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## **Analysis of the Effect of Monetary Policy on Price Stability in Nigeria**

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### **ABSTRACT**

This paper focuses on the impact of monetary policy on price stability in Nigeria, using time series data from 1980-2015 obtained from the Central Bank of Nigeria's Statistical Bulletin. The main purpose is to investigate the extent to which the apex monetary authority- the Central Bank of Nigeria has addressed adverse changes in price, output and interest rates through the use of monetary policy instruments. For our analysis, we adopt Error Correction model. The findings show that monetary policy has a negative and insignificant relationship with the general price level in the short period while in the long-run, they are positively related. It equally reveals that interest rate exerts a positive and insignificant influence on inflation. The study therefore, recommends among others that the autonomy granted the CBN should be sustained and even strengthened since it is only an independent monetary authority that can pursue the objective of price stability at the cost of other objectives.

**Keywords:** Inflation Rate, Interest Rate, Treasury Bill Rate, Money Supply, Real Gross Domestic Product.

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### **INTRODUCTION**

Since its establishment in 1959, the Central Bank of Nigeria (CBN) has continued to play the traditional role expected of a Central Bank, which is the regulation of money stock in such a way as to promote social and economic welfare (Ajayi, 1999)[1]. This role is anchored on the use of monetary policy that is usually targeted towards the achievement of full employment equilibrium, rapid economic growth, price stability and external balance (Adebayo, 1996)[2]. Over the years, the major goals of monetary policy hence often had been the two later objectives. Thus inflation targeting that exchange rate policy, has dominated CBN's monetary policy focus based on the assumption that there are essential tools of achieving macroeconomic stability. The economic environment that guided monetary policy before 1986 is characterized by the dominance of the oil sector, the

expanding role of the public sector in the economy and over dependence on the external sector. In order to maintain price stability and health balance of payment position, monetary management depended on the use of direct monetary instruments such as credit ceilings, administered interest and exchange rates as well as the prescription of cash reserve requirement and special deposits. The use of market based instrument was not feasible at that point because of the undeveloped nature of financial concept and the deliberate restrains on interest rates. The most popular instrument of monetary policy was the issuance of credit rationing guideline which primarily set of the rates of exchange of the components and aggregate Commercial Bank Loans and advances to private sector. The sector allocation of Bank of Credit in CBN guidelines was to stimulate the productive sector and thereby stem inflationary pressures. The fixing of interest rate at relatively low level was done mainly to promote investment and growth.

Occasionally, special deposits were imposed to reduce the amount of free reserve and creating capacity of banks. Minimum cash ratios were stipulated for the bank in the mid-1970s on the basis of their total deposits liability, but since such cash ratios were usually lower than those voluntarily maintained by the banks, they proceed less effective as a restraint on their credit operations. In general terms, monetary policy refers to a combination of measures designed to regulate economy. The value, supply and cost of money in the economy, in consonance with the expected level of economic activity (Okwo and Nwoha 2010; Adesoye, 2012)[3],[4] for most economies, the objectives of monetary policy include price stability, maintenance of balance of payment equilibrium, promotion of employment and output growth and sustainable development (Folawewo and Osinbi, 2006)[5]. These objectives are necessary for the attainment of internal and external balance, and the promotion of long run economic growth. The importance of price stability derives from the harmful effect of price stability which determines the ability of policy maker to achieve other laudable macroeconomic objective. There is indeed a general consensus that domestic price fluctuation undermines the role of money as a store of value and frustrates investment and growth. Empirical studies (Ajayi and Ojo, 1981; Fisher, 1994)[1],[5] on inflation, growth and productivity have long term inverse relationship between inflation and growth with the achievement of price stability. The conditions in the financial market and institution would create a high degree of confidence, such that the financial infrastructure of the economy is able to meet the equilibrium of market participants. Indeed, an unstable or crimsoned financial sector will render the transmission mechanism of monetary policy less effective, making the achievement and maintenance of strong macroeconomic fundamental difficult. This is because it is only in a period of price stability that investors and consumers can interpret market signals correctly. Typically, in

period of high inflation, the horizon of the investor is very short, and resources are diverted from long-term investment to those with immediate returns and inflation levels, including real estate and currency speculation. It is on this background that this study would investigate the effectiveness of monetary policy in Nigeria with special focus on major growth components.

