

## The effectiveness of monetary policy in achieving economic growth: the case of Nigeria, 1980-2009

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**Abstract:** This study investigates the Effectiveness of Monetary policy in achieving Economic Growth: The case of Nigeria for the period 1980-2009.

Monetary policy has become a major tool in economic management in Nigeria because of the dominance of the financial sector in its economic activities. This study employed the Ordinary Least square method in carrying out the research. From the various test carried out it was find out that monetary policy rate (MPR) (formerly minimum rediscount rate (MRR)), exchange rate and treasury bill investment have negative impact on GDP. Also it is seen that during the period under review that the manipulation of monetary policy instruments have not proven to be effective in achieving economic growth. It is therefore recommended that the monetary authorities should strengthen the working mechanism of the monetary policy instruments to ensure their success in helping to achieve the desired macroeconomic growth. In addition the policy instrument should be a well coordinated optimal mix of instruments.

**Key words:** Monetary Policy, Economic growth, GDP

### 1 Introduction

Monetary policy refers that branch of economic policy which attempts to achieve the broad objectives of policy – stability of employment and prices, economic growth, and balance in external payments – through control of the monetary system and by operating on such magnitudes as the supply of money, the level and structure of interest rates and other conditions affecting the availability of credit. Like other arms of policy, monetary policy operates ultimately through its influence on expenditure flows.

Since the late 1980s, monetary policy has become a major policy /instrument in Nigeria. The reasons for this are not inconsiderable. First is the dominant role of the financial sector in major formal economic activities in Nigeria. This can be traced to several factors. Among them are the oil boom of the early 1970s, the need for reconstruction after the civil war, the industrialization strategy adopted at the time (import substitution and industrialization policy) and the militarization of governance. The second reason for the increasing dominance of monetary policy in the management of the economy is the fall in the international price of oil in the late 1980s. Furthermore, the persistent fiscal policy deficiencies since the early 1970s (and given the decline in oil revenue) required effective monetary policy focus that saw the emergence of the monetary institutions and the financial sector in major economic activities. The socioeconomic dimensions of the collapse of oil prices and the general mismanagement of the economy in the 1980s brought the issue of economic growth and development to the fore. By the mid 1980s, it was observed that the formal private sector was going extinct, economic activities as measured by aggregate output, industrial production, non-oil exports, etc., were

all showing distress signs. Above all, there was strong, widespread evidence of pervasive and massive poverty in the land in spite of growing public expenditure and fiscal deficit. By 1986 all major socioeconomic indicators were pointing downwards. The rate of unemployment was (and is still) high, purchasing power of the people was down, poverty was becoming entrenched and economic growth became negative. In sum, there was severe macroeconomic imbalance – domestically and externally. It was apparent that the economy required major adjustment.

The structural adjustment programme (SAP) was introduced in 1986 to correct the perceived imbalance in the economy. Just immediately after the introduction of the structural adjustment programme, it was observed that socioeconomic indicators were not responding positively to the reform measures—they were getting worse. Hence, several measures were introduced to reduce the social cost of adjustment. In fact, it was a common feature of fiscal behaviour to observe that before the end of the second quarter of any particular year, actual fiscal activities of the government were totally at variance with budget proposals, thus necessitating the adoption of appropriate monetary policy options in the economy. The government regularly finds itself engaging in extra-budgetary expenditure that is occasioned, largely, by the observed suffering of the majority of the people. Looking at various monetary policy measures in the last two decades in Nigeria, one would observe that attention has been focused on the financial sector stability and growth of the economy.

## **2 Statement of the problem**

Despite the several monetary policy measures introduced since 1986, and given the prominence of monetary policy in macroeconomic management in Nigeria, growth has not accelerated. Monetary policy is still widely recognized as a potent tool for enhancing growth, redistributing income and reducing poverty (though the Nigerian experience is tending to suggest otherwise). One could then ask, to what extent is monetary policy effective in inducing growth, redistributing income and ensuring price stability in Nigeria? Furthermore, could monetary policy be designed so as to ensure growth and development while maintaining macroeconomic stability? These are crucial questions to ask given the renewed interest of the current democratic structure in Nigeria in achieving rapid economic growth and given that monetary policy is the arrowhead of the policy package of the current policy framework in Nigeria, particularly in the banking industry. Growth and development have received attention in Nigeria (see, for example, Aigbokhan, 1996 Obadan, ,1996,1997; among several of such studies). However, none of these studies have attempted to examine our puzzle analytically. Furthermore, previous studies on Nigeria have relied on partial frameworks. The differential effects of monetary policy on various productive sectors and on the different income groups are neither explored nor captured. Most of these studies have preoccupied themselves with presenting indices of underdevelopment in Nigeria.

