
Money Supply and Inflation in Nigeria 1986-2009

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ABSTRACT

A rapid and persistent increase in the general prices of goods and services is harmful to the economy in various ways. It is for this reason that price stability is a prime objective of economic policy all over the world. In Nigeria, Government has implemented a number of anti-inflation measures but with limited success. This may be due to an inadequate understanding of the inflationary process. While there is considerable disagreement on the causes of inflation, one of the most frequently cited factor is the money supply. The results of the existing works on the importance of money supply in the inflationary situation in Nigeria are mixed. It is against this background that this study investigated the effect of the money supply on inflation in Nigeria between 1986 and 2009. It also examined the effect of aggregate demand on inflation. The objective of this study is to ascertain how far the money supply can explain the inflationary phenomenon in Nigeria. The study uses secondary data obtained mainly from the Central Bank of Nigeria's Statistical Bulletin and World Bank data base 2011. The data were analyzed principally by multiple regression method using the ordinary least square method. An ADF test indicated that some of the variables used were stable at levels and others at first difference. Other tests are; the GARCH model, Johansen cointegration. Based on the results of the analysis and test the study concluded that the money supply and aggregate demand were the main determinants of inflation in Nigeria during the review period. Given this conclusion, it was recommended that the Central Bank of Nigeria should concentrate on controlling the growth of money supply while the policy of fiscal restraint is used to curb aggregate demand. This would lead to a moderation of the increases in the price level.

Introduction

Inflation is a controversial term which poses an enormous challenge to economists. It refers to a persistent and sustained rise in the general level of prices of goods and services in an economy. It manifests itself most visibly in the decline in the value of money. According to Yahaya

(2000), the major explanations of inflation include fiscal, monetary and balance of payment aspects. On the one hand inflation is considered to be due to an increase in the money supply. On the other, the fiscal explanation views inflation as rising from budget deficits which are considered fundamental causes of inflation. However, the fiscal aspect is closely linked to the monetary explanations of inflation since government deficits are often financed by money creation in developing countries. In the balance of payments aspect, emphasis is placed on the exchange rate. The collapse of the exchange rate usually brings about inflation through higher import prices and increases in inflationary expectations which are often accommodated through an accelerated wage indexation mechanism.

Essien and Uche (2002) distinguish two features of inflation which are worth noting. First, inflation is generally associated with an increase in an individual good and service. Secondly, a once and for all increase in the price level does not necessarily add impetus to the underlying inflation. On the other hand, a onetime increase in the price of certain goods may trigger a chain of price increases which can lead to a sustained increase in inflation.

Inflation has been a problem in Nigeria since the 1970s when the country's weak economic base became problematic, especially as from the late 1970s. There were all sorts of disequilibria in the economy resulting from an imbalance between the spending power and the productive capacity of the economy. The disequilibria were caused by the rapid depletion of the external reserves thus leading to disequilibrium in the balance of payments, and a rapid expansion of overall monetary expenditure in the economy which helped to drive up prices (Omofa 2006).

Money plays a fundamental role in an economy. This role has been vividly described by the quantity theory of money represented by Fisher's Equation of Exchange and the New Quantity Theory of Money as ascribed to a variant of the Chicago School tradition. According to Shepherd and Duck (1978), there is substantial and growing evidence that one of the necessary conditions for economic and financial stability is that the expansions of the money stock be adequately controlled. This has to be so because in the view of Laidler (1971), changes in the money stock influence economic activities after a time lag. This has led a number of economists, including Friedman (1968), to argue that the most sensible monetary policy involves the central bank's ensuring that the money stock be expanded annually in conformity with the economy's growth rate. Thus, given this strategic role of money, it is imperative to control its behavior.

The effect of high inflation on the economy is generally considered to be predominantly harmful. Inflation causes serious discomfort to consumers, investors, producers and the government. As observed by Yahya (2000) inflation led to the abandonment of the German currency in the 1920s, a national strike in France in 1973 and to a national riot in Egypt in 1977. Also almost all free market economies have experienced some degree of protest against inflation.

