



THE IMPACT OF MONETARY POLICY ON PRICE STABILITY IN NIGERIA

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ABSTRACT

This study examines the impact of monetary policy on price stability in Nigeria from 1970 to 2014. The data obtained for the purpose of the study through Central Bank of Nigeria Statistical Bulletin were analysed using ordinary least square regression (OLS) model, unit root test and Johansen co-integration test. Consumer Price Index (CPI) is used as a proxy for general price level, which is the explained variable. Exchange rate and money supply were used as explanatory variables. The research also addressed various problems associated with monetary policies such as budget deficits, change in policy formulation, lack of enabling environment in the financial market and political instability. The result of the findings reveals that exchange rate and money supply actually influenced price stability in Nigeria both in the short-run and long-run. This is evidenced by 90% coefficient of determination and F-Statistics of 168.30 which is higher than the tabulated F-Statistics.

KEYWORDS: Monetary policy, Consumer Price Index, Money Supply, Exchange Rate, Debt Financing

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INTRODUCTION

Monetary policy is a combination of measures designed to regulate the value, supply and cost of money in an economy, in consonance with the expected level of economic activity (Folawewo & Osinubi, 2008). The Central Bank of Nigeria (CBN) is saddled with the responsibility of ensuring price stability in Nigeria (Sulaiman, 2005). In ensuring price stability, the CBN implements policies that enhance sustained economic growth through an appropriate change in the level of money supply.

Giving the bank's mandate to promote macroeconomic stability through the conduct of monetary policy, it is pertinent to examine how monetary policy influences the attainment of its stated objectives so as to achieve domestic price stability as a necessary condition for promoting high output, employment growth and a healthy balance of payments position.

Price instability is a reflection of rising inflation and thus poses a threat on the economic progress of a nation. However, maintenance of price stability is often difficult to attain, at least in the short-run because of its apparent conflicts with other macroeconomic objectives. Consequently, monetary management involves some trade-offs with other national economic policy objectives.

The conduct of monetary policy solely relies on direct control measures, which involves imposition of selective sectoral control and credit ceiling, interest rate control, cash reserve requirement, exchange rate control and call for special deposits. The use of market-based instrument was not successful due to the under-development of the financial market in the early part of the periods under review. The research investigates the impact of monetary policy on price stability in Nigeria.

LITERATURE REVIEW

Monetary policy is a combination of measures designed to regulate the value, supply and cost of money in an economy in consonance with the expected level of economic activities (Adesoye, 2012). Inflation which confronts the economic policy-makers throughout the world in the form of a dominant economic problem is not a new phenomenon because from the earliest days of history, mankind has been puzzled and discom-

fort by rising prices. One of the policy objectives of monetary and fiscal policy is to stabilize the price level (Jhingan, 2004). Both economists and laymen favour this policy because fluctuation in prices brings uncertainty and instability to the economy. Rising and falling prices are both hazardous due to the fact that they bring unnecessary loss to some people and undue advantage to others.

A policy of price stability keeps the value of money stable, eliminates cyclical fluctuations, brings about economic stability, helps in reducing inequalities of income and wealth, enhances social justice and promotes economic welfare (Jhingan, 2004).

However, there are certain difficulties in pursuing a policy of stable price level. The first problem relates to the type of price level to be stabilized, whether relative or general price level. Despite this drawback, majority of the economists favour a policy of stable prices.

Another problem is the definition of price stability. Price stability does not mean that prices will remain stable indefinitely.

Since the establishment of Central Bank of Nigeria (CBN) in 1959, the bank continued to play the traditional role expected of a central bank, which is the regulation of the stock of money in such a way as to promote the social welfare (Ajayi, 1999).

This role is premised 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. Over the years, the major goals of monetary policy have often been the two later objectives. Thus, inflation targeting and exchange rate policy have dominated CBN's monetary policy focus based on assumption that these are essential tools of achieving macroeconomic stability.