## **3 Objectives of the study**

The main objective of the study is to empirically investigate the effectiveness of monetary policy in helping to achieve economic growth in Nigeria. The specific objectives are as follows:

- i. To identify the various monetary policy tools being used in Nigeria.
- ii. To highlight the various monetary policy objectives in Nigeria.
- iii. To evaluate monetary policy as a tool for economic growth
- iv. To analyze monetary policy as a tool for economic development

### *STATEMENT OF RESEARCH HYPOTHESES*

The research work is guided by the following hypotheses:

H<sub>0</sub>: There is no significant relationship between monetary policy tools and

economic growth.

H0: There is no significant relationship between monetary policy tools and economic development

#### *ORGANIZATION OF THE STUDY*

This research work is divided into five parts. The introduction, which present the background of the study; the statement of problem; the objectives of the study, the statement of research hypotheses and the organization of the study which is part one. This is followed by the Literature review, as part two, the methodology of the research is part three. While part four is the presentation and analysis of regression results. Part five shows the findings and recommendation.

## **4 Review of related literature**

Monetary policy rests on the relationship between the rates of interest in an economy, that is the price at which money can be borrowed, and the total supply of money. Monetary policy uses a variety of tools to control one or both of these, to influence outcomes like economic growth, inflation, exchange rates with other currencies and unemployment. Where currency is under a monopoly of issuance, or where there is a regulated system of issuing currency through banks which are tied to a central bank, the monetary authority has the ability to alter the money supply and thus influence the interest rate (to achieve policy goals).

A policy is referred to as contractionary if it reduces the size of the money supply or increases it only slowly, or if it raises the interest rate. An expansionary policy increases the size of the money supply more rapidly, or decreases the interest rate. Furthermore, monetary policies are described as follows: accommodative, if the interest rate set by the central monetary authority is intended to create economic growth; neutral, if it is intended neither to create growth nor combat inflation; or tight if intended to reduce inflation.

There are several monetary policy tools available to achieve these ends: increasing interest rates by fiat; reducing the monetary base; and increasing reserve requirements. All have the effect of contracting the money supply; and, if reversed, expand the money supply. Since the 1970s, monetary policy has generally been formed separately from fiscal policy. Even prior to the 1970s, the Bretton Woods system still ensured that most nations would form the two policies separately.

Within almost all modern nations, special institutions (such as the Bank of England, the European Central Bank, Reserve Bank of India, the Federal Reserve System in the United States, the Bank of Japan, the Bank of Canada or the Central Bank of Nigeria) exist which have the task of executing the monetary policy and often independently of the executive. In general, these institutions are called central banks and often have other responsibilities such as supervising the smooth operation of the financial system.

The primary tool of monetary policy is open market operations. This entails managing the quantity of money in circulation through the buying and selling of various financial instruments, such as treasury bills, company bonds, or foreign currencies. Usually, the short term goal of open market operations is to achieve a specific short term interest rate target. In other instances, monetary policy might instead entail the targeting of a specific exchange rate relative to some foreign currency or else relative to gold. For example, in the case of the USA the Federal Reserve targets the federal funds rate, the rate at which member banks lend to one another overnight.

The other primary means of conducting monetary policy include: (i) Discount window lending (lender of last resort); (ii) Fractional deposit lending (changes in the reserve requirement); (iii) Moral suasion (cajoling certain market players to achieve specified outcomes). Therefore, monetary decisions today take into account a wider range of factors, such as:

- short term interest rates;
- long term interest rates;

- velocity of money through the economy;
- exchange rates;
- credit quality;
- bonds and equities (corporate ownership and debt);
- government versus private sector spending/savings;
- international capital flows of money on large scales;
- Financial derivatives such as options, swaps, futures contracts, etc.

#### **4.1 Theoretical literature**

Monetary policy is the process by which the government, central bank, or monetary authority of a country controls (i) the supply of money, (ii) availability of money, and (iii) cost of money or rate of interest to attain a set of objectives oriented towards the growth and stability of the economy. Monetary theory provides insight into how to craft optimal monetary policy.

Monetary policy rests on the relationship between the rates of interest in an economy, that is the price at which money can be borrowed, and the total supply of money. Monetary policy uses a variety of tools to control one or both of these, to influence outcomes like economic growth, inflation, exchange rates with other currencies and unemployment. Where currency is under a monopoly of issuance, or where there is a regulated system of issuing currency through banks which are tied to a central bank, the monetary authority has the ability to alter the money supply and thus influence the interest rate (to achieve policy goals).