### STATEMENT OF THE PROBLEM

Over the years, the question of the existence and nature of the link between price changes and economic growth has been the subject of considerable interest and debate. The challenges of monetary management rest wholly on the CBN which over ten years have been committed to its effective control. Although monetary policies have improved enormously, the expected growth benefit hence, failed to materialize. Despite the fact that the performances of the monetary authorities in the area of price stability seem to have improved in recent times, macroeconomic indication, interest rate and inflation hence remained at moderate levels. This is why the increase in the country's economic growth has failed to translate into high standard for living for the citizenry. This therefore means that monetary policy has not achieved its objectives. This paper therefore tends to find out if the Nigerian monetary policies have a positive impact on price stability and economic growth inspite of the shortcomings in its implementation.

### OBJECTIVES OF THE STUDY

The main objective of this study is to ascertain the long-run relationship of monetary policy and price stability in Nigeria. The specific objectives are:

1. To determine the effect of monetary policy in Nigeria economic growth.
2. To ascertain the level of unemployment, low investment and high inflation rate.

### RESEARCH HYPOTHESES

$H_0$ : There is no long-run relationship between monetary policy and price stability in Nigeria.

$H_1$ : There is long-run relationship between monetary policy and price stability in Nigeria.

### LITERATURE

#### THEORETICAL LITERATURE

The effect of monetary policy is a central issue and has attracted a lot comments both in and out of the country. The theories of monetary policy become successes during 1930's and 1940's it was believed that the well being of monetary policy in simulating recovery from depression was severely limited than in controlling a boom and inflation. These views emerged from the experience of Keynes in his theory. Keynes general view holds that during depression. The CBN can increase the reserve of commercial bank through a cheap monetary policy. They can do so by buying securities and reducing the interest rate. As a

result of these, the ability of extending credit facilities to borrowers increases. But the great depression tells us that in a serious depression when there is pessimism among economic actors, the successes of such a policy is practically zero, in this situation even at a reduced interest rate. In this case the question of borrowing for long-term capital needs does not arise in a depression when the business activities are already at a low level.

Classical theorist like Say (1963) contends that money does not matter in the economy and therefore is merely a veil. He opines that the economy tends towards full employment equilibrium, hence, general overproduction and general unemployment is impossible since supply creates its own demand. Based on such an assumption therefore, changes in the stock of money result in proportional change in the general price level are stated herewith.

Hence,  $MV=PQ$

Where M=Money stock

V= Velocity of money

P=Average price

Q= Volume of transaction or quantity of goods

Given that Q and V are constants, then M equals P. An increase in money supply increases the general price level.

Monetarism view of monetary policy dates back in 1950's a new view of monetary policy called monetarism, has emerged that disputes the Keynesian view that monetary policy is relatively ineffective. Adherent of monetary argue that the demand for money is stable and not sensible to change the interest rates.

#### EMPIRICAL REVIEW

Many scholars who have investigated the effect of monetary policy instruments on price stability have come up with varieties of remedial steps.

Empirical studies done on the United States economy has confirmed the ability of non-bank financial institutions to generate monetary disturbance through lending output of the funds at their disposal or their pattern of investment. In view of this, Nigerian Monetary Authorities have found it necessary to control the pattern of investment of non-bank financial institutions as the case with commercial and merchant banks. The purpose of such is to ensure that non-bank financial institutions invest disposal funds properly and that their lending operation to net run is in contrast to their desired economic objectives.

Anyanwu (1993)[7] conducted a research on the topic "an econometric analysis of the relative potency of monetary policy on the control of price fluctuations in Nigeria for the period (1996-2006). The econometric tool used for carrying out his study was the ordinary least squares (OLS) using multiple regression analysis.

He built a line or model using four variables: gross domestic product (GDP), inflation rate, liquidity ratio and interest rates. GDP was used as the dependent variable while inflation rate, liquidity ratio and interest rates were used as the explanatory variables. From his results he concluded that there is a significant relationship between money supply and the GDP on economic growth of Nigeria. He concluded that money supply is a major determined factor in determining the economic growth of Nigeria.