With the introduction of indirect monetary control instrument, CBN now controls the stock of money (from banks and non-bank public) through the manipulation of the monetary base of reserve aggregates. This was expected to move the interest rate to the desirable position, so that

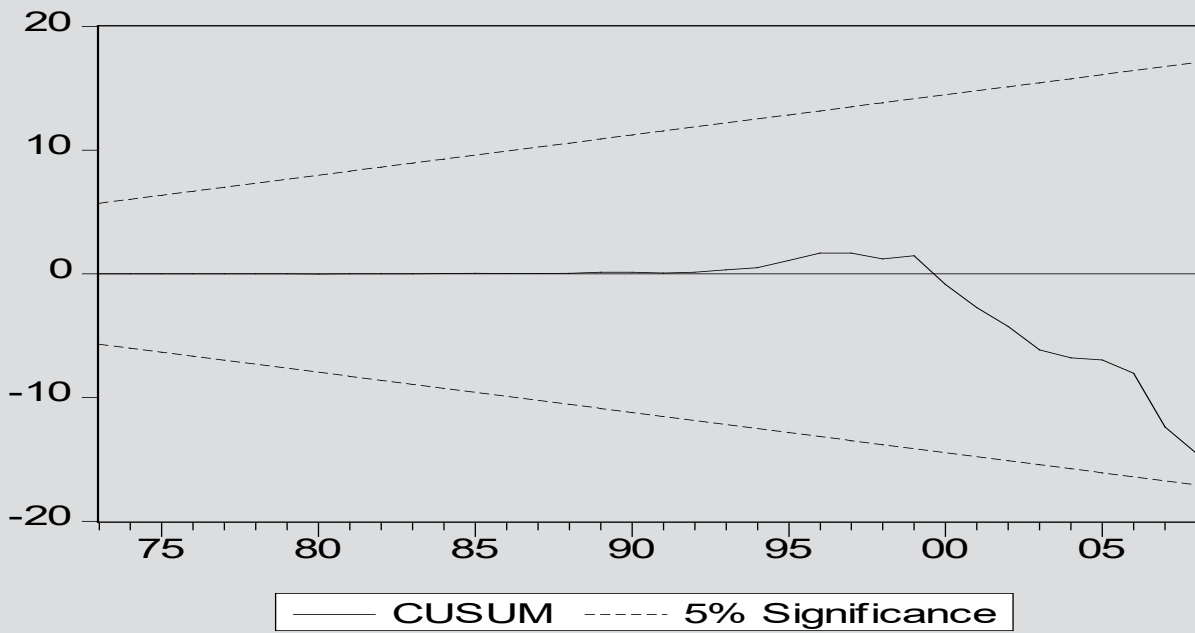


Figure1: Cumulative sum of Residuals (CUSUM) Test

Source: Author's Computation, 2015

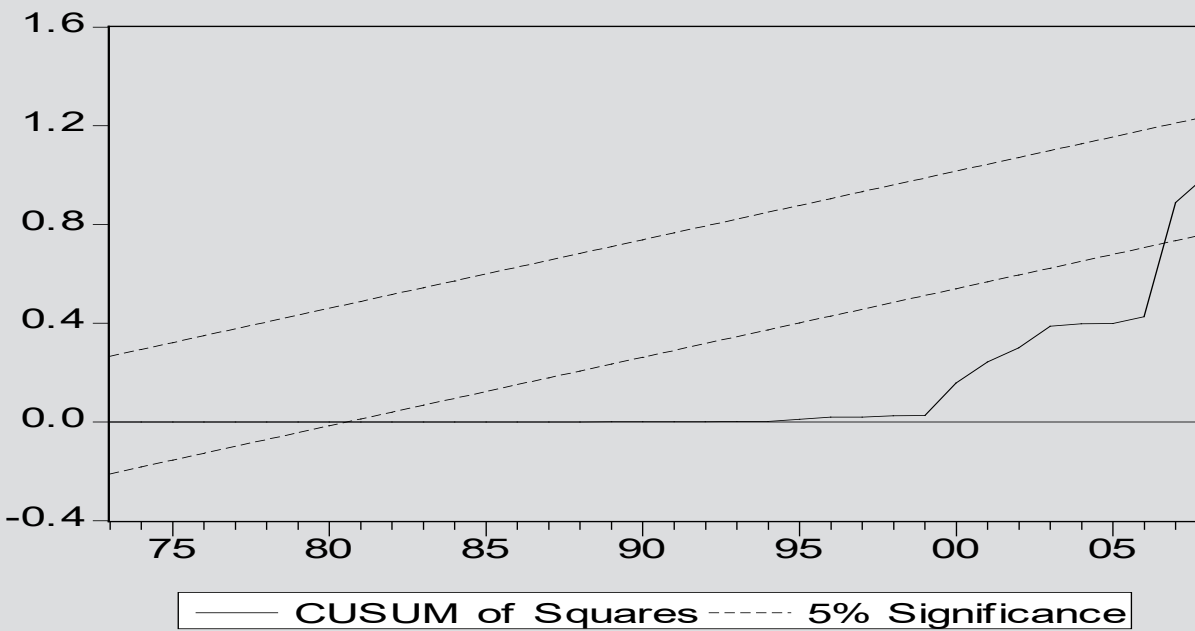


Figure2: Cumulative sum of squares of Residuals (CUSUM of squares) Test.

Source: Author's Computation, 2015

through their influence on monetary aggregates and market interest rates, the ultimate goals of monetary policy may be achieved.

Ajisafe & Folorunsho (2002) investigated the relative effectiveness of monetary and fiscal policy in Nigeria from 1970 to 2008. They employed co-integration and error correction models. Their research evidence reveals that monetary policy rather than fiscal policy exerts greater impact on economic activity in Nigeria.

Akinbobola (2012) provides a quantitative analysis of the dynamics of money supply, exchange rate and inflation in Nigeria from 1986 to 2008 using Vector Error Correction Mechanism (VECM). His empirical evidence confirms that money supply and exchange rate have significant negative effects on inflationary pressure in the long-run while real output and foreign price changes have direct effects on inflationary pressure.

Adesoye (2012) examined the Cointegration and causality between price, monetary policy aggregate and real output in Nigeria from the period of 1970 to 2009 using the inflationary gap model that results from the quantity theory of money. The empirical results revealed that inflation is a monetary phenomenon and previous price and output are strong indicators of controlling monetary aggregate in Nigeria.

Chimobi & Uche (2010) examined the relationship between Money, Inflation and Output in Nigeria using co-integration and ganger-causality test. The results of their findings revealed that monetary stability could lead to price stability in Nigeria since the variation in price level is mainly caused by money supply.