It is believed that unstable prices cause uncertainty in expectations, thereby distorting the process of economic decision making. Inflation creates distortions by increasing the opportunity cost of holding (interest earning) money and promotes inefficient use of real resources in transactions. Another effect of inflation is the reduction in the standard of living of the citizenry, since an increase in the general level of prices decreases the purchasing power of money, as each monetary unit effectively buys fewer goods and services than before.

High inflation rates widen the income gap between those with fixed income (who lose) and others with variable income (who gain). The real value of fixed nominal payments such as rents, pensions, wages and taxes are eroded by inflation. High inflation rates also diminish the net present value of current investments and makes returns to investment uncertain. Inflation is thus a major challenge for every central bank. As observed by Orubu (2009) the achievement of price stability has always been one of the fundamental objectives of macroeconomic policy in both developed and less developed countries (Orubu, 2009). Since the major aim of any sound economic policy is price stability, price and the money stock are thought to be positively related, it is important that the money stock be controlled. This relationship has been made more precise by the quantity theory of money which asserts that the general price level is determined by the money stock. Inflation is therefore a major challenge for every central bank and the government to adopt appropriate monetary policy frame work to ensure price stability.

The rate at which inflation is increasing and affecting budget implementation at all tiers of government as well as business activities in Nigeria has become a serious concern for many Nigerians. In fact inflation has been a constant menace to the Nigeria economy, especially since the 1990's. It is against this background that the researcher attempts to analyze the extent of the effects of money supply on inflation

Statement of the Problem

Thus, a continuous rise in the general price level is injurious to the community's socio-economic interest, both in terms of the current welfare and future economic development. As explained above, the consequences

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of inflation on the economy are pervasive and generally adverse. For instance, high and unpredictable inflation rates create inefficiencies and uncertainties in the economy. The uncertainties, for example, make it difficult for economic agents to budget and plan effectively. This is why policy makers are concerned about inflation. Prices are the common denominator which brings together different market actors in the economy.

Given the adverse consequences of inflation highlighted above, the maintenance of price stability is expected, but this objective has proved elusive over time. One of the possible reasons is inadequate understanding of the inflationary process in Nigeria on the part of the monetary authorities. Nigeria has instituted and implemented various anti-inflation measures over time, reflecting the divergent views on the causes of inflation as observed earlier, thus measures have met with limited success.

Several studies on inflation in Nigeria have been conducted but the results are mixed. However, one of the most frequently cited factor contributing to the inflationary situation in Nigeria is the money supply. The basic question which these studies attempted to address is that; to what extent can the money supply explain the inflationary situation in Nigeria? In other words, is inflation truly and essentially a monetary phenomenon in Nigeria?

Objectives of the Study

The broad objective of this study is to assess the impact of money supply on the inflationary rate in Nigeria, from 1986-2009. The specific objectives of this study are to:

- Examine the effect of aggregate demand on the inflation rate in Nigeria.
- Analyze the impact of other determinants on inflation in Nigeria

Research Hypotheses

This study has been designed to test a hypothesis that the money supply and inflation in Nigeria are unrelated. The research hypothesis will test two main hypotheses which are stated thus:

- H₁: Changes in the level of money supply have no significant effect on rate of inflation in Nigeria.
- H₂: Changes in the level of aggregate demand have no significant impact on inflation in Nigeria.

Conceptual Framework

Money Supply

Money supply is defined differently in different countries depending on the level of development of their financial system. In Nigeria, this level is low. Savings and Time deposits first have to be converted into cash or demand deposits before they can be used as medium of exchange. Consequently, the official definition of money supply in Nigeria is M_1 which comprises notes and coins in circulations and demand deposits in commercial and central bank. Other wider definitions of money merely add to M_1 . For instance, M_1 is obtained by adding savings and time deposits at commercial banks to M_1 .

The supply of money is the stock of money at a particular point in time. The supply of money at any moment is the total amount of money in the economy (Jhingan, 2006). According to Anyanwu and Oaikhenan (1995), money supply is the assets which represent immediate purchasing power in the economy and which as a result function as a medium of exchange. In Nigeria, the narrow money supply (M_1) is defined as currency outside bank plus demand deposits of commercial banks plus domestic deposits with the central banks less Federal Government deposits at commercial banks. In simple terms, M_1 is defined as;

$$M_1 = C + D$$

Where:

M_1	=	Narrow money supply
C	=	Currency outside banks
D	=	Demand deposits.