He recommended that the government must be able to fit in the possible policy tools to be used in remedying the variables which affected the GDP both in monetary and fiscal policies as well as certain desired national objectives. He further argued that excess supply of money would result to excess demand for goods and services which would cause rising prices and deterioration of the balance of payments position. He also believes that inadequate supply of money would induce stagnation in the economy thereby retarding growth and development.

Klein (1978) argued that the Monetary Authority lies must attempt to keep money supply growing at appropriate rate so as to ensure sustainable economic growth and maintain internal control of money stock. According to him, monetary policy basically aims at the control of inflation, maintenance of a healthy balance of payment position in the country in order to safeguard the external value of the national currency, achievement of price stability, exchange rate stability, high level of employment and a rapid and sustainable economic growth.

Ndugbu (2002)[8] in his own opinion argued that monetary policy is not an end in itself, but a means to achieving certain end. He argued strongly that for instance, in Nigeria, the essence of our developmental effort is to bring about an improvement in the living conditions of our citizens.

The problem is not merely one of choosing or setting objectives, but one of co-coordinating and ensuring consistency of these objectives among other differing objectives. For instance, the pursuit of accelerated economic growth may lead to rapid importation of capital goods, and hence pressure on the balance of payments. In the same way, the objectives of growth and price stability could be in conflict.

Inflationary policies may accelerate the rate of growth in the short run which may not be sustainable in the long run. This is to say that country's commitment to full employment tends to be inflationary when put in the other way round. If an increase in the supply of money is not accompanied by a change in output, the general price level would rise and vice versa.

Ahmed *et al.*, (2013)[9] studied the interest rate effect of monetary transmission mechanism and observed that contractionary monetary policy leads to a rise in domestic

real interest rates, raises cost of capital, thereby causing a fall in investment spending and a decline in output. Onoh (2007)[10] adopted a simplified Ordinary Least Square techniques in his analysis on monetary policy and macroeconomic stabilization in Nigeria and found out that interest rate has an insignificant influence on price stability.

Genev (2002)[11] studied the effects of monetary shocks in 10 Central and Eastern European (CEE) countries and found some indication that changes in the exchange rate affect output but no evidence that suggests that changes in interest rate affect output. Star (2005) in his (SVAR) model with orthogonaized identification, found little evidence of real effects of monetary policy in five common wealth of independent states (CIS) with noble exception that changes in interest rate have a significant impact on output.

Balogun (2007)[12] used simultaneous equation model in testing the hypothesis of effectiveness of monetary policy in Nigeria, and found out that rather than promote growth, domestic monetary policy was a source of stagnation and persistent inflation.

Omoke and Ugwuanyi (2010)[13] note that lagged consumer price index (CPI) among other variables propagate the dynamics of inflationary process in Nigeria. In their findings, the level of output was negative and significant only at 10% level in the error correction model.

Chuks (2009)[14] in his study of the effect of monetary innovations in Nigeria used a Structural Vector Autoregressive (SVAR) approach, revealed that price based nominal anchors do not have a significant influence on real economic activity modestly. Okwo and Nwoha (2010)[3] examined the effect of monetary policy outcomes on macroeconomic stability in Nigeria using a simplified Ordinary least square technique stated in multiple forms. They found out that there exists an insignificant relationship between monetary policy, gross domestic product, credit to private sector and inflation in Nigeria.

Omoke and Ugwuanyi (2010)[13] in their long - run study of money, prices and output in Nigeria, found out that there exists no co-integrating vector but however proved that money supply granger causes both output and inflation. Thus, suggest that monetary stability can contribute towards price stability since inflation in Nigeria is a monetary phenomenon.

Nwosa (2011)[16] in his appraisal of monetary policy development in Nigeria, examined the effect of monetary policy on macroeconomic variables using an Ordinary Least Square technique after conducting the unit root, co -integration tests revealed that monetary policy has a significant effect on exchange rate and an insignificant influence on price stability.

