©IDOSR PUBLICATIONS
International Digital Organization for Scientific Research ISSN: 2550-7966
IDOSR JOURNAL OF HUMANITIES AND SOCIAL SCIENCES 2(1): 63-74, 2017.

EMPIRICAL INVESTIGATION OF THE CAUSALITY RELATIONSHIP BETWEEN MONETARY POLICY AND ECONOMIC GROWTH IN NIGERIA-2000 TO 2015.

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ABSTRACT

This study is embarked upon to highlight the relevance of monetary policy in the Nigeria economy and to emphasis its relationship among monetary policy variables and their application in the economy. The study period covers between 2000 and 2015. The study investigates the nature and direction of causality among the variables vis-à-vis the gross domestic product (GDP). To tackle this, the broad objective of this study is to examine the effect of monetary policy on gross domestic products. Other objectives include, determining the effect of money supply on GDP, ascertain the effect of interest rate on GDP, find out the effect of inflation on GDP and others. Our study adopted the ex post facto design. Ex-post facto design refers to research design that relies essentially on secondary data. Therefore, data on monetary policy, interest rate, exchange rate, money supply, inflation rate and Gross Domestic Product (GDP) were collected from Statistical Bulletin and Annual Report and Statement of Account of Central Bank of Nigeria (CBN) for various years. Granger causality pair wise test was conducted in determining the casual relationship among the variables. The result showed that there was causal relationship among the variables from interest rate to inflation. The overall findings of the study revealed that there is somehow a general consensus that there is a direct relationship between monetary policy and economic growth.

Keywords: Nigeria, Monetary policy, Interest rate, exchange rate, Money supply, Inflation and Gross domestic product (GDP).

INTRODUCTION

One of the major function of the Central Bank of Nigeria (CBN) since its establishment in 1959 is to control the quantity of money in circulation, using the monetary policy instruments, the aim is to improve on the social welfare of Nigerians through the regulation of the stock and cost of money in the economy. This role is meant to be actualized through the use of monetary policy instruments targeted towards the achievement of macroeconomic goals in line with government set objectives for each policy period [1]. Such macroeconomic goals include the achievement of full-employment, price stability, and maintenance of inflation at a single digit, reduction of pressure in the external sector, rapid economic growth amongst others. Suffice it to note that these goals synchronize with the objectives of monetary policy which in most economies include price stability, maintenance of external balance, reduction

of unemployment, growth in output, and sustainable development. These are long run economic growth measures that are necessary for the attainment of internal and external balances [1]. It is obvious that the achievement of either of these goal or objectives determines the situation or the position of the other.

In the past, inflation targeting and exchange rate policy dominated CBN's monetary policy focus because it was assumed to be the most essential instrument for achieving macroeconomic stability. Prior to structural adjustment program (SAP) era in 1986, the dominance of the oil sector, the expanding role of the public sector in the economy and over-dependence on the external sector were the main determinants of monetary policy [2]. Consequently, in order to maintain price stability and a healthy balance of payments position, monetary management depended on the use of direct monetary policy instruments such as credit ceilings, selective credit controls, administered interest and exchange rates, cash reserve requirements and special deposits. The underdeveloped nature of our financial market and the use of regulatory control on interest rates however, made it difficult to achieve macroeconomic stability in the country [3].

In Nigeria the CBN had to affect monetary and other financial conditions through influence over the availability and cost of credit in pursuit of the broad objectives of sustainable growth of output, price stability and a healthy balance of payments position. The authority's discretionary control of the money stock involves the expansion or contraction of money and influencing interest rate to make money cheaper or more expensive depending on the prevailing economic conditions and the policy thrust. [4], submitted that ordinarily, the achievement of price stability through the use of monetary policy will create a high degree of confidence among investors and the increasing desire of more investors to venture into the economic scene, believing the government has the ability to manage and control her economy effectively. Monetary policy as instruments of monetary control is classified into two broad categories - direct and indirect instruments. Under a system of direct monetary control, the Central Bank uses some criteria to determine money, credit and interest rate targets that would achieve the goals of economic policy.