Ajayi (1978) contends that M_2 is the appropriate definition of money in Nigeria. In the UK narrow money includes M_0 , M_1 and M_2 . M_0 includes only notes and coins in circulation and in bank tills, m_1 includes notes and coins in circulation and sight deposits with banks, M_2 includes not only notes and coin and bank current accounts, but also 7-days bank deposits and some building society deposits. In the Nigerian context board money (M_2) is defined as M_1 plus quasi money. Quasi-money as used here is defined as the sum of savings and time deposits with commercial banks. Symbolically shown as;

$$M_2 = C + D + T + S$$

Where:

M_2	=	Board money
T	=	Time deposit
S	=	Savings deposits

C and D as defined above.

The Concept of Inflation

Inflation is one of the most frequently used terms in economic discussions, yet the concept is variously misconstrued. There are various schools of thought on inflation, but there is a consensus among economists that inflation is a continuous rise in the prices. Simply put, inflation depicts an economic situation where there is a general rise in the prices of goods and services, continuously. It could be defined as a continuing rise in prices as measured by an index such as the consumer price index (CPI) or by the implicit price deflator for Gross National Product (GNP). The term inflation according to Shapiro (1978) in Jhingan (2006) is a persistent and appreciable rise in the general level of prices. According to Dernberg and McDougall (1976) in Jhingan, the term usually refers to a continuing rise in the price as measured by an index such as the consumer price index (CPI).

According to Ishmael (2004), one of the most difficult problems facing almost all countries of the world, a problem which appears to be defined as a high and persistent rise in the price level is inflation. This implies that not every price increase is termed inflation; a once for all rise in the price level may not be termed an inflationary phenomena. Again, price of all goods and services may not rise simultaneously or by the same proportion. Even if the increase in price is over a prolonged period, it may not be considered inflation if the rate of increase is considered minimal (Rebmann, 1976).

This definition of inflation has some limitation because inflationary pressures are not always manifested in rising prices. In some cases the level of price is prevented from rising because of the imposition of very strict price control- a situation usually refers to as suppressed or represented inflation. In such circumstances inflationary pressure are manifested in long queues of customers at shop anxiously waiting to receive their allocation of the very limited supplies. In other circumstances, inflationary pressure are reflected in an excessive drain of the country's foreign exchange reserve as excess demand for goods and services is shifted outside the domestic economy.

Theoretical Framework

The theoretical basis of this study was anchored on Monetarist and Keynesian schools of thought. The Monetarists hinge their proposition on the quantity theory of money in which they argue that changes in the price level are determined by fluctuations in the level of money supply. Keynesian theory proposes that money is transparent to real forces in the economy, and that visible inflation is the result of pressure in the economy expressing themselves in price.

The Monetarist View of Quantity Theory of Money

The monetarists used the quantity theory of money as the framework for explaining the relationship between money supply and the price level. According to Jhingan (2006), the Monetarists emphasize the role of money as the principal cause of demand-pull inflation. They contend that inflation is always a monetary phenomenon. Price tends to rise when the rate of increase in the money supply is greater than the rate of increase in real output of goods and services (Johnson, 1973).

Ayodele and Emmanuel (2005), assumes that the price level will change proportionately with changes in the quantity of money. This belief is often summed up in the phrase, "money is in the long run-neutral". The rate of money creation is reflected in the rate of inflation in the long run. It further posits the existence of the classical dichotomy between relative and absolute price determination. The crude quantity theory, focusing on long-run relationship, posit that the theory of value explains the relative prices (because they are determined in the real sector) while monetary theory explains absolute prices. A change in the quantity of money will only change the general level of absolute prices; it will not affect output or relative prices (Lucket, 1980).