It is important for policymakers to make credible announcements, and deprecate interest rate targets as they are non-important and irrelevant in regarding to monetary policies. If private agents (consumers and firms) believe that policymakers are committed to lowering inflation, they will anticipate future prices to be lower than otherwise (how those expectations are formed is an entirely different matter; compare for instance rational expectations with adaptive expectations). If an employee expects prices to be high in the future, he or she will draw up a wage contract with a high wage to match these prices. Hence, the expectation of lower wages is reflected in wage-setting behavior between employees and employers (lower wages since prices are expected to be lower) and since wages are in fact lower there is no demand pull inflation because employees are receiving a smaller wage and there is no cost push inflation because employers are paying out less in wages.

To achieve this low level of inflation, policymakers must have credible announcements; that is, private agents must believe that these announcements will reflect actual future policy. If an announcement about low-level inflation targets is made but not believed by private agents, wage-setting will anticipate high-level inflation and so wages will be higher and inflation will rise. A high wage will increase a consumer's demand (demand pull inflation) and a firm's costs (cost push inflation), so inflation rises. Hence, if a policymaker's announcements regarding monetary policy are not credible, policy will not have the desired effect.

Two fundamental propositions about the effect of the quantity of money on the economy predate the emergence of monetary economics as a recognized discipline of study. The first is that increases in the quantity of money that is not associated with corresponding increases in real output will eventually lead to inflation, and the second is that a shortage of money can depress the volume of economic activity (Chuku 2009). The former have the potential for stimulating the economy when it is sluggish while the latter cools it down when it overheats.

#### **4.2 Theoretical framework**

The basic theoretical framework for analyzing monetary policy effects is the Keynesian IS-LM framework with a Philips curve superimposed on it to determine inflation. The mechanism is such that changes in monetary policy (usually specified as exogenous shifts in monetary aggregates) affect the money supply, which changes interest rate to balance the demand with supply. The changes in interest rates then affect investment and consumption which latter cause changes in output and eventually prices.

Contemporary studies on the effects of monetary policy now generally favour a more encompassing dynamic stochastic general equilibrium (DSGE) framework (see for e.g. Walsh, 1998; Goodfriend and King 1997 and the references therein). Here, we pursue a simple general-equilibrium framework, similar to that of Clarida et al. (2005) but different in the sense that we exclude the assumption of perfect price flexibility and stick to the sticky price assumption.

The analysis begins by fully articulating a model of the Nigerian economy, where the model details include (1) a statement of agents optimizing problems, (2) a mechanism of monetary non-neutrality and (3) a source of monetary shock imparting on the economy. The purpose is to show the central bank's objective function in maximizing the welfare of agents through policy choices. Rather than work through the details of the derivation, which are readily available elsewhere, (Walsh, 1998; Bernanke et al., 1998; Fuerst, 1998 and Clarida et al., 1999) we instead directly introduce the key aggregate relationships.

The model is as follows: let  $Y_t$  be the actual output, and  $Z_t$  be the natural level of output both in logs. Let the difference between actual and potential output be called the 'output gap'  $x_t$ . Hence,

$$x_t \equiv \frac{Y_t - Z_t}{Z_t} \quad 2.0$$

In addition, let  $\pi_t$  be the period  $t$  inflation rate, defined as the percent change in the price level from  $t-1$  to  $t$  and let  $i_t$  be the nominal interest rate. Each variable is expressed as a deviation from the long-run trend.

It is then possible to represent the baseline model in terms of two equations: an IS curve that relates the output gap inversely to the real interest rate, and a Phillips curve that relates inflation positively to the output gap. Hence:

$$x_t = -\phi [i_t - E_t \pi_{t+1}] + E_t x_{t+1} + g_t \quad 2.1$$

$$\pi_t = \theta x_t + \beta E_t \pi_{t+1} + \mu_t \quad 2.2$$

Where  $E_t$  is the expectations operator,  $E_t \pi_{t+1}$  is the future expectation of inflation,  $E_t x_{t+1}$  is future expectation of the output gap,  $[i_t - E_t \pi_{t+1}]$  measures the real interest rate, measures the interest elasticity in the IS curve and is a disturbance term. Equation (2.1) is obtained by log-linearizing the consumption Euler-equation that arises from the household optimal savings decision, after imposing the equilibrium condition that output equals consumption plus government expenditure (see Walsh, 1998 for a step by step derivation).

Equation (2.1) differs from the traditional IS curve mainly because current output depends on expected future output as well as the real interest rate. Higher expected future output raises current output. The reason is that individuals prefer to smooth consumption expectations of higher consumption next period (associated with higher expected output) which leads them to want to consume more today (Clarida et al., 1999). The negative sign of the coefficient of real interest rate on current output reflects the intertemporal substitution of consumption. Hence, the coefficient  $-\phi$  represents the intertemporal elasticity of substitution.