However, price and exchange rate volatility undermine the ability of policy makers to achieve other laudable macroeconomic objectives which makes it difficult for monetary authorities to achieve the role of money as a store of value, and thus discourage investments and growth. This long run inverse relationship between inflation and economic growth is replete with details in the literature. Monetarist strongly believes that monetary policy exerts great impact on economic activities. This is because any considerable change in the stock of money, affects output as well as growth. However, Nigeria by using these monetary policies has not been able to harness her economic potentials for rapid economic development [4]. Suffice it to note that the main objectives of monetary policy in Nigeria include moderating the inflation rate, promoting economic growth, reducing pressure on the external sector,

stabilizing the Naira exchange rate, inducing increased savings, investment and employment [5].

STATEMENT OF THE PROBLEM

Several studies have been previously made on this topic and as such enormous literatures abound as regard the impacts of monetary policy on economic growth. Some of the studies concluded that there was a positive co-relation between monetary policies represented by certain proxies and economic growth in Nigeria, while a good number of studies were of the opinion that there was a negative co-relation in the same subject matter. However, due to a lot of changes that have taken place in the economic climate largely attributable to government policies and reforms in recent years, the researcher saw it imperative that further studies be conducted in other to reflect modern realities which were somehow missing in the previous studies. Consequently, the researchers decided to fill this gap by focusing on very important monetary policy proxies for interest rate, exchange rate, inflation rate and money supply. This has created a gap in literature which this study has decided to fill.

However, the broad objective of this study is therefore to examine the effect of CBN monetary policy especially in contemporary times on the Nigeria economy, the gains and the losses while proffering workable solutions. The specific objectives are; to evaluate the effect of interest rate on gross domestic product, to ascertain the effect of exchange rate on gross domestic product, to determine the effect of money supply on gross domestic product and to examine the effect of inflation rate on gross domestic product. To achieve the objectives the study null-hypothesized that monetary policy has no significant and positive effect on economic growth of Nigeria.

The rest of the paper is organized thus: the second section contains review of literature, section three treats methodology, while sections four and five contain data presentation/analyses and summary of findings, conclusion and recommendations respectively.

THEORETICAL FRAMEWORK OF THE STUDY

There are so many theories backing up the issues of monetary policy vis-à-vis economy growth but in this work we looked into just few of them. One of them is the Neo Classical School of Thought propounded by [6], which argued that the monetary authorities could control inflation rate, especially in the long run, through the control of the money supply. This is so because too much money in circulation can lead to inflation, consequently high interest rate, high unemployment rate, hence low economic growth. Friedman is of the view that changes in the stock of money are closely related to changes in the price level and through it, on other general economic aggregates. The amount of money the public desires to

hold relative to its income distorts the rigidity of the relationship. Lags that exist between the formulation and implementation of monetary policy is a constraint on its effectiveness.

In addition, the Monetarists theory argued that there is a positive link between money supply and inflation vis-à-vis money growth. It further asserts that higher volume of money in circulation will put upward pressure on interest rates and other monetary policy instruments. The monetarist transmission mechanism postulates that changes in money supply results to a change in the real magnitude of money. As a backup [7] have supported the proposition that the Central Bank has been obliged to control the quantity of money in circulation to avoid either inflation or deflation. She does this by monetizing the economy when the volume of money in circulation is low and does demonetization when the reverse becomes the case. Such monetization results in an increase in the money supply and the rate of inflation, at least in the long run period. While the demonetization results to a decrease in the money supply which leads to reduction on inflation rate if other things become equal.

The monetarists equally believe that high inflation in the economy can lead to increase in government deficit financing, hence low economic growth and other consequences. As a result the Central Bank is mandated to monetize the deficits to cushion the effect of inflation in the economy. Taking this assertion to be correct, an alternative view expanded by [8], argues that money supply is necessarily inflationary irrespective of whether the economy is monetized or not. According to Miller, a high volume of money in circulation leads to inflation through different channels. The Central Bank might be forced into monetary accommodation of too much money in circulation as argued by [7]. But, even if the Central Bank does not monetize the surpluses, they are still inflationary through crowding out. That non-monetized economy leads to higher interest rates, higher interest rate crowed out private investment, and hence reduce the rate of growth of real output.

Another theory considered in this work is the Keynesian theory by John Maynard Keynes who recommends that monetary policy is ideal for stimulating aggregate demand in order to curtail unemployment and reduce money supply so as to control inflation [9]. The Keynesian postulation in the monetary transmission mechanism is the determination of real output, general price level and other macro-economic variables. The Keynesians postulate that national income depends on the interplay between expected rate of profit and interest rate. The rate of interest is determined by the supply of money and the demand for money.