According to Glahe (1977), it must be noted that the monetary conclusion is based on the joint validity of a particular assumption about the demand for and supply of money. They are both assumed to be perfectly interest elastic. This is what is referred to as the exogeneity of money. The Monetarist's contention hence goes thus: given the level of real money supply and the level of demand for money at certain income levels, money do not change alone with changes in the level of interest rate. For the derivation of the general equilibrium, the equilibrium in the real (goods) market is needed which together with the money market equilibrium, yield the general equilibrium level refer to as the aggregate demand in the economy, while the full employment level yields what is referred to as aggregate supply level. Therefore, national income and price are determined by the equilibrium of aggregate demand and supply (Omofa, 2000).

An increase in the equilibrium in the goods market will only lead to an increase in the rate of interest with little or no impact on the income and price level. It can thus be said that the impact of fiscal policy is not necessary since it may not yield the desired result. If on the other hand, nominal money supply is increased through Central Bank, it will result in an increase in the money market equilibrium. This now meets the original equilibrium in the goods market at full employment which results in a higher aggregate demand than when fiscal policy was embarked upon. As a result of this decision, aggregate demand meets aggregate supply at a higher level of national income and price level (Omofa, 2000). The

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quantity theorists established a direct relationship between money supply and price level.

Thus, the monetarists employ the familiar identity of Fisher's equation of exchange:

$$MV=PQ$$

Where;

M	=	Money supply
V	=	Velocity of money in circulation
P	=	Aggregate price level
Q	=	Level of real output/aggregate output.

Assuming V and Q as constant, the price level (P) varies proportionately with the supply of money (M). With flexible wages, the economy was believed to operate at full employment levels. The labour force, the capital stock, and technology also change only slowly over time. Consequently, the amount of money spent did not affect the level of real output so that a doubling of the quantity of money will result simply in doubling the price level. Until price has risen by this proportion, individuals and firms would have excess cash which they would spend, leading to rise in prices. So inflation proceeds at the same rate at which the money supply expands (Jhingan, 2006).

The Keynesian View

The Keynesian school of thought is usually referred to as demand side economist. Keynes economic theory proposes that changes in money supply will not directly affect price and that visible inflation is the result of pressure in the economic expressing themselves in price. Keynes emphasizes that increases in aggregate demand are the source of demand-pull inflation. There may be more than one source of demand. Consumers want more goods and services for consumption purposes. Businessmen want more inputs for investment. Government demands more goods and services to meet civil and military requirements of the country. Thus, the aggregate demand comprises consumption, investment and government expenditure.

Thus, Keynesian model is given as;

$$Y=C+I+G \text{ (for a close economy)}$$

Where;

Y	=	Aggregate Demand
C	=	Private Domestic Consumption
I	=	Investment

G = Government Expenditure

Inflation according to the Keynesian school of thought arises from excessive aggregate demand over aggregate supply, particularly when the economy operates at the level of full employment resources. Keynes rejected the quantity theory of money, which revolves around the Fisher's equation of exchange which is as stated earlier. He argued that an increase in the money supply would not inevitably lead to an increase in the price level. Increasing M may instead lead to a decrease in V, in other words, the average speed of circulation of money could fall because there was more of it in the system.

Alternatively the increase in M may lead to an increase in T (number of transactions) because as we have seen Keynes disputes the assumption that the economy will find its own equilibrium. It may be in the position where there is insufficient demand for full-employment equilibrium and in that case increasing the money supply will fund extra demand and move the economy closer to full employment. Keynes tends to argue that inflation is more likely to be cost-push or from an excess level of demand. This is usually term demand-pull inflation (Robert 1988).

Some Keynesian economists also disagree with the notion that the central bank fully controls the money supply, arguing that central banks have little control, since the money supply adapts to demand for bank credit issued by commercial banks. This is known as the theory of "endogenous money" and has been advocated strongly by post-Keynesians as far back as the 1960s. It has today become a central focus of "Taylor rule" advocates. This position is not universally accepted-banks create money by making loans but the aggregates volume of these loans diminishes as real interest rate increase. Thus, central bank can influence money supply by making money cheaper or more expensive, thus increasing or decreasing its production (Robert 1988).