Folawewo & Osinubi (2008) examined the efficacy of monetary policy in controlling inflation rate and exchange instability from 1980 to 2000. They adopted time series model to conduct their analysis. Their research evidence shows that inflation affects volatility in its own rate as well as exchange rate.

Olorunfemi and Dotun (2008) examined the impact of monetary policy on economic performance in Nigeria using ordinary least square regression (OLS). His research evidence showed that negative relationship exists between interest rate and GDP on one hand, and inflation and

GDP on the other hand.

Chuku (2009) examined the effect of monetary policy innovations in Nigeria by adopting structural vector auto-regression (SVAR) approach to trace the effects of monetary policy shocks in Nigeria from 1986 to 2008. He employed three alternative policy instruments, namely, broad money (M2), minimum rediscount rate and the real effective exchange rate. His research evidence showed that monetary policy innovations have real and nominal effects on economic parameter depending on the policy variable selected.

Onayemi (2013) also investigated the price stability effect of monetary policy and output growth in Nigeria from 1970 to 2011 following the adoption of the Keynesian inflationary gap model that emanates from the quantity theory of money. The empirical evidence shows that previous price gap tends to be a significant determinant of inflationary pressure. The result also reveals that changes in monetary aggregate and output gap enhance inflationary pressure in Nigeria as a result of inefficiency of monetary and macroeconomic policies in stabilizing the price level.

Nenbee & Madume (2011) examined the impact of monetary policy on macroeconomic stability in Nigeria from 1970 to 2009. He employed error correction model (ECM) and co-integration. The results of their findings showed that monetary policy instruments had conflicting results with respect to their effect on inflation.