The disturbance  $g_t$  is a function of expected changes in government expenditure relative to expected changes in potential output. Changes in  $g_t$  correspond to shifts in the IS curve which can be referred to as demand shocks. This would have also been the case if we were abstracting using investments or private consumption.

To better understand how expectations about the future affect current aggregate activity within the framework, we iterate equation (2.1) forward to obtain:

$$x_t = E_t \sum \{-\phi[it+i - \pi_{t+1+i}] + g_{t+i}\} \quad \text{-----} \quad 2.3$$

Equation (2.3) implies that the optimal gap depends not only on the real interest rate and demand shock, but also on the expected future paths of these two variables. It therefore follows that expected as well as current monetary policy (in this case, measured by changes in interest rate) can affect aggregate demand.

The Philips-curve depicted by equation (2.2) is simply a log-linear approximation of the steady state aggregation of individual firm's pricing decisions (Clarida et al., 1999). The equation resembles the traditional expectations-augmented Phillips curve described by Blanchard (1997) because it relates the inflation rate with the output gap and expected inflation. However, it is different from the traditional specification in that expected future inflation  $E_t \pi_{t+1}$ , enters additively as opposed to expected current inflation  $E_t -1 \pi_t$ . The implications of this distinction can be observed if we iterate equation (2.2) forward thus:

$$\pi_t = E_t \sum [\theta x_{t+i} + \mu_{t+i}] \quad \text{-----} \quad 2.4$$

From equation (2.4) we observe that unlike the traditional Philips curve, inflation depends entirely on current and future economic conditions rather than lagged inflation expectations. The variable  $x_{t+i}$  captures movements in marginal costs associated with variations in excess demand. Whereas, the exogenous shock  $\mu_{t+i}$  usually referred to as "cost push" captures anything else that may affect expected marginal costs.

Putting this framework in context, and focusing on the nominal interest rate as the choice variable of monetary policy, the above framework provides a reasonable description of the operating procedures of the Central Bank of Nigeria. With sticky prices, innovations in the nominal interest rate immediately affects the real interest rate which causes agents to adjust their expectations and actions in such a way that output and prices are affected in the direction specified in the IS and LM equations.

To sum up, we introduce the Central Bank's objective function which converts the behavior of the target variables into a welfare measure to guide policy choices. Following contemporary practice, we assume the Central Bank's objective function is over an inflation target  $\pi_t$  and an output  $x_t$  target and takes the form:

$$\text{Max} - \frac{1}{2} E_t \{ \sum [\alpha x_{2t+i} + \pi_{2t+i}] \} \quad \text{-----} \quad 2.5$$

Where the parameter  $\alpha$  is a relative weight assigned to the output deviations. Since  $x_t \equiv Y_t - Z_t$ , the objective function takes the potential output of the economy  $Z_t$  as the target output and implicitly takes zero as the target inflation rate. The appropriate weight to be assigned to the parameter  $\alpha$  has generated a lot of controversies among monetary policy practitioners and researchers. However, there now seems to be a growing convergence to the consensus that the primary emphasis of monetary policy should be to control inflation and not to target output as Bernanke and Mishkin (1997) argue. We nurse our reservations about the appropriateness of placing the emphasis on inflation targeting especially in a developing country like Nigeria that requires enormous and sustained stimulation of aggregate demand to engender development.

### 4.3 Monetary policy in Nigeria

The Central Bank of Nigeria (CBN) is mandated by the CBN act of 1958 to promote and maintain monetary stability and a sound financial system in Nigeria. Just like other central banks, the CBN has the objective of achieving price stability and sustainable economic growth through the means of monetary policy. Embedded in this twin objectives are (1) the attainment of full employment, (2) maintaining stability in the long-term interest rates and (3) pursuing optimal exchange rate targets. To achieve these objectives, the CBN operates through a system of targets. These are; the operational targets, the intermediate targets and the ultimate target (Ibeabuchi, 2007). The Central Bank uses its operational target (unborrowed reserves), over which it has deterministic control to influence the intermediate target (broad money) which eventually affects the ultimate targets (inflation and output). In setting its targets, the CBN considers an information set that is feed into by contemporaneous and lagged values of real Gross Domestic Product (GDP), real investment prices, real wages, labour productivity, fiscal operations and balance of payments performance, among others. Depending on the relative importance attached to the various information elements, the CBN sets its target parameters for its quantity-based nominal anchor and its price-based anchors. The bank generally implements its monetary policy programmes using the market-based and rule-based techniques. When implementing monetary policy using the rule-based technique, the CBN uses direct instruments like selective credit controls, direct regulation of interest rates and moral suasion. While indirect instruments like the Open Market Operation (OMO), discount rate and the reserve requirements are used when implementing monetary policy programmes using the market-based approach. Since its inception, the CBN has implemented monetary policy using various combinations of these two techniques with more or less emphasis on the one. Depending on the emphasis that is placed on either of the techniques, the evolution of monetary policy in Nigeria can be classified into two phases: (1) the era of direct controls (1959-1986) and (2) the era of market-based controls (1986-date). The era of direct controls was a remarkable period in monetary policy management in Nigeria, because it coincided with several structural changes in the economy; including the shift in the economic base from agriculture to petroleum, the execution of the civil war, the oil boom and crash of the 1970s and early 1980s respectively and the introduction of the Structural Adjustment Programme (SAP). During this period CBN's monetary policies focused on fixing and controlling interest rates and exchange rates, selective sectoral credit allocation, manipulation of the discount rate and involving in moral suasion. Reviewing this period, Omotor (2007) observe that monetary policy was ineffective particularly because the CBN lacked instrument autonomy and goal determination, being heavily influenced by the political considerations conveyed through the Ministry of Finance.