Conceptual Framework of the Study

There are some concepts in our study which must be explained for readers to assimilate and comprehend our work. Some of them include monetary, policy, monetary policy and economic growth.

Methodology

Our study made use of *Ex post facto* design in generating data for carrying out this study; hence data were collected from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN) Statistical Bulletin for 2000 to 2015 periods.

The relationship between monetary policy and economic growth has been generally examined widely in the literature. In this study monetary policy is proxy by interest rate, exchange rate, money supply and inflation. The monetarist assumption, which suggests that monetary policy is mainly a result of the outcomes of these variables, is explicitly or implicitly held in many literatures. But some studies are questioning the magnitude and direction of the relationship among these variables and economic growth, whether the relationship is directional or unidirectional. For example if there is a direct relationship between money growth and inflation vis-à-vis economic growth. Therefore, there is obvious need to know which of these variables causes the other and the direction of causality in Nigeria. This paper therefore employs the Pairwise Granger causality test model.

AREA OF STUDY INTEREST

The focal point of this study is basically on the CBN Monetary policy instruments proxied by Interest Rate, Exchange Rate, Money Supply and Inflation Rate.

DESCRIPTION OF STUDY VARIABLES

Independent variables

As already noted, the four variables that have been proxied for monetary policy which include interest rate, exchange rate, money supply and inflation formed the independent variables of this study and they are defined as follows:

Interest Rate: Interest rate is the amount expressed as a percentage of principal charged by a lender to a borrower for the use of assets for a period of time. Interest rates are typically noted on an annual basis, known as the annual percentage rate (APR). It is the cost of using money that belongs to the lender, if the cost is high, it will reduce the lending desires of the borrowers and the reversal is the case when the cost is low. Suffice it to note that both of them have effect on the stock of money in circulation either reduction or increase as the case may be, consequently inflation or deflation.

Exchange Rate: This is the price of a nation's currency in terms of another currency. The rate can be influence by macroeconomic variables such as inflation, level of investment, the productivity base of the economy etc. When a currency of a nation appreciates over other currencies of other nations, the tendency is that its monetary policy is working effectively but the reverse is the case when the currency depreciates on daily basis just a naira is doing

today. In other words, a strong practicable monetary policy is a platform for currency appreciation and other economic flamboyances.

Money Supply: Money supply equals to cash in circulation plus bank account deposits. In this study our emphasis is on M1 which is the simplest and is known as transaction money. It connotes currency in circulation that is physically used to conduct transactions between consumers and businesses rather than stored in a bank, financial institution or central bank. Currency in circulation is part of the overall money supply, with a larger portion of the money stock being stored in current and savings accounts and this portion is known as M2. Central banks pay attention to the amount of physical currency in circulation because it can cause inflation when the volume is too much. The more money that comes out of circulation and into long-term investments, the less money is available to fund short-term consumption - a major component of GDP.

Inflation rate: Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling. Central banks attempt to limit inflation, and avoid deflation, in order to keep the economy running smoothly.

Description of the Dependent Variable

Gross Domestic Product (GDP): Gross Domestic Product is the monetary value of all the finished goods and services produced within a country's borders in a specific time period, though GDP is usually calculated on an annual basis. It includes all private and public consumption, government outlays, investments and exports less imports that occur within a defined territory. It is also defined as the market value of all officially recognized final goods and services produced within a country in a year, or other given period of time. GDP per capita is often considered an indicator of a country's standard of living. The higher the GDP of a country, the better the growth and development of that country is.

Data presentation and analyses

Table 1: Summary of Johansen co-integration test result

Series: LINTR, LEXR, LVMIC, LCPI				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None *		0.723536	64.49498	58.32
At most 1	0.439732	21.37248	31.79	46.76
At most 2	0.234431	7.883933	17.52	31.35
At most 3	0.005882	0.321242	4.66	7.76

*(**) denotes rejection of the hypothesis at the 5%(1%) level

Trace test indicates 1 co-integrating equation(s) at the 5% level

Trace test indicates no co-integration at the 1 % level

Hypothesized			Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic Critical Value		Critical Value	
None **	0.723536	45.23359	38.08		43.35
At most 1	0.439732	14.34316	31.88		36.63
At most 2	0.234431	4.738095	16.08		20.74
At most 3	0.005882	0.321242	4.66		7.76