Onyeiwu (2012) investigated monetary policy shock on Nigerian Economy from 1981 to 2008 using ordinary least square regression (OLS) method. The empirical results showed that monetary policy exerts a positive impact on gross domestic product (GDP) growth and balance of payments but a negative impact on the rate of inflation.

METHODOLOGY

In measuring the impact of monetary policy on price stability, there must be specification of the model which shows the relationship between all the explanatory variables namely: money supply (MS), interest rate (IR), exchange rate (EXR), debt financing (DF) the economic reform (ER) and the dependent variable such as consumer price index (CPI) as a proxy for the rate of infla-

TABLE 2 OLS OUTPUT FOR EXR AND MS

Dependent Variable: EXR				
Method: Least Squares				
Sample (adjusted): 1970-2014				
Included observations: 45 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.704343	4.113907	1.629678	0.1121
MS	9.09E-05	7.27E-06	12.49255	0.0000
R-squared	0.816815	Mean dependent variable		32.82293
Adjusted R-squared	0.811581	S.D. dependent variable		49.64935
S.E. of regression	21.55141	Akaike info criterion		9.031298
Sum squared residual	16256.22	Schwarz criterion		9.118375
Log likelihood	-165.0790	F-statistic		156.0637
Durbin-Watson stat	0.638606	Prob(F-statistic)		0.000000

Source: Author's Computation, 2015

TABLE 3 OLS OUTPUT FOR CPI, EXR AND MS

Dependent Variable: CPI				
Method: Least Squares				
Sample: 1970- 2014				
Included observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	191.5384	158.4930	1.208498	0.2347
MS	0.000468	9.32E-05	5.017674	0.0000
EXR	34.82531	3.074684	11.32647	0.0000
R-squared	0.903383	Mean dependent variance		1799.965
Adjusted R-squared	0.898016	S.D. dependent variance		2507.454
S.E. of regression	800.7548	Akaike info criterion		16.28279
Sum squared residual	23083494	Schwarz criterion		16.41076
Log likelihood	-314.5144	F-statistic		168.3033
Durbin-Watson stat	0.736434	Prob(F-statistic)		0.000000

Source: Author's Computation, 2015

tion. From the theoretical analysis, changes or increase in money supply from whatever source be it induced or autonomous, would lead to an increase in the price level (inflation).

Monetary Policy Rate (MPR) was chosen as a proxy for interest rate because it determines the direction in which other rates will move in the money market. The monetary policy rate (MPR) is the rate of interest charged by the Central Bank mainly when they are under pressure for short-term funds. The effect or impact of exchange rate on price stability is also through the money supply. That is, if the exchange rate rises or domestic currency depreciates, more money will need to be exchanged for a unit of foreign currency with a consequent decline in domestic money supply.

In specifying the model, both explanatory variables and explained variable were used. Two models were also employed in the course of this study.

Model one shows the relationship between the money supply and exchange rate.

Model One

$$MS = f(\text{EXR}) \quad (1)$$

If linearised, we have

$$Y_1 = \beta_0 + \beta_1 X_1 + u \quad (2)$$

Where:

- Y_1 = Money Supply (MS)
 X_1 = Exchange rate (EXR)
 β_0 and β_1 = Parameters
 u = Stochastic error term.

Model Two:

Model two shows the impact of monetary policy on price

Stability as specified below:

$$MS = f(\text{CPI}) \quad (3)$$

Where

MS = Money Supply

CPI = Consumer price index

RESULTS

4.1 OLS REGRESSION BETWEEN CPI & MS

Table 1 shows the traditional ordinary least square (OLS) regression result between the dependent variable Consumer Price Index (CPI) and the independent variables, Money supply proxied by the broad money supply (MS).

From the result, it was observed that the independent variables (MS) have the expected a priori signs. This shows that 1.000 percent increase in Money Supply (MS) will lead to 1.806 percent increase in Consumer Price Index (CPI).