The money supply is also thought to play a major role in determining levels of more moderate levels of inflation, although there are differences of opinion on how important this role is for example, the monetarists believe that the link is very strong. But Keynesian economists emphasize the role of aggregate demand in the economy rather than the money supply in determining inflation, that is, for Keynes the money supply is only one determinant of inflation. The fundamental concept in inflation analysis is the relationship between inflation and unemployment. This relationship is sometimes expressed in terms of the "Phillips curve". The models suggest that there is a tradeoff between price stability and employment. Therefore some level of inflation could be considered desirable in order to minimize unemployment. The Phillips curve model described the US experience well in the 1960s but failed to describe the

combination of rising inflation and economic stagnation (sometime refer to as stagflation) experience in the 1970s (Chatham, 2008).

Thus, (Blanchard 2000) describes inflation analysis using a Philips curve that shifts (so that the trade-off between inflation and unemployment changes) because of such matters as supply shock and inflation becoming built into the normal workings of the economy. The former refers to such events as the oil shocks of the 1970s while the latter refers to the price/wage spiral and inflationary expectations implying that the economy "normally" suffers from inflation. Thought in the case of the monetarist, Keynes did not believe in a single cause of inflation. His analysis allows other factors besides change in money supply to affect the aggregate demand and supply curve such as fiscal policy and supply shocks.

Empirical Studies

Considerable empirical work has been carried out on money supply and its inflationary effect in Nigeria. Omofa (2006), carried out an empirical study of money supply and its effect on the Nigerian inflationary process from 1985-2000. Since the overall objective of his study was to examine the effect of money supply on the Nigerian inflationary process, this study focused on The Fulfillment of Economic A Prior Criteria, i.e., sign and size of the estimates of interest. The conventional criteria relating to the R^2 were not used. But he made use of the F-ratio and the t-value and the Durbin Watson statistic in determining the goodness of fit of the regression equation and statistical significance of the co-efficient. He used money supply in the current (M_t) and previous (M_{t-1}) period, the price level in the previous period (p_{t-1}), foreign price (p_t), interest rate (A), the level of output i.e., GDP (Y), the exchange rate (E) and the government deficit (GD) to explain change in the general price level, i.e., rate of inflation (P_t). The overall fit shows a very strong relationship between the price level and the explanatory variables. It shows that about 99.9% of the variation in the price level during the period under consideration is explained by the model. The remaining 1% could be explained by other variables not included in the model. This tends to validate the monetarists contention that if monetary variables can be brought under control then the price level would be simultaneously controlled. This means that if the explanatory variables can be sufficiently controlled, varied to about 99.9% the price level can be brought under reasonable control. Since the F-statistic is very high (99.7) it shows that the data fits into the model and at least one of the coefficients or parameters of the model is non-zero.

Iorkyase (2005) carried out an empirical study on the Monetary Policy and Macroeconomic Performance in Nigeria under Deregulation. He presents an empirical analysis on the relationship between inflation and money stock. His study focused on the fulfillment of the economic a priori

criteria. The conventional criteria relating to R^2 was used and he made use of the F-ratio and the t-value Durbin Watson statistic in determining the goodness of fit of regression equation and statistical significant of the co-efficient. He used money supply (Ms), structural adjustment programme (SAP), which is used in his analysis as dummy variable, Export (EXPT), Import, public expenditure (P.EXP), to explain the changes in inflation (INF). The results revealed, that the co-efficient of determination (i.e. R^2) of 0.299 shows that only about 30 percent of changes in the dependent variable is explained by changes in the independent variable of the model. The t-value shows that the independent variables are not significant in explaining changes in the dependent variable.

Kilindo (1997), carried out an empirical study on Fiscal Operations on Money Supply and Inflation in Tanzania, he established the relationship between fiscal operations, money supply and inflation in Tanzania. A structural model borrowed from Aghevli and Khan (1977a, 1977b, 1978) was used to establish the relationships. The study established a strong relationship between fiscal operations, money supply and inflation in Tanzania. This is evidenced by the significant coefficient of the structure model and stimulation results that the historical series are adequately tracked by the stimulated series. While during the 1970-1984 period differential elasticity in expenditure and revenue are the main element sustaining the self-generating inflation, during the period 1985-1991, it is the role of Central Bank in the money supply process, through it provision of credit in in the response to external inflows, that will sustain inflation. This however, does not eliminate the role of the budget since the Government finances loss making parastatals through bank borrowing. The findings of this study have several policy implications. There is need for adoption of a restrictive monetary policy in which the supply of money must be constrained to grow steadily at the rate of growth of real output. Since the growth of money supply is greatly influenced by expansion of credit (especially to Government), there is need to limit Government borrowing from banks to finance deficits. In line with this policy, it is necessary to streamline the banking system so that competitiveness is achieved. Dependence on bank borrowing by the Government could be reduced if the domestic capital market is developed by for example making the return on securities more attractive to the public. This will enhance the working of open market operation as a tool of monetary policy in the country.