Progressively, the implementation of the SAP programme which commenced in 1986, ushered in a new era of monetary policy implementation with market-friendly techniques in Nigeria. The capacity of the CBN to carry out monetary policy using market friendly techniques was letter reinforced by the amendments made to the CBN Act in 1991 which specifically granted the CBN full instrument and goal autonomy. Using this technique, the CBN indirectly influences economic parameters through its Open Market Operations (OMO). These operations are conducted wholly on Nigerian Treasury Bills (TBs) and Repurchase Agreements (REPOs), and are being complimented with the use of reserve requirements, the Cash Reserve Ratio (CRR) and the Liquidity Ratio (LR). These set of instruments are used to influence the quantity-based nominal anchor (monetary aggregates) used for monetary programming. On the other hand, the Minimum Rediscount Rate (MRR) is being used as the price-based nominal anchor to influence the direction of the cost of funds in the economy. Changes in this rate give indication about the monetary disposition of the Bank, whether it is pursuing a concessionary or expansionary monetary policy. This rate has generally been kept within the range of 26 and 8 percent since 1986. As a companion to the use of the MRR, the CBN latter introduced the Monetary Policy Rate (MPR) in 2006 which establishes an interest rate corridor of plus or minus two percentage points of the prevailing MPR. Since 2007, this rate has been held within the band of 10.25 and 6 percent. Despite the empirical evidence found for the efficacy of monetary policy with market-based

techniques, the effectiveness or otherwise of monetary policy during this era is still an issue in debate. Though we take a position on this issue at the conclusion of the work, we recognize that monetary policy in Nigeria is confronted with several challenges. Some of them include; fiscal dominance and non-synchronization of fiscal and monetary policies, the existence of a large informal sector, debt and liquidity overhang, data inconsistencies and lateness, and the cash-in-hand nature of the economy. These peculiar characteristics of the economy place a special emphasis on the dynamism of monetary policy in Nigeria.

## 5 Methodology

### 5.1 Model specification

In the model specified, Monetary Policy Rate (MPR), Maximum Lending Rate (MLR), Exchange Rate (EXR), Commercial Banks' Credit (CBC) and Treasury Bills Issue (TBI) form the independent variable. The dependent variable is the Gross Domestic Product (GDP), which is a measure of a nation's economic performance – economic growth in this instance. Explicitly, the model for the study is specified below:

$$\begin{aligned}
 \text{GDP} &= \alpha_0 + \alpha_1 \text{MPR} + \alpha_2 \text{MLR} + \alpha_3 \text{EXR} + \alpha_4 \text{CBC} + \alpha_5 \text{TBI} + e_i \\
 &\qquad\qquad\qquad (-) \qquad\qquad\qquad (-) \qquad\qquad\qquad (-) \qquad\qquad (+) \qquad\qquad (+)
 \end{aligned}$$

Where:

- GDP = Gross Domestic Product
- MPR = Monetary Policy Rate
- MLR = Maximum Lending Rate
- EXR = Exchange Rate
- CBC = Commercial Banks' Credits
- TBI = Treasury Bills Issue
- $e_i$  = Stochastic variable or error term
- $\alpha_0$  = Intercept
- $\alpha_1, \alpha_2, \alpha_3, \alpha_4$  &  $\alpha_5$  = Parameter estimates

### 5.2 Sources of data for the study

Annual time-series data on the variables under study are used in this study for estimation of the functions. The Gross Domestic Product (GDP) is the dependent variable in model. Then the relevant explanatory variables are Monetary Policy Rate (MPR), Maximum Lending Rate (MLR), Exchange



Rate (EXR), Commercial Banks' Credit (CBC) and Treasury Bills Issue (TBI). The data for the variables were sourced from various issues of the Central bank of Nigeria Economic and financial Review; Annual reports and Statements of Accounts; and Principal Economic and Financial Indicators, and Central bank of Nigeria Statistical bulletin.