The T-Statistics shows that, the variable MS (7.752) is above the T- Critical of 2.67 and therefore statistically significant. This indicates that MS (7.752) exert statistical significant on CPI. The coefficient of determination (R^2) and the Adjusted R^2 show that the independent variables adequately explained the dependent variable. Both the R^2 (0.625) and the adjusted R^2 (0.614) shows that, 62% variation in the CPI variable is being caused by the independent variable (MS). This implies that the result is relatively a good fit. The F-Statistics of 60.0548 denoted that a simultaneous change in the dependent variable (CPI) is being caused by the independent variables (MS).

The Durbin –Watson Statistic of 0.609278 shows that there is negative autocorrelation in the model. Since, the relationship between MS and CPI has been tested and strong positive relationship exists between the two variables, there is need to test the empirical relationship between exchange rate (EXR) and Money Supply (MS).

OLS REGRESSION BETWEEN EXR & MS

The result in table 2 shows the relationship between the dependent variable exchange rate (EXR) and the independent variable Money Supply (MS). From the result, it was observed that MS has the expected and hypothetical positive signs. The T-Statistic shows that Money Supply

TABLE 1: OLS RESULT BETWEEN CPI AND MS

Dependent Variable: CPI				
Method: Least Squares				
Sample (adjusted): 1970-2014				
Included observations: 45 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	857.8480	255.2913	3.360271	0.0019
MS	0.001806	0.000233	7.749504	0.0000
R-squared	0.625214	Mean dependent variable		1639.493
Adjusted R-squared	0.614803	S.D. dependent variable		2329.338
S.E. of regression	1445.685	Akaike info criterion		17.44175
Sum squared residual	75240198	Schwarz criterion		17.52794
Log likelihood	-329.3933	F-statistic		60.05482
Durbin-Watson stat	0.609278	Prob (F-statistic)		0.000000

Source: Author's Computation, 2015

TABLE 4 ADF UNIT ROOT TEST AT LEVEL, ONE & TWO DIFFERENCE

VARIABLES	ADF TEST AT LEVEL	ADF AT ONE DIFFERENCE	ADF AT TWO DIFFERENCES	ORDER OF INTERGRATION
CPI	1.175	-2.140	-4.9787	I(2)
EXR	-0.1984	-5.855	-10.7969	I(1)
MS	3.932	2.1390	-6.538	I(2)
MACKINNON CRITICAL VALUE	ONE % -3.628	FIVE % -2.947	TEN % -2.6118	

Source: Author's Computation, 2015

TABLE 5 JOHANSEN CO-INTEGRATION RESULT

Date: 09/07/14 Time: 09:20				
Sample: 1970-2014				
Included observations: 45				
Test assumption: Linear deterministic trend in the Data	*(**) denotes rejection of the hypothesis at 5%(1%) significance level		L.R. test indicates 3 cointegrating equation(s) at 5% significance level	
Series: CPI MS EXR				
Lags interval: 1 to 1				
	Likelihood	5 Percent	1 Percent	Hypothesized
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)
0.602859	68.11893	29.68	35.65	None **
0.412163	33.95073	15.41	20.04	At most 1 **
0.320421	14.29241	3.76	6.65	At most 2 **

Source: Author's Computation, 2015

TABLE 6 ERROR CORRECTION MODEL (ECM) RESULT

Dependent Variable: CPI(1)				
Method: Least Squares				
Sample(adjusted): 1970-2014				
Included observations: 45 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	157.8613	171.6356	0.919746	0.3648
MS	9.33E-05	0.000491	0.189998	0.8505
MS(1)	0.000866	0.000275	3.127272	0.0053
EXR(1)	36.84572	3.503339	10.51732	0.0000
ECM(-1)	-20.57898	9.774495	-2.105375	0.0435
R-squared	0.912362	Mean dependent variance		1949.062
Adjusted R-squared	0.901054	S.D. dependent variance		2555.190
S.E. of regression	803.7526	Akaike info criterion		16.34471
Sum squared residual	20026566	Schwarz criterion		16.56464
Log likelihood	-289.2047	F-statistic		80.68202
Durbin-Watson stat	1.726721	Prob(F-statistic)		0.000000

Source: Author's Computation, 2015

(MS) value (12.49255) is above the theoretical/table value of (2.67), this implies that Money Supply (MS) exert statistical significant impact on exchange rate (EXR).