Methodology

The study used a time series data that span a period of 24 years (1986-2009). An econometrics method of multiple regression analysis was employed as the tool to estimate the relationship between inflation and some selected explanatory variables. The data for money supply was

obtained from Central Bank of Nigeria annual bulletin; annual reports. The coefficient of determination was used to examine the effect of money supply on inflation in Nigeria. The student t and f-statistics was equally used to test for individual and over all significance of the regression respectively.

Model Specification

Inflation is a function of many variables. These variables include the level of money supply, aggregate demand, cost of inputs of production, changes in the wage rate, and psychological factors. The model for this study is expressed as:

$$\text{Inf} = f(\text{Ms}, \text{Im}, \text{Bd}, \text{Ad}, \text{Pop})$$

The explicit form of the model is formulated as:

$$\text{Inf} = \beta_0 + \beta_1\text{Ms} + \beta_2\text{Im} + \beta_3\text{Bd} + \beta_4\text{Ad} + \beta_5\text{Pop} + U$$

Where;	Inf	=	Inflation
	Ms	=	Money Supply (M_2)
	Im	=	Import
	Bd	=	Budget deficit
	Ad	=	Aggregate demand
	Pop	=	Population
	U	=	Random Variable

The inclusion of import is in line with Asogu (1991) who opined that monopolistic practice with respect to importation causes inflation. This is because importing goods and services from inflationary countries has the tendency of creating inflation in the economy. It should be noted that an increase in population and aggregate demand will lead to increase in the price of goods and services. It is important to note that the above mentioned variables which are in nominal values were converted to rates since the dependent variable is in rate.

A Priori Expectation

It is expected that Ms, Im, Bd, Ad and Pop are positively related to inflation. This is, given as: $\text{Inf} > 0$; $\text{Ms} > 0$ $\text{Im} > 0$; $\text{Bd} > 0$; $\text{Ad} > 0$; and $\text{Pop} > 0$. This implies that as these variables increases; inflation also increases.

Empirical Results and Discussion

Result of Stationarity Test

Table 1: Unit Root test for Stationarity

Variable	ADF	Order of Integration
Inf	-4.620013(-3.0114)	1(1)
Ms	-3.191456(-3.0038)	1 (0)
Im	-3.639270(-3.0038)	1(0)
Bd	-4.625252(-3.0114)	1 (1)
Ad	-5.772069(-3.0199)	1(1)
Pop	-4.16988(-3.0114)	1(1)

Source: Eview 7 statistical package

Critical values (in parenthesis) are at 5% level of significance. The results of the ADF test in Table1 indicate that Ms and Im are stationary at levels, but Inf, Bd, Ad and Pop are not stationary but co- integrated at 1st order difference.

Regression Result and Interpretation

From the empirical equation in the model used in this study, the regression result is presented below:

$$\text{If} = -99.61 + 0.63\text{Ms} + 0.02\text{Im} + 0.00\text{Bd} + 0.46\text{Ad} + 35.59\text{Pop}$$

$$(-1.36) \quad (3.28) \quad (0.40) \quad (0.52) \quad (3.92) \quad (1.22)$$

$$R^2 = 0.67$$

$$\text{Adjusted } R^2 = 0.57$$

$$F - \text{Statistic} = 6.57$$

$$\text{DW} = 1.55 \quad \text{t-values are in parenthesis}$$

Source: Eview 7 statistical package

The regression results showed that only the money supply and aggregate demand are statistically significant. This means that the money supply and aggregate demand are the main determinants of the inflation rate in Nigeria. Other variables captured in the model exert an insignificant effect on the rate of inflation. Furthermore, the coefficient of the money supply and aggregate demand are positively signed.