Bilquees, Mukhtar, and Sohail (2012)[17] investigates the dynamic interactions among macroeconomic variables such as money supply, prices, interest rate, exchange rate and output level using a the quarterly data for Pakistan over the period 1972Q1 to 2009Q4. The

Johansen multivariate cointegration technique, Granger causality test and variance decomposition are employed. The results indicate existence of cointegration, the outcomes of causality test tends to support the non-neutrality of money view of the Keynesians and the Monetarists at least in the short-run. Also, they report a bi-directional causality between money supply and price level, interest rate and price level.

Ahmed, Asad, and Hussain (2013)[9] analysed the fundamental relationship between money supply, prices and income in Pakistan was determined in this research study. The time series data of real gross domestic product (GDP), nominal GDP, prices and money supply for the period of 1973 to 2007 was used. The stationary properties of the data series were investigated with the help of ADF test and series were found integrated of the order zero. The results indicated a relationship between the growth of money supply and inflation in Pakistan during the study.

### METHODOLOGY

The Ordinary Least Square (OLS) method will be used for the regression analysis. This estimate is used based on GAUS-MARKOUSS theory which states that the OLS is the best linear unbiased estimate (BLUE).

The ECM procedure of estimate is chosen for this study because its computational procedures are simple and the estimates obtained from the procedures have optimal properties which include linearity and unbiasedness.

### MODEL SPECIFICATION

A discussion on monetary policy in relation to price stability could be based on economic variables such as Interest rates (INTR), Money supply (MOS), Real Gross Domestic Product (GDP), Treasury Bill Rate (TBR) and Inflation Rate (INFR). This is because monetary policy has been defined by Taylor (1963) as the combination of measures intended to regulate the value, supply and cost of money in an economy, in agreement with the expected level of economic activity, so as to achieve some specified macroeconomic objectives such as price stability etc. The functional relationships between the dependent and the independent variables in our study are established as follows:

$$INF = f(INTR, TBR, M2, RGDP) \dots \dots \dots 1$$

Equation (1) can be stated in econometric form as:

$$INF = \alpha_0 + \alpha_1 INTR_t + \alpha_2 TBR_t + \alpha_3 LM2_t + \alpha_4 LRGDP_t + \mu_t \dots \dots \dots 2$$

Transforming to Log

$$INF = \alpha_0 + \alpha_1 INTR_t + \alpha_2 TBR_t + \alpha_3 LM2_t + \alpha_4 LRGDP_t + \mu_t \dots \dots \dots 3$$

Where

INFR= Inflation Rate

INTR= Interest Rate

TBR= Treasury Bill Rate

LM2= Money Supply

LRGDP= Real Gross Domestic Product.

$\mu$ = Error term

t= A certain time period

$\alpha$  Intercept

$\alpha_0$

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$  parameters / coefficients

$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0, \alpha_4 < 0$

$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0, \alpha_4 < 0$

$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0, \alpha_4 < 0$

$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0, \alpha_4 < 0$

On the a priori basis, we expect the coefficients of the independent or the explanatory variable such as money supply to positively influence inflation since an excess money supply in an economy results in an excess demand for goods and services which could cause rising prices. Interest rate on the other hand is expected to have a negative influence on inflation since an increase in interest rate discourages investors from borrowing more money and therefore reduces money supply. The Real Gross Domestic Product refers to the monetary value of all the goods and services produced within the geographical confines of an economy in a year. It is therefore employed to capture the influence of income. Increase in income increases the desire to demand for more goods invariably triggering off inflation. Hence a positive relationship is expected. The Treasury Bill Rate is the short term interest rate for government securities. Increased issuance of treasury securities in the primary markets mops up excess liquidity in the system and reduces inflation. Hence, a negative relationship is expected.

### DATA AND ANALYSIS TEST FOR STATIONARITY

Unit root test is a test for Time Series data to ascertain the stationarity of the variables. Non stationary series data suffers permanent or prolonged effects from random shock. In order to ascertain the Time Series properties of the model variables, we employ the Augmented Dickey- Fuller (ADF) test for stationarity. Our null hypothesis is that the variables have unit root that are not stationary while the alternative hypothesis does not have unit root or stationary. However, our decision rule is to reject the null hypothesis if the absolute value of the ADF statistic value exceeds the critical value at a chosen level of significance.