*(**) denotes rejection of the hypothesis at the 5 %(1%) level

Max-eigenvalue test indicates 1 co-integrating equation(s) at both 5% and 1% levels

The result of the Johansen co-integration test in table 1 indicates the existence of a long run relationship among interest rate (INTR), exchange rate (EXR), money supply (M1) and inflation (CPI). This is suggested by both the trace statistics and max-eigen value statistics which indicated one co-integrating equation in each case. The results of the long run elasticity are reported in table 2 shown thus:

Table 2: Summary of long run elasticities- Dependent *Variable: LRGDP*

Variable	Coefficients	Std. error	t-statistics	Probabilities
LCPI	-0.343427	0.178177	-2.824381	0.0108
LIMP	-	0.128991	1.053292	0.0587
LMS	-0.321148	0.039177	0.594744	0.0000
LMS	-0.524332	1.017851	1.467902	0.0001
		R^2 = 0.85; DW = 1.345; Fstat= 31.86; Prob (Fstat) = 0.0001		

The estimated long run result in table 2 reveals that inflation rate and interest rate have significant but negative effect on the real gross domestic product (RGDP) in the long run. The result equally shows that an increase in the inflation rate and exchange rate by 1% decreased the RGDP by 0.34% and 0.26% respectively. This implies that high inflation rate leads to high interest rate on loanable funds with the resultant decrease in the growth of the economy. The

result of the error correction representation is shown in table 3 thus:

Table 3: Error Correction Representation: ***Dependent Variable: DLRGDP***

Varrriab	Coefficients	Std. Error	t-Statistic	Prob.
DLINT	-0.627883	0.123534	-3.626248	0.0104
DLEXR	-0.343664	0.052518	-3.578157	0.0160
DLVMI	-0.524655	0.114584	-5.688871	0.0121
DLCPI	-0.376324	0.078326	-4.017455	0.0142
C	-0.044868	0.082445	0.633486	0.4882
	R^2= 0.74; DW= 1.026832; F statistic= 33.80;			Prob(Fstat) = 0.000
ECM (-1)	-0.33244	0.076442	-2.0024452	0.3362

The error correction result reveals that the overall fit is satisfactory at an R^2 of 74 percent. The probability values of 0.0104 and 0.0160, 0.0121 and 0.0142 are indications that the interest rate, exchange rate, money supply and inflation are statistically significant but negative. The result equally shows that an increase in the rate of any of these variables by 1 percent decreases the real domestic products by 0.63%, 34%, 52% and 37% respectively. The coefficient of the ECM is negative and is statistically significant, indicating a satisfactory speed of adjustment in the long and short run. A highly significant error correction is an indication of a stable long run relationship as seen in the work of [10]. Thus, this is a confirmation of the existence of long run relationships among interest rate, exchange rate, money supply and inflation vis-à-vis gross domestic product. The result of the ARCH test shown in table 4.4 with a combined *coefficient* of approximately 1 is an indication of the persistence of volatility between the independent variables (INTR, EXR, M1 and CPI) and the dependent variable (RGDP). This is an indicative that the real gross domestic product in Nigeria is susceptible to fluctuations in interest rate, exchange rate, money supply and the general price level.

Tab 4 Summary of ARCH Result: Dependent Variable: LRGDP Convergence achieved after 15 interactions

	Coefficient	Std. Error	z-Statistic	Prob.
LCPI	-0.267426	0.018422	-11.83487	0.0000
C	5.665744	0.131842	38.21624	0.0000
Variance Equation				
C	0.033186	0.043358	0.748744	0.2644
ARCH(1)	0.485143	0.724118	0.678552	0.3693
GARCH(1)	0.228484	0.363966	0.618331	0.3484

R-squared	0.585868	Mean dependent var	0.522112	4.209644
Adjusted R-squared	0.551228	S.D. dependent var	0.583321	1.126396
Log likelihood	-14.54374	F-statistic		16.847621
Durbin-Watson stat	1.264846	Prob(F-statistic)	3.1224	
0.0000				

The results of the ARCH convergence in table 4 confirmed that there is overall convergence relationship among the independent variables included in the model which comprised interest rate, exchange rate, volume of money in circulation and the general price level. Specifically, the result of the test suggests that interest rate, exchange rate, volume of currency in circulation and inflation have equilibrium condition with gross domestic product which keeps them in proportion to each other in the long run. This evidence of convergence among the variables does not imply that there is causal influence between pairs of variables in the model of convergence test.