The coefficient of money supply (Ms) is 0.63 with a t-statistic of 3.28. The coefficient is thus statistically significant at the 5% level. This implies that the money supply is an important determinant of the inflation rate. On the other hand, the coefficient of import (Im) is 0.019 with a t-statistic of 0.39. The coefficient is thus statistically not significant at the 5% level; the coefficient of the budget deficit (Bd) is 0.002, with a t-statistic of 0.52. The coefficient is thus statistically not significant at the 5% level; the coefficient of aggregate demand (Ad) is 0.46 this implies that a 100% increase in aggregate demand, is expected to increase the inflation rate

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by 46%, the coefficient of population (Pop) is 35.58, with a t-statistic of 1.21. The coefficient is thus statistically significant at the 5% level. This implies that the population is an important determinant of the inflation rate.

The results showed that the model has a reasonably good fit. The adjusted coefficient of multiple determinations R^2 , of 0.57 indicates that about 57% of the variation in the rate of inflation in Nigeria during the period under consideration is explained by the model. The remaining 43% could be explained by other variables not included in the model and chance. The Durbin Waston (DW) statistics of 1.55 shows the presence of positive autocorrelation among the random variables built into the regression model. And this led the researcher to employ the use of GARCH model which help in reducing the volatility in the inflation rate.

The t-value of regression coefficient of money supply is 3.27 and the degrees of freedom 19. The critical value of the t at the 5% level of significance with 19 degrees of freedom is 2.093. Given that $t_{cal} > t_{tab}$, it therefore implies that money supply is statistically significant at 5% level of significance. The t-value of the regression coefficient of import is 0.39 with a critical value of 2.093 at 5% level of significance, given that $t_{cal} < t_{tab}$, it implies that import is statistically insignificant at 5% level of significance. The t-value of budget deficit is 0.52 with a critical value of 2.093 at 5% level of significance, since $t_{cal} < t_{tab}$, it means budget deficit is not statistically significant at 5% level of significance. More also, the t-value of the regression coefficient of aggregate demand is 3.91. But the critical value of t at 5% level of significance with degree of freedom of 19 is 2.093. Given that $t_{cal} > t_{tab}$, it implies that aggregate demand is statistically significant at 5% level of significance. The t-value of population is 1.21 with a critical value of 2.093 at 5% level of significance, since $t_{cal} < t_{tab}$, it means population is not statistically significant at 5% level of significance.

From the result obtained, the F-value is 6.57 while the critical value of F at 5% level of significance is 2.62 at the degree of freedom of 19. Given that F calculated is greater than F tabulated, ($F_{cal} > F_{tab}$), the conclusion is that taken together the coefficients are statistically significant and plausible at 5% level significance.

From the regression results obtained, it was observed that; the result was spurious and in order to reduce the volatility in the dependent variable, a GARCH model was used.

GARCH Result and Interpretation

The GARCH model was used because of the volatile nature of inflation. The result is presented below.

$$GRACH = C(7) + C(8)* RESID(-1)^2 + C(9)*GARCH(-9)$$

Variable	Coefficient	Std Error	z-Statistic	Prob.
BD	-0.002825	0.006829	-0.413621	0.6792
IF	0.502203	0.320131	1.568743	0.1167
IM	0.112672	0.069659	1.617480	0.1058
MS	-0.376647	0.387641	-0.971639	0.3312
POP	2.781630	41.64850	0.066788	0.9468
C	22.53249	110.2184	0.204435	0.8380

Variance Equation				
C	72.24666	115.9199	0.623160	0.5332
RESID(-1)^2	0.481342	0.670135	0.718276	0.4726
GARCH (-1)	0.272560	0.541541	0.503304	0.6148
R-squared	0.579469	Mean dependent var	32.86789	
Adjusted R-squared	0.462654	S.D dependent var	24.68829	
	S.E of Regression	18.09747	Akaike info criterion	8.977629
Sum squared resid.	5895.334	Schwarz criterion	9.419400	
Log likelihood	-98.78155	Hannan-Quinn criter	9.094831	
Durbin Watson	- 2.731523			

It can be seen from the above table that the coefficient of inflation is 0.502203 with the standard error of 0.320131 though it is not statistically significant. The variance equation of the GARCH model for the residual in the first lagged is minimum (0.481342) while the GARCH in the first lagged is 0.272560. This shows that the heteroscedasticity in the inflation variable has been reduced. The Akaike info Criterion and Schwarz criterion are all low which shows that the model will not yield spurious results.