## 6 Presentation of data and results

This part focuses on the analysis of, and interpretation of the result generated from the regression analysis. This serves as a yard-stick/benchmark for the measurements of the various impacts which the different variables have on economic growth (GDP) of the country.

### Presentation of data

The data employed in the study are presented in table 4.1 below:

Table 4.1 Regression Data

#### DATA FOR REGRESSION

YEAR	GDP	MPR	MLR	EXCH.	CBC	TBI
1980	50,848.60	6.00	9.50	0.55	6,379.20	10,619.00
1981	102,686.80	6.00	10.00	0.61	8,604.80	13,970.00
1982	110,029.80	8.00	11.75	0.67	10,277.00	28,458.00
1983	119,117.10	8.00	11.50	0.72	11,100.00	47,815.00
1984	125,074.80	10.00	13.00	0.76	11,503.40	57,888.00
1985	114,724.10	10.00	11.75	0.89	12,170.30	8,861.00
1986	143,623.90	10.00	12.00	2.02	15,701.50	67,890.00
1987	203,037.10	12.75	19.20	4.02	17,531.90	90,651.00
1988	275,198.20	12.75	17.60	4.54	20,044.90	113,142.00
1989	403,762.90	18.50	24.60	7.39	22,221.20	132,543.00
1990	497,351.30	18.50	27.70	8.04	26,083.90	93,893.90
1991	574,282.10	14.50	20.80	9.91	31,762.40	135,147.00
1992	909,754.20	17.50	31.20	17.30	41,810.00	137,961.90
1993	1,132,181.20	26.00	36.09	22.05	48,056.00	114,319.50
1994	1,457,129.70	13.50	21.00	21.89	92,624.00	105,320.50
1995	2,991,941.70	13.50	20.79	21.89	141,146.00	105,321.40
1996	4,135,813.60	13.50	20.86	21.89	169,242.00	105,322.50
1997	4,300,209.00	13.50	23.32	21.89	230,600.00	74,927.90
1998	4,101,028.30	14.31	21.34	21.89	272,895.50	90,928.90
1999	4,799,966.00	18.00	27.19	92.69	353,081.10	80,930.90
2000	6,850,228.80	13.50	21.55	102.11	508,302.20	86,951.10
2001	7,055,331.00	14.31	21.34	111.94	796,164.80	1,985,453.20
2002	7,984,385.30	19.00	29.70	120.97	954,628.80	2,421,143.20
2003	10,136,364.00	15.75	22.47	129.36	1,210,033.10	3,026,347.10
2004	11,673,602.20	15.00	20.62	133.50	1,519,242.70	3,467,740.50
2005	14,735,324.00	13.00	19.47	132.15	7,483,090.30	2,521,840.00
2006	18,709,786.50	12.25	18.70	128.65	9,542,573.40	1,509,070.00
2007	20,657,317.7	8.75	18.36	120.97	4,813,488.8	1,304,182.4
2008	24,296,329.3	9.75	20.26	121.90	23,358,395.2	9,163,000.0
2009	24,712,669.9	6.00	23.19	150.01	35,167,203.7	13,924,000.0

Source: CBN Statistical Bulletin, various issues

**6.1 Presentation of estimated results**

$$GDP = \alpha_0 + \alpha_1 MPR + \alpha_2 MLR + \alpha_3 EXR + \alpha_4 CBC + \alpha_5 TBI + e$$

	(-)	(-)	(-)	(+)	(+)	
GDP	= 1.6919	-1.93MPR	+ 49198.MLR	+ 95827.EXR	+ 0.81108CBC	+ -1.2048TBI
S.E.	= (1.3764)	(3.1042)	(2.0417)	(9894.4)	(0.20852)	(0.42)
t	1.229	-0.622	0.241	9.685	3.890	0.49021
R <sup>2</sup>	= 0.933883		F-Statistic	= 67.799	D.W.	= 1.33

*N.B: The regression result is presented in Appendix I while the data which was used to carry out the regression is presented above.*

**6.2 Discussion of findings**

From the regressions result, the R-squared (R<sup>2</sup>) value of 0.933883 shows that at 93.39% the explanatory variables explain changes in the dependent variable. This means that at 93.39% the independent variables explain changes in the Gross Domestic Product (GDP). This simply means that the explanatory variables explain the behaviour of the dependent variable at 93.39%. The calculated F-statistics of 67.799 which is greater than the F-table value (2.6207) implies that all the variables' coefficients in the regression result are all somehow and to an extent statistically significant to Gross Domestic Product (GDP). The Durbin-Watson (DW) as shown in the regression analysis is 1.33. From this, it shows that there is the presence of autocorrelation.