The coefficient of determination (R^2) and the Adjusted R^2 show that the independent variable (MS) explained the dependent variable (EXR). Both the R^2 (0.8168) and the Adjusted R^2 (0.8115) shows that 81 percent variation in the EXR variable is being caused by the independent variable (MS). This implies that the result is a good fit.

The F-Statistics of 156.0637 shows that the result typically explained the model. The F-Statistics of 156.0637 denoted that a simultaneous change in the dependent variable (EXR) is being caused by the independent variable (MS). The Durbin-Watson Statistic of 0.638606 shows that, there is negative autocorrelation in our model.

OLS REGRESSION BETWEEN CPI, MS & EXR

The OLS result in table 3 shows the relationship between the dependent variable Consumer price Index (CPI) and two independent variables, Money Supply (MS) and Exchange rate (EXR). From the result, it was observed that both MS and EXR have the expected and hypothetical positive signs.

The T-Statistic shows that both Money Supply (MS) (5.0176) and Exchange rate (11.326) values are above the theoretical/table value of (2.67). This implies that Money Supply (MS) and exchange rate (EXR) exert statistical significant impact on Consumer price Index (CPI).

The coefficient of determination (R^2) and the Adjusted R^2 show that the independent variables (MS and EXR) explained the dependent variable (EXR). Both the R^2 (0.903) and the Adjusted R^2 (0.898) show that 90.3 percent variation in the CPI variable is being caused by the independent variable (MS, EXR). This implies that, the result is a good fit.

The F-Statistics of 168.30 shows that the result typically explained the model. The F-Statistics of 168.30 denoted that a simultaneous change in the dependent variable (EXR) is being caused by the independent variable (MS). The Durbin – Watson Statistic of 0.7364 shows that, there is negative autocorrelation in our model. Based on

the spuriousness of the regression results, there is need to carry out further test which involves the use of ADF unit root test, Johansen Co-integration test and the ECM test.

The main reason behind the use of the Augmented Dickey-Fuller (ADF) test is to determine whether the variables are stationary i.e. whether it has unit roots and check its order of integration.

UNIT ROOT TEST

The unit root test results in Table 4 (ADF) has shown the degree of stationarity of each variables used in the model. Plausibly, it can be seen that in the ADF unit root tests, all the variables were not stationary at level. But with further test, it was observed that both (CPI and MS) were stationary at two difference level, with an integer of order two (2). While EXR was stationary at one difference level with an integrated order of one (1). Since all the variables used for this thesis are stationary at difference levels, there is need to check if there is a long run relationship among all the variables. Here, the Johansen Co-integration test is employed.

JOHANSEN CO-INTEGRATION TEST RESULT

As noted earlier, the Johansen co-integration test is used to test for long run relationship among the numerous variables employed in our econometric analysis. This result is important because it shows us if there is need to proceed for further test or not. The output of the test is depicted in Table 5. The table shows that there is a long run relationship among all the variables used for the econometric analysis. Hence, the test indicates three (3) co integrating equation(s) at 5% significance level. As a result of the long run relationship among all the variables used, there is need to conduct further test called the Error Correction Model (ECM).

ERROR CORRECTION MODEL

The ECM output is depicted in Table 6 below. The Error Correction Model (ECM) result depicted in table 6 reviews that, the money supply (MS) and Exchange rate variables (EXR) were found to be consistent with the apriori expectation as they both assumed a positive sign. The positive response reported by the result of the intercept signifies that there will be positive growth in the

Nigeria economy.