**Table 1:** Results of Augmented Dickey Fuller (ADF) stationarity test

Variables	Lag	ADF-Stat.	Critical value			Order of Int.
			1%	5%	10%	
<b>INFR</b>	1	-5.567472**	-3.653730	-2.957110	-2.617434	1
<b>INTR</b>	0	-8.202138**	-3.646342	-2.954021	-2.615817	1
<b>TBR</b>	0	-7.646342**	-3.646342	-2.954021	-2.615817	1
<b>LM2</b>	0	-3.423790***	-2.639210	-1.951687	-1.610579	2
<b>LRGDP</b>	2	-6.878374***	-3.670170	-2.963972	-2.621007	2
<b>ECM</b>	1	-8.124897***	-3.661661	-2.960411	-2.619160	2

*Source: Author's Computation (E-View Output).*

In this study, the Augmented Dickey-Fuller (ADF) unit root tests were employed to test for the time series properties of the model. The summarized result presented in the table above shows that at various levels of significance (1%, 5%, 10%), all the variables were found stationary after differencing once or twice since the ADF values are greater than the critical values in absolute forms. Given the result, we suspected a long-run relationship between the dependent and independent variable(s) since they have the same level of integration. So we proceed to test for co-integration in order to ascertain the long-run relationship.

#### JOHANSEN CO-INTEGRATION TEST

A necessary but not sufficient condition for co-integrating test is that each of the variables be integrated of the same order. The Johansen co-integration test uses two statistics tests namely; the trace test and the likelihood eigenvalue test. The first row in each of the table test the hypotheses of no co-integrating relation, the second row test the hypothesis of one co-integrating relation and so on, against the alternative of full rank of co-integration. The results are presented in table 2a and 2b below.

**Table 2a:** Co-integration for Trace Statistic test among the variables; (INTR, TBR, LM2, and LR GDP)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**
None*	0.838198	162.4812	69.81889	0.0000
At most 1*	0.751346	107.8398	47.85613	0.0000
At most 2*	0.658366	66.08894	29.79707	0.0000
At most 3*	0.592428	33.86846	15.49471	0.0000
At most 4*	0.206587	6.942357	3.841466	0.0084
<b>Trace test indicates 5 co-integrating eqn(s) at the 0.05 level</b>				
<b>*denotes rejection of the hypothesis at the 0.05 level</b>				
<b>**Mackinnon-Haug-Michelis (1999) p-values</b>				

*Source: Author's Computation (E-view Output)*

**Table 2b:** Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None*	0.838198	54.64140	33.87687	0.0001
At most 1*	0.751346	41.75081	27.58434	0.0004
At most 2*	0.658366	32.22048	21.13162	0.0009
At most 3*	0.592428	26.92610	14.26460	0.0003
At most 4*	0.206587	6.942357	3.841466	0.0084
<b>Max-eigenvalue test indicates 5 co-integrating eqn(s) at the 0.05 level</b>				
<b>*denotes rejection of the hypothesis at the 0.05 level</b>				
<b>**Mackinnon-Haug-Michelis (1999) p-values.</b>				

*Source: Author's Computation (E-view Output)*

The above result denotes the existence of co-integration between inflation and Interest Rate (INTR), Treasury Bill Rate (TBR), Money Supply (LM2) and the Real Gross Domestic Product (LR GDP). It shows the rejection of null hypothesis of no co-integration and acceptance of the alternative of co-integration. The results suggest the existence of a stable long-run relationship between price stability and the components of monetary policy in Nigeria. Lastly, we employed the Error Correction Mechanism (ECM) result.

### PRESENTATION OF REGRESSION RESULT

The empirical results are presented in a table which shows the estimated parameters, the t-statistics and other diagnostic tests of equations.