Johansen Co-integration Test

The Trace Statistic and Eigen value show that there is a co-integration in the three (3) equations. It was observed that at the beginning the values of Trace Statistic, Eigen value and Eigen value, Max-Eigen Statistic are not the same, but towards the end the values now becomes the same that is (0.061118 and 1.387449 respectively), this indicates that the values are at equilibrium and it shows that we have establish already that there is a long run relationship between the variables. (See appendixes 10)

The Result of the Diagnostic Tests

Autocorrelation Test

The Durbin Waston (DW) statistic as stated above is 1.55 from the estimated mode which implies that positive autocorrelation is present among the random variable built in the regression model. Despite the present of autocorrelation in the model the results are valid; although, GARCH model was latter employed to reduce the volatility in the dependent variable.

The White Heteroscedasticity Test

The result of white heteroscedasticity test shows that $n(R^2) = 24(0.4676) = 11.22$, while the critical value X^2 at 5% level of significance with d.f of 10 is 18.31. As $X^2_c < X^2_{0.05}$ we hereby reject the null hypothesis and conclude that there is no heteroscedasticity in the mode.

Test of Hypotheses

At 5% level of significance, the first null hypothesis which states that changes in the level of money supply have no significant effect on the rate of inflation in Nigeria is rejected as the t-test revealed that changes in the level of money supply have significant influence on inflation in Nigeria. The second null hypothesis which states that changes in aggregate demand have no significant impact on inflation is also rejected as the t-test also revealed that the changes in aggregate demand had a significant effect on the rate of inflation in Nigeria from 1986 to 2009. It is therefore concluded that money supply and aggregate demand significantly affect inflation in Nigeria.

Discussion of Findings

The model used in this research reveals a positive relationship between inflation, Money Supply, Import, Budget Deficit, Aggregate Demand and Population induced inflation during the study period. As stated earlier, the coefficients of all the explanatory variables being positive sign, confirm a priori expectations. The positive signs imply a positive relationship of the relevant variables with the rate of inflation. This is an indication that the variables perform in line with the economic theory. The study shows that money supply is a strong determinant of inflation, which indicates a positive relationship between the money supply and inflation rate in Nigeria in the period under study and this is in line with the objective one of the study as against the findings of Omofa (2006) who concluded that money supply have no significant impact on price level in Nigeria. The study revealed that changes in aggregate demand had a significant effect on the rate of inflation in Nigeria in the period under study; this is in line with the objective two of the study.

Recommendations

Based on the finding of the study, the following recommendations are hereby made

- The Central Bank of Nigeria should continue to focus on controlling the growth of the money stock through a restrictive monetary policy.
- Government should pursue a conservative fiscal policy by reducing substantially the fiscal deficit, it should be noted that fiscal deficits when financed through the financial system as currently done in Nigeria not only increase aggregates but impinge directly on the money supply.
- The above recommendations underscore the need for monetary and fiscal co-ordination as they complement each other. Government should not be pursuing a liberal fiscal policy when the Central Bank is advocating restraint in the face of mounting pressure on the price level.

Conclusion

This study attempts to examine the impact of money supply on inflation in Nigeria. It adopted the monetarist's approach based on its usefulness for the purpose at hand.

From the various econometric tests carried out, it was revealed that money supply and aggregate demand had significant impact on the price level in Nigeria. The implication of this result is that, the emphasis by the monetarists on the relative effectiveness of monetary policy in controlling inflation may be the best policy for the Nigerian economy. Import, budget deficit, and population are important variables in explaining variation in the price levels, though with a negligible effect on it.

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