The above model tested the effect of five different variables namely – Monetary Policy Rate (MPR), Maximum Lending Rate (MLR), Exchange Rate (EXR), Commercial Banks' Credit (CBC) and Treasury Bills Issue (TBI) on Gross Domestic Product (GDP). In order to obtain the regression result, the OLS technique with the help of the PC Give software was used.

The result obtained from the regression shows that there is negative relationship between Gross Domestic Product and Monetary Policy Rate with a coefficient of -1.93. The corresponding standard error and t-values show that this coefficient is not statistically significant. Hence, Monetary Policy Rate is inelastic to Gross Domestic Product in Nigeria. This negativity of the coefficient of Monetary Policy Rate is in conformity to the economic a priori expectation of a positive impact of Monetary Policy Rate on Gross Domestic Product.

Also, the regression result shows that Maximum Lending Rate has a positive impact on Gross Domestic Product with a coefficient of 49198. However, the coefficient of Maximum Lending Rate is not statistically significant as shown by both the corresponding standard error and t-values. Thus, Total Trade is inelastic to Gross Domestic Product. This positivity of the coefficient of Monetary Policy Rate, however, does not conform to the economic a priori expectation of a negative impact of Monetary Policy Rate on Gross Domestic Product.

Furthermore, the result obtained from the regression shows that Exchange Rate has a positive and significant impact on Gross Domestic Product. This is indicated in its positive coefficient of 95827. Thus, Exchange Rate is elastic to GDP since the standard error and t-values revealed that the coefficient is not statistically significant. The positivity of Exchange Rate coefficient does not conform to the economic a priori expectation of a negative impact of Exchange Rate on Gross Domestic product.

Again, the regression result shows that Commercial banks credit has a positive impact on Gross Domestic Product with a coefficient of 0.81108. The coefficient of commercial banks credits is statistically significant as shown by both the corresponding standard error and t-values. Thus, commercial banks credit is elastic to Gross Domestic Product. This positivity of the coefficient of commercial banks credit conforms to the economic a priori expectation of a negative impact of commercial banks credit on Gross Domestic Product.

Finally, the result obtained from the regression shows that Treasury Bills issue has a negative and significant impact on Gross Domestic Product. This is indicated in its negative coefficient of -1.2048. Thus, Treasury Bills issue is elastic to GDP since the standard error and t-values revealed that the coefficient is statistically significant. The negativity of Treasury Bills issue coefficient does not conform to the economic a priori expectation of a positive impact of Treasury Bills issue on Gross Domestic product.

### 6.3 Statistical tests of significance

In this study, two types of test are conducted: the test for the statistical significance of each estimator (t-test) and similarly the test of the estimator's significance (F-test). The tests are conducted at the 5% significance level.

In a given regression equation with k regressors for estimator's test of significance, the null hypotheses is:

$$H_0: \alpha_i = 0$$

And the alternative hypothesis is

$$H_1: \alpha_i \neq 0$$

For a decision the observed F-ratio,  $F_s$ , is compared with the theoretical F-ratio,  $F_{0.05}$ , which has  $V-1 = k-1$ ,  $V_2 = N-K$  degrees of freedom; N is the sample size and K is the total number of parameters estimated.

The decision rules are:

- i. If  $F_s > F_{0.05}$ , Reject  $H_0$  - the regressor have a significant influence on the dependent variable;
- ii. If  $F_s < F_{0.05}$ , Accept  $H_0$  - the regressor have an insignificant influence on the dependent variable.

Furthermore, two-tailed tests are conducted by comparing the observed t-ratio,  $t_s$ , with the theoretical t-ratio,  $t(0.025)$  that has degrees of freedom  $N-K$ . The null and alternative hypotheses are respectively,

$$H_0: \alpha_i = 0$$

$$H_1: \alpha_i \neq 0$$

The decision rules are:

- i. If  $|t_s| > |t(0.025)|$ , Reject  $H_0$  -  $\alpha_i$  is not equal to zero and with regressor influence, the dependent variable significantly;
- ii. If  $|t_s| < |t(0.025)|$ , Accept  $H_0$ ,  $\alpha_i$  is not statistically different from zero and with explanatory variable does not influence the regression significantly.

Now, from the 'F' distribution table, the theoretical F-ratios at 5% significance level is 2.6207. From the student's 't' distribution table, the theoretical t-ratio for two-tailed test at 5% significance level 2.060. At this point, these theoretical ratios are compared accordingly with the F-statistic of the various estimators and observed t-ratio ( $t_s$ ) for each parameter, and next we simple summarize which equations are significant or not.

