.349
L CRR	0.269657	0.120944	2.2295**	0.035

$$R^2 = 0.97784$$

$$R^2(\text{adj}) = 0.974660$$

$$\text{SER} = 0.32264$$

$$\text{F-Stat} = 334.3501$$

$$\text{DW} = 1.201924$$

$$* = \text{Significant at 1\% level}$$

$$** = \text{Significant at 5\% level}$$

$$\text{INTR} = 11.30272 + 1.205602 + 0.153842 + 0.269657$$

$$\text{INTR} = 11.302 + 1.206 \text{ MS} + 0.154 \text{ INF} + 0.270 \text{ CRR}$$

On the other hand, the coefficient of determination and the adjusted R^2 with 0.974660 using error correction modeling shows that about 97 percent variation in interest rate is determined by changes in the explanatory variables specified in the model. Thus, it is a good fit. The f-statistic shows that the whole model is jointly significant at 5 percent level.

There is no multicollinearity in the model because the adjusted R^2 is relatively high as most of the coefficient of the variables are significant at 5 percent level.

4.3 Test of hypotheses

In order to test the already stated hypotheses in chapter one, the following decision rule is stated.

Decision rule

The decision rule is to reject the null hypotheses if the F-calculated is $>$ F-table. And accept the null hypotheses if the F-calculated $<$ F-table.

Hypothesis I

$$\text{F-calculated} = 124.7578$$

$$\text{F-critical (n-k)(k-1)} = 3.10$$

Since the F-cal (124.7578) is greater than F-critical (3.10), accept the alternate hypothesis and reject null hypothesis. It is concluded that there is a significant relationship between monetary policy and macroeconomic aggregate (inflation).

Hypothesis II

$$\text{F-calculated} = 334.3501$$

$$\text{F-critical (n-k)(k-1)} = 3.10$$

Since the F-cal (334.3501) is greater than F-critical (3.10), accept the alternate hypothesis and reject null hypothesis. It is concluded that there is a significant relationship between monetary policy and macroeconomic aggregate (interest rate).

4.4 Discussion of findings

The study portrays the impact of monetary policy on macroeconomic aggregate.

From the results of our hypotheses as stated above, money supply had a positive impact on inflation, interest rate had a positive effect on inflation and cash reserve requirement contributed positively on the performance of inflation.

On the other hand, the incorporated variables have a positive effect on the dependent variable (interest rate).

Given the empirical results of the model, the study revealed that monetary policy contributed positively on the performance of macroeconomic aggregate. Moreover, these results are in conformity with economic theory that states a rise in an independent variable leads to a rise in the dependent variable.

5 Summary, conclusions and recommendations

5.1 Summary

The major findings of the study include:

1. There is a significant relationship between money supply and inflation.
2. There is a significant relationship between interest rate and inflation.
3. There is a significant relationship between cash reserve requirement and inflation.
4. There is a significant relationship between monetary policy and interest rate.

5.2 Conclusion

Monetary policy is associated with interest rates and inflation. Instruments of monetary policy have included short term interest rates and bank reserves through the monetary base. Monetary policy was seen as an executive decision, and was generally in the hands of the authority with seigniorage, or the power to coin.

According to monetary theory, monetary policy manipulates the money supply and rate of interest in such a way to achieve the set goals.

5.3 Recommendations

The following recommendations are proffered:

1. The government should adopt all measures simultaneously; inflation is like a hydra-headed monster which should be fought by using all the weapons at the command of the government.
2. Monetary policy alone should not be used to control inflation but fiscal and other non-monetary measures must be employed.
3. Effective monetary policy should focus on manipulating instruments and emphasis should be placed on the use of interest rates to manage the economy.

REFERENCES

- Adamgbe, E. (2004). Price volatility, expectations and monetary policy in Nigeria. *CBN Economic and Financial Review*, 4(2), 12-27.
- Akinlo, A. E. (2007). The dynamics of money, output and prices in Nigeria. Paper presented at the Central Bank of Nigeria 2007 Executive Policy seminar.
- Bernanke, B. (2007). Inflation targeting: A new framework for monetary policy. *Journal of Economic Perspectives*, 11(2), 97-116.
- Cochrane, J. (2008). What do the VARs mean? Measuring the output effects of monetary policy. *Journal of Monetary Economics*, 41(2), 277-300.
- Cushman, D. (2007). Identifying monetary policy in a small open economy under flexible exchange rates. *Journal of Monetary Economics*, 3(9), 433-448.
- Ehrmann, M. (2007). The timing of Central Bank Communication. *European Journal of Political Economy*, 2(3), 124-145.
- Ibeabuchi, S. N. (2007). Overview of monetary policy in Nigeria. *CBN Economic and Financial Review*, 45(4), 15-37.
- Lucas, R. (2002). Expectations and the neutrality of money. *Journal of Economic Theory*, 4(2), 103-144.
- Maddala, G. S. (2008). *Unit roots, Cointegration and structural change*. Cambridge: Cambridge University Press.
- Kanu, N. (2001). *Fundamentals of the Nigerian financial system*. Owerri: Bon publishers.
- Oduola, A. (2005). Monetary aggregate targeting and inflation in Nigeria. *West African Monetary Journal of Economic Integration*, 5(2), 67-87.
- Omotor, D. (2007). Monetary policy and economic growth: Theoretical and conceptual issues. *CBN Economic and Financial Review*, 45(4), 39-67.
- Uchendu, O. A. (2006). The transmission of monetary policy in Nigeria. *CBN Economic and Financial Review*, 34(2).
- Zhang, W. (2009). China's monetary policy: Quantity versus price rules. *Journal of Macroeconomics*, 3(1), 473-48.
- Starr, M. (2005). Does money matter in the CIS? Effects of monetary policy on output and prices. *Journal of Comparative Economics*, (33), 441-461.
- Nzotta, S. M. (2004). *Monetary banking and finance: Theory and practice*. Owerri: Hudson Publishers.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:

<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Academic conference: <http://www.iiste.org/conference/upcoming-conferences-call-for-paper/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