**Table 3: The Error Correction Model (ECM)**

Dependent Variable: (INFR)				
Method: Least Squares				
Date:08/14/15 Time: 05:40				
Sample: 1982 2014				
Included observations: 33 after adjustment				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-8.992228	5.052590	-1.779726	0.0864
D(INTR)	1.160475	1.320532	0.878794	0.3873
D(TBR)	-0.240805	1.259693	-0.191162	0.8498
D(LM2)	12.77392	12.30068	1.038473	0.3083
D(LRGDP)	30.19839	15.77689	1.914090	0.0663
D(ECM(-1))	-0.096273	0.193456	-0.497647	0.6228
<b>R-Squared: 0.193045; F-statistic: 1.291823; Prob(F-statistic): 0.296557;</b>				
<b>Adjusted R-squared: 0.043609; Durbin-Watson Stat: 1.939057</b>				

*Source: Author's Computation (using E-View Output).*

### RESULTS AND DISCUSSION

The result shows that the past inflationary trend does not exert any significant influence on the current inflationary trend. Interest rate exhibits a positive and insignificant relationship with the rate of inflation.

From the result, the coefficients of interest rate have positively signed (1.160475) which corresponds with the normal expectation. This is welcoming considering the fact that interest rate is a major tool of monetary policy which the government adjusts in order to regulate price in the economy. For instance, if the government wants to reduce the amount of money in circulation, it increases the rate of interest and as such discourages investors from borrowing more money and thereby reducing money supply. A good look at its current level depicts a positive sign. This could be attributed to the fact that in Nigeria, people are not usually scared away by increase in interest rate rather their concern is how to raise money for a particular investment. If at all the financial institution is ready to give out loanable funds, then whether the interest accruable is high or not becomes less important since they are in dire need of money. The coefficients of the Treasury Bill Rate show a negative relationship (-0.240805) at the current level. This corresponds with the

apriori expectation since decreased issuance of treasury securities in the primary markets mops up excess liquidity in the system thereby reducing inflation exhibits a negative influence. The coefficients of money supply exhibit a positive influence (12.77392), which is not in line with the natural expectation that increase in money supply decreases the general price level. The Real GDP on the other hand, shows a positive relationship at the current level. This is in line with the statistical expectation since increase in income increases demand for goods and services and invariably causes rising prices. Among all the variables, only money supply significantly influences inflation.

The error correction model is negatively and rightly signed thereby meeting the natural expectation. It is worthy of note here that the rate at which this correction is made is low and statistically insignificant as the probability is higher than the critical level of significance ( $0.09 > 0.05$ ). The economic implication is that the adjustment of deviation of the explanatory variable back to normalcy is very low.

### EVALUATION OF RESULT

#### EVALUATION BASED ON ECONOMIC CRITERIA

From our results obtained in the regression, the result is expected to follow the economic aprior expectation of magnitude and sign. Thus, table 4 below shows the outcome of the signs of the parameters and expected signs.

**Table 4: Economic Apriori Criteria**

Variable	Expected sign	Obtained signs	Conclusion
INFR	This is the dependent variable, so it has no sign		
INTR	Positive (+)	Positive (+)	Conforms
TBR	Positive (+)	Negative (-)	Do not conforms
LM2	Negative (-)	Positive (+)	Do not conforms
LRGDP	Positive (+)	Positive (+)	Conforms

Source: Author's Computation

#### ANALYSIS BASED ON STATISTICAL CRITERIA (1ST ORDER TEST)

1. **Coefficient of Multiple Determinations ( $R^2$ ):** From the result, the value of the coefficient of determination  $R^2$  is 0.193045 which implies that 19.3% of the variation in GDP is explained by the independent variables included in this model. While about 80.7% are accounted for by variables outside our model. Coincidentally, the goodness of fit of the regression remained too low after adjusting for the degree of freedom as indicated by the adjusted  $R^2$  ( $R^2 = 0.193045$  or 19.3%).
2. **Test of Significance of the Parameter (T-test):** The student t-test is used to determine the significance of the individual parameter estimate. To achieve this, we have to

compare the calculated t-value in the regression results with the tabulated t-value at n-k degree of freedom (DF) and at 5% significant level

$H_0: \beta = 0$  (not significant)

$H_1: \beta \neq 0$  (statistically significant)

Note: The null hypothesis assumes equality of the coefficient of the parameter with zero (0) which is not usually significant for the economy as a whole. But the alternative hypothesis ( $H_1$ ) assumes inequality of the coefficient of parameter ( $\beta$ ) with zero which is always statistically significance for the economy as a whole.