In equation both tests revealed that exchange rate, commercial banks' aggregate credit to the economy and treasury bill issue were significant in explaining economic growth via the Gross Domestic Product (GDP) during the period of analysis, 1980-2009. But the tests showed that Monetary Policy Rate and

Maximum Lending Rate were not significant to economic growth in Nigeria during the period of analysis, 1980-2009.

#### **6.4 Examination of algebraic signs of parameter estimates**

How far do the directions of the influences of the various explanatory variables on the Gross Domestic Product (GDP) conform to the a priori expectations as shown in 3.1. This question is warranted since any reliable estimated regression equation is expected to conform to the priori restrictions imposed or determined by the theoretical underpinning of the study in question. They are examined below.

In the regression equation, the coefficients of Maximum Lending rate and Exchange Rate did not conform to the expected negative sign respectively. The coefficient of Treasury Bills issue did not also conform to the expected positive sign. But the coefficient of Monetary Policy Rate conformed to the expected negative sign. However, the coefficient of Commercial Banks' credits conforms to the expected positive sign.

An observation of the monetary tools show an increasing pattern while Gross Domestic Product (GDP) show non-systematic pattern and finally, the F-test and t-test tend to suggest the non significance of some of the explanatory variables.

#### **6.5 Test of multicollinearity and autocorrelation**

In auto correlation test, we use D.W. limits on a 5% level of significance and k degrees of freedom; to compare the theoretical lower and upper limits of the Durbin-Watson statistics dl and 4-dl respectively, with the observed or computed D.W. statistics dc.

- i. If  $D.W = 2$  there is no autocorrelation;
- ii. If  $D.W \neq 2$  then autocorrelation exists.

Now, the regression results reveal that autocorrelation exists in the model equation as the D.W. value of the equation is 1.33, which is not equal to two (2).

#### **6.6 Evaluation of working hypotheses**

The empirical evidence or test results presented in section 4.1 do not support our first null hypothesis that there is no significant relationship between monetary policy tools and economic growth with the exception of exchange rate, commercial banks' credits and treasury bills. The significance of exchange rate, commercial banks' credits and treasury bills can be seen in their respective standard error values and t-tests.

The second null hypothesis that there is no significant relationship between monetary policy tools and economic development is an extension of the first hypothesis, in hope that economic growth would eventually translate to economic development. So, the evaluation of the first hypothesis holds for the second one too.

## **7 Summary, conclusion and recommendations**

### **7.1 Summary of findings**

The results of the ordinary least squares regression of the key functions specified were presented in part Four. Two types of test were conducted: the test for the statistical significance of each estimator (t-test) and similarly the test of the estimator's significance (F-test). The tests were conducted at 95%

confidence interval. The tests showed that the influence of some explanatory variables was statistically significant while some were statistically insignificant. On the examination of algebraic signs of the parameter estimates, the signs of the coefficients of most of the algebraic signs of the explanatory variables did not conform to the expected signs. Given that the specification and interpretation of the coefficients were correct, future researchers are then urged to investigate further on the probable causes of the wrong signs.

Still on the analysis, the test of multi-collinearity and auto-correlation revealed that the estimated equations were free of serious auto correlation and that multi-collinearity was not a problem. In evaluating the working hypotheses, it was seen that the empirical evidence or test result somehow supported our first and second null hypotheses. The basis of this support was seen in the statistical test of significance, examination of algebraic signs of parameter estimates and standard error values of the estimated equation. Despite the fact that Economic theory should be complemented with empiricism, the researcher noted that the interpretation of all econometric studies leaves much room for judgment and thus expected that the possible implications of the results of this study should be taken with caution. The researcher therefore concludes that the Nigeria monetary authorities should give greater priority to other policy instruments or measures than monetary tools to achieve rapid economic growth.

**RECOMMENDATIONS.** From the various tests conducted and hypotheses evaluated, it is clear that the manipulation of monetary policy tools over time has not proven to be effective. Therefore, th

In view of the findings of the study, the researcher makes the following recommendations:

- i. It is suggested the use of a coordinated optimal mix of policy instruments since to achieve a particular macro economic objective might not be realistically attainable.
- ii. Policy makers should always avail themselves of quantitative research works such as the present study in ascertaining the weight to be assigned to each policy instrument.
- iii. And at the same time, government must proceed in the direction of reconciling and merging the various policy tools.
- iv. The monetary authorities must look for ways strengthening the working mechanisms of the monetary policy tool to ensure the effectiveness of the policy tools in achieving the desired macro-economic goals in the country.

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