The coefficient of Exchange rate (EXR) which stood at 36.845 did perform well in terms of a priori expectation as it assumed the positive value. This indicates a positive relationship between exchange rates and Consumer price index (CPI). This implies that the exchange rate policy used in Nigeria till 2014 is fluctuating but will relatively stable over time if there is good government and better exchange rate policy. Also, when tested for Statistical reliability, the estimate was found to be statistically significant at 0.01 level of significance (99% Confidence Level), the t-statistics is (10.517) and the probability value (0.0000) is examined. This indicates that exchange rate exert significant impact on Consumer price index (CPI) in Nigeria.

Also, the Money supply variable (MS) which stood at 0.000866 did perform well in terms of a priori expectation as it assumed the positive value. This implies that, there is a direct positive relationship between Money supply variable (MS) and Consumer price index (CPI) in Nigeria. Therefore, the higher the Money supply variable (MS), the tendency that the percentage of the CPI will increase. Basically, the monetary authorities such as the Central Bank of Nigeria (CBN) have an active role to play in order to regulate the rate of monetary flow in order to have an increased and stable CPI in the economy.

In line with the above, the ECM (-1) was consistent in the model by assuming a negative value, and significant with the t-statistic value of -2.105375 and its corresponding probability value of (0.0435). The speed of convergence to equilibrium or the actual adjustment level of Consumer price index (CPI) is adjusted by 20.57 percent to equilibrium in the short run.

Furthermore, the R^2 is 0.9123 in the Error correction vector showing that the explanatory variables explain 91.23% of changes in the dependent variable. It remained strong even after adjusting for the degrees of freedom to 90.1% (0.9010). This means that in Nigeria, these variables are strong in explaining Consumer price index (CPI).

The F-calculated which measures the joint statistical influence of the explanatory variables in explaining the dependent variable was found

to be statistically significant at 1% level when its F-calculated figure is 80.682 and the corresponding probability value of 0.0000 is examined from the result in table 5.6.

In conclusion, it is interesting to note that, the ECV result showed the existence of no autocorrelation as the error correction model revealed 1.726721 which fell within the acceptance range in applied research of no autocorrelation.

OTHER DIAGNOSTIC TESTS

The tests for Stability properties of the model using cumulative sum of the residuals (CUSUM) and cumulative sum of the square of the residuals (CUSUM squares) tests are also recognized. The results of the tests are provided in figures 1 and 2. The existence of parameter instability is established if the cumulative sum of the residuals and Cumulative sum of the squares of residuals go outside the area between the two critical levels. From Figures 1 in the Cumulative sum of Residuals (CUSUM) it can be inferred that, the graph show that the parameter movements are within the critical lines at the five (5) percent level of significance for the period under review, which establish that the Cumulative sum of Residuals (CUSUM) is Stable and reliable. However, from 1980 to 2006 and 2009 to 2014, element of instability is noted using the Cumulative sum of the Squares of residuals (CUSUM of Square), but stability was established in late 2007 and 2008.

The CUSUM Squares stability result reveals that during President Shehu Shagari , Gen. Buhari Regime, President Yar'adua government and President Jonathan's regime (1980 – 2014) the Consumer price index (CPI) trend is not stable. This is as a result of weak monetary and fiscal policies used by the government. With the result of instability experienced within this period, we can easily conclude that government inconsistent policies and neglect in the manufacturing and Agricultural sectors have been the major cause of variation in export growth in Nigeria.

DISCUSSION

The empirical analysis within the scope of the study reveals that price stability in Nigeria is largely determined by both money supply and interest rate. Emphasis was placed on both money supply and interest rate because they are direct-

ly controlled by monetary authorities while other explanatory variables such as deficit financing and exchange rate were used to measure the impact of monetary policy on price stability because they are indirectly influencing price stability through money supply.

The result shows that price stability is positively influenced by both money supply and interest rate. In other words, reducing money supply and interest rate can check inflation in Nigeria. Despite the manipulation of these variables by the monetary authorities, inflation still persists. Inflation can be controlled if Federal Government of Nigeria continues to reform the economy with sincerity because there will be efficiency if interest rates are determined by the forces of demand and supply. If there are adequate infrastructures like good motorable roads, stable power supply, political stability, security of lives and properties, level of productivity will be increased and price stability will be enhanced.

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