**Decision Rule:** Reject  $H_0$  if  $t\text{-cal} > t\text{-tab}$  and accept if otherwise. From the data,  $n = 34 - 5 = 29$  from statistical table, critical t-tabulated at 5 percent significance level is equal to 2.04. The result of the regression analysis is summarized in table 4.5 below.

Table 5: T-statistic

Variables	t-value	t-tab	Remark
INFR	-1.779726	$\pm 2.04$	Insignificant
INTR	0.878794	$\pm 2.04$	Insignificant
TBR	-0.191162	$\pm 2.04$	Insignificant
LM2	1.038473	$\pm 2.04$	Insignificant
LRGDP	1.914090	$\pm 2.04$	Insignificant
ECM(-2)	-0.497647	$\pm 2.04$	Insignificant

Source: Author's Computation (using E-View Output)

The result in Table 5 shows that the overall regression is insignificant.

3. **The F-statistics test:** The test is conducted to determine if the independent variables in the model are simultaneously significant or not.

$$k-1 = 5-1 = 4, \quad n-k = 34-5 = 29$$

Table 6: F-test Summary

Fcal	Ftabat 0.05 significant level	Decision
1.291823	2.70	Reject $H_0$ and accept $H_1$

Source: Author's Computation (using E-View 8.1 Output)

From the table, since  $t\text{ cal} > t\text{-tab}$  that is,  $1.291823 < 2.70$ , we therefore reject alternative hypothesis ( $H_1$ ) and accept null hypothesis ( $H_0$ ) and conclude that all coefficients are simultaneously equal to zero, that is, the independent variables are simultaneously insignificant.

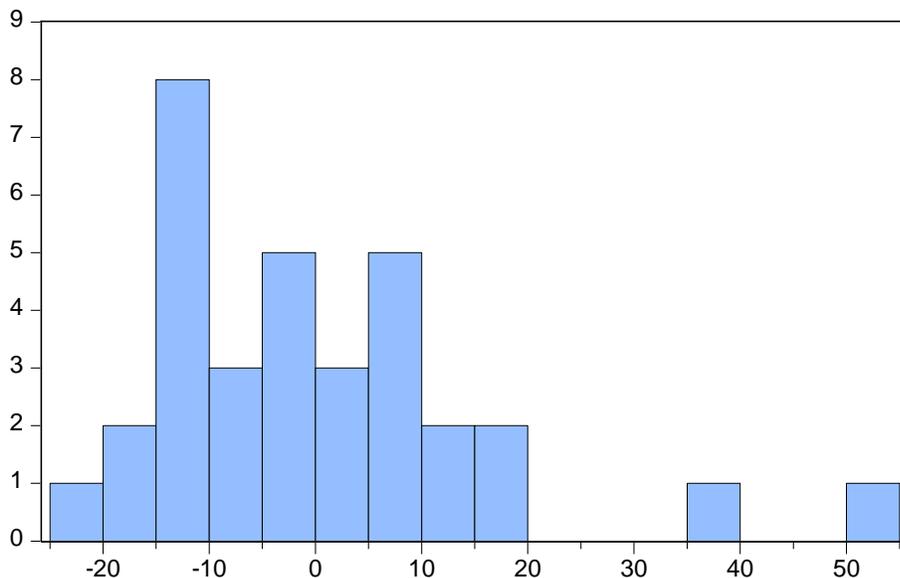
#### ECONOMETRIC TEST OR (2<sup>nd</sup> ORDER TEST)

- a. **Test for Autocorrelation:** From the Durbin Watson table, we found DL (lower limit) to be 1.14 and the Du (the upper limit) to be 1.74, then the Durbin Watson calculated is

1.939057, comparing the upper limit and Durbin Watson statistics, thus the range  $0 < d < dl$ . We reject the null hypothesis of positive autocorrelation and conclude that there is positive auto correlation.

**b. Test of Normality:** This test was carried out to check whether the error term follows the normal distribution. The normality test adopted is the Jarque-Bera (JB) Test of Normality. This test computes the skewness and Kurtosis measures of the OLS residuals and uses the Chi-square distribution [18].