Suffice is to note that regression analysis deals with the dependence of one variable on the other variable, but in most cases it does not necessarily imply causality. In other words, the existence of a relationship in time series data may warrant the situation to be somewhat different. This is because time does not run back-ward, that is, if event X happens before event Y, then it is possible that Y is causing X which means that events in the past can cause events to happen today. Future events cannot cause yesterday's events to happen today. This is roughly the idea behind the so-called Granger Causality test, but it should be clearly noted that the question of causality is deeply philosophical with all kinds of controversies among authors. For example at one extreme of the debates are authors who believe that events cause events (everything causes everything). An Econometrician named Edward Leaner prefers the term precedence to causality, while Francis Diebold prefers the term predictive causality. Whichever term, the estimate of causality is presented in table 5 thus:

Sample: 2000-2015

Lag 1

Table 5 the Estimates of Causality-Test Pairwise Granger Causality Tests Results

Null Hypothesis:	F-Statistic	Probability
LINTR does not Granger cause LRGDP	3.12342	0.00000
LRGDP does not Granger cause LINTR	1.96518	0.07009
LEXR does not Granger cause LRGDP	0.48672	0.55602
LRGDP does not Granger cause LEXR	1.03126	0.36428
LVMC does not Granger cause LRGDP	1.06501	0.16415
LRGDP does not Granger cause LVMIC	0.10414	0.87415
LCPI does not Granger cause LRGDP	3.18872	0.02599
LRGDP does not Granger cause LCPI	6.52523	0.00197
LVMC does not Granger cause LCPI	3.08792	0.02617
LCPI does not Granger cause LVMC	0.16452	0.68362
LINTR does not Granger cause LCPI	0. 22112	0.66211

Source: Researchers' computation 2016

The results in table 4.5 reveal that interest rate, exchange rate, money supply and inflation have causal effect on gross domestic product. However, a strong unidirectional causality was found between velocity of money in circulation and inflation with the causality running from velocity of money in circulation to inflation at 5 percent level of significant. Also exchange rate was found to granger cause inflation at a very weak rate at 5 percent significant level, while interest rate and

exchange rate have a very strong causality running from interest rate to exchange rate at 5 percent significant level. The result equally shows that there exists a unidirectional causality between gross domestic product and interest rate; this runs from GDP to interest at 10% significant level. Also, a unidirectional causality was found between GDP and inflation rate, which runs from GDP to inflation at 10 percent significant level. The monetarists' causal argument for inflation was confirmed by the Granger test result at 5 percent level of significant.

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This study has been on the empirical investigation of the impact of monetary policy on economic growth in Nigeria. The study period covers between 2000 and 2015. The co-integration technique and its implied error correction methodology were used as well as the ARCH and Granger causality methodology. Sequel to the analysis done, some findings were made based on the objectives of the study. These include;

- There is strong causality relationship between monetary policy and economic growth in Nigeria. This implies that the GDP in Nigeria is highly responsive to changes in the monetary policy.

- There is a long run causality relationship among interest rate, exchange rate, money supply, inflation and gross domestic product (GDP) of Nigerian economy.

The overall finding is that one variable can cause another to happen either positively or negatively depending on the situation of things. For example the high volume of money in circulation can cause inflation as too much money in circulation chasing few goods can hick price level, consequently high rate of interest with resultant effect of depreciation in exchange rate, hence overall low growth rate of the economy. All these macroeconomic variables have recycling or ripple effects on each other and consequently the overall economy. It is here recommended that policy makers should adopt and implement complementary macroeconomic policies that should be geared towards increasing productive base of the economy for improved exports. Equally important is the need to streamline the objectives which monetary policy is set to achieve as this will go a long way in helping the implementation of such within the targeted period for better results. The

paper equally recommended a synergy between monetary policy and fiscal policy and their implementation as to collaborate the achievement of their respective objectives which are complementary not supplementary and by so doing the overall objective of stabilizing the economy will be actualized.

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