**FIG. 1: Test of Normality**



Source: Researchers E-view Output Result

The result of the Normality test shows that Jarque-Bera value is 16.48857 with a probability of 0.000263, this Jarque-Bera value, however is more than 0.05 meaning that we cannot reject the null hypothesis, instead we reject the alternative hypothesis and accept the null hypothesis which states that the residual is normally distributed. Based on this however we conclude that the residual is normally distributed. This result is in line with what was desired.

**c. Test For Heterosedaticity:**

**Table 7** Heteroskedasticity Test: Breusch-Pagan-Godfrey

<b>F-statistic</b>	0.763506	<b>Probability</b>	0.5840
<b>Obs*R-squared</b>	4.087882	<b>Probability</b>	0.5368

Source: Researchers E-view Output Result

The result of the Heteroskedasticity Test: Breusch-Pagan-Godfrey shows that the prob(F-stat) is 0.76350 while the prob (Obs\* R<sup>2</sup>) is 0.5368, these probability is greater than 0.05 implying that we cannot reject the null hypothesis instead we reject the alternative hypothesis and accept the null hypothesis which states that there is no Heteroskedasticity

or there is a Heteroskedasticity in the model. Based on this, we conclude that the model is Heteroskedasticity which is very much desirable. This however can be said to improve as a result of the introduction of log in the model.

#### SUMMARY OF FINDINGS

The study theoretically and empirically investigated how interest rate, Treasury bill rate, money supply and real gross domestic product respond to shocks in monetary policy (captured by inflation). The ECM was employed to estimate the model, where the impulse response revealed how the inflation, interest and exchange rates responded to shocks in monetary policy and the variance decomposition brought to the limelight the impact of monetary policy on these Macroeconomic variables. Augmented Dickey Fuller (ADF) was conducted on all the variables before the estimations to establish the absence of stochastic process.

#### OUTLINES OF MAJOR FINDINGS

The results have shown the influence of monetary policy on price stability in Nigeria. The result shows that the past inflationary trend does not exert significant influence on the current inflationary trend. Interest rate is found to be insignificant in affecting the level of inflation at the current period as well as the past levels. In other words, interest rate responds quickly and positively to shocks in monetary policy from the first through the last period. Therefore, monetary policy has its greatest influence on interest rate (prime lending rate). This result is in consonance with the findings of Dickey and Fuller (1981)[19]. However, the result is in contrast to the findings of [20]

Money supply at its current level seems to have a reducing and insignificant effect on inflationary trend. This could be attributed to the fact that, decrease in money supply increases the purchasing power of the people and as such increases their marginal propensity to save. But then, in the case of producers, when money supply increases, money gets into people's hands, where such is the case, producers would engage in large scale production of goods. But then excess production results in excess output and when supply is greater than demand, it forces price down thereby reducing inflation in the short period. However, with the passage of time, that is, in the long run when everyone comes to offload money into the market, prices will rise. The values of money supply support the monetarist contention that inflation is everywhere and monetary phenomenon. Though in contrast to the findings of Hall and Henry (1989)[21] this result agrees with Omoke (2010)[13] and that of Johansen (1989)[22]. Money supply remains an important predictor in the discussion of inflation in Nigeria.

### CONCLUSION

In this study, we have ascertained the effects of monetary policy tools in controlling inflation in Nigeria. In developing countries particularly Nigeria, increase in money supply leads to increase in savings and hence reduces inflation. Thus, the contention of natural rate of the monetarist does not hold. It is clear from the study that interest rate, the Treasury bill rate, and non- monetary factor- the real Gross Domestic Product are not good predictors of inflation rate in Nigeria.

### RECOMMENDATION

Based, on the research findings, the following recommendations are made to arrest the enumerated problems. Since there is a long run positive impact of monetary policy on price stability in Nigeria, appropriate monetary policy measures should be pursued. To achieve this, focus should be placed on the following:

1. The autonomy granted the CBN should be sustained and even strengthened since it is only an independent Central Bank that can pursue the objectives of price stability at the cost of other objectives.
2. The need for the government to adequately control its deficit spending which gives room for effective operation of the tight monetary policy measures could be pursued by the CBN from time to time.
3. Interest rate reform should be a component of the broad package aimed at facilitating financial intermediation and monetary management as well as enhancing economic growth in a developing country like Nigeria.

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