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UNDERSTANDING THE MACROECONOMIC IMPLICATIONS OF THE DYNAMICS OF MONETARY POLICY MEASURES: LESSON FROM THE NIGERIAN ECONOMY

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ABSTRACT: *In this paper, econometrics evidence linking monetary policy measures to key macroeconomic goals with emphasis on price stability and unemployment is provided using error correction mechanism (ECM), unit root and cointegration tests in addition to basic descriptive statistics. The unit root test results showed that the variables are mixed integrated. The outcomes of the cointegration test reveal that the variables in each of the models have long run relationship and as such can be represented as an ECM. The estimated parsimonious ECM show that the current values of cash reserve ratio and exchange rate as well as lagged values of credit to the private sector are positively and significantly related to inflation. On the contrary, the short run effect of contemporaneous and lagged values of interest rate on inflation is negative. Additionally, money supply exerts significant negative effect on inflation during the study period. The result of the estimated unemployment model reveals that the current and first lag of interest rate has significant positive effect on unemployment. The result also shows that the current and third lag of money supply has significant positive impact on unemployment rate. The short run impact of credit to the private sector and third lag of exchange rate on unemployment is negative. The error correction coefficients in each of the models are associated with the expected negative sign and are statistically significant at 5 percent level. Owing to the findings, the paper recommends that the Central Bank of Nigeria should adequately monitor the implementation of monetary policy in order to prevent or reduce bottlenecks that may impair its effectiveness in achieving goals of price stability and employment generation.*

KEYWORDS: Monetary policy, price stability, unemployment, cointegration, ECM and Nigeria

Introduction

The puzzle on the effectiveness of monetary policy in terms of achieving price stability and low unemployment rate has continued to dominate macroeconomic debates across the globe. Faced with dual objectives of price stability and job creation, central banks including the Central Bank of Nigeria (CBN) have been confronted with the challenge of determining how much weight to assign to each of the objectives in the formulation and implementation of monetary policy. Primarily, monetary policy is geared towards achieving tolerable level of inflation and sustainable growth of the economy (CBN, 2011). Aside inflation targeting, monetary policy is equally designed to boost output and employment over long-term sustainable period. The channels through which monetary policy influences economic activities as identified by the European Central Bank (2004) include interest rate, bank credit, asset prices and exchange rates.

Both economic theory and empirical evidence suggest that expansionary monetary policy tend to generate high inflation and reduce unemployment temporarily. However, the ability of monetary policy to impact on the average level of unemployment in the long-run is limited (Soderstom &

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Vredin, 2013). Evidences abound where economies in recession are advised to embrace monetary measures as a roadmap to recovery and eventual stabilization of economic activities. This is Akin to Romer & Romer (1994) assertion that monetary policy is the most effective solution to recession.

In recent years, economic literature has been characterized by divergent views on the appropriate objective of monetary policy. For the proponents of inflation targeting, monetary authorities should focus their attention on controlling inflation. Conversely, others are of the view that the monetary authorities should concentrate on reducing the rate of unemployment in order to foster economic development. In spite of the controversies on the exact effect of monetary policy, Bhattacharyya (2012) asserts that it is a general notion that monetary policy significantly affects the domestic economic activity and job creation.

Notably, the CBN is saddled with the responsibility of coordinating monetary policy measures in Nigeria through the control of the cost, volume, availability and direction of money and credit in order to achieve key macroeconomic goals. Specifically, the CBN has anchored the monetary policy operations in Nigeria on both direct and indirect channels. Although monetary policy authorities such as the CBN adopt various policy measures to stabilize domestic price, the effectiveness of these measures to achieve the set goals remains a source of concern to policy makers (Gbadebo & Mohammed, 2015).

Undoubtedly, the socio-economic distortions that characterized the Nigerian economy in the past two decades are attributed to the prevailing inflationary pressures. The Nigerian economy experienced considerable inflationary shocks between 1980s and early 1990s with an average of 19 percent per annum in the 1980s (Danjuma et al., 2012). In 1995, the inflation rate in Nigeria reached an all-time high of 72.8 percent (Gbadebo and Mohammed 2015). The movement in the inflation rate seems to send signal of distortion in the overall economic activities. While the inflation rate stood at 11.6 percent and 12 percent in 2008 and 2009 respectively, it rose slightly to 11.8 percent and 12.3 percent in 2010 and 2013 respectively (See CBN, 2017). Recently, monetary policy is shifting towards inflation targeting, which according to Asuquo (2012) focused on directing efforts of the monetary authority towards achieving a specific rate of inflation that does not undermine output growth and job creation. Additionally, inflation targeting allows the domestic economy to respond to shocks as the monetary authority sets precise inflation targets to ensure price stability.

Furthermore, the medium through which monetary policy influences unemployment lies on the ease with which firms access loan and other credit facilities to expand their businesses. Umaru & Zubairu (2012) described unemployment as a serious constraint to social and economic prosperity. Proponents of job creation have advocated for central banks to effectively use monetary policy to reduce the rate of unemployment and facilitate economic development. In support of this, Bhattacharyya (2012) posits that the International Labour Organization (ILO) has in recent years increased its activity with central banks, emphasizing the role monetary policy can play in reducing the level of unemployment. The CBN has employed monetary policy measures to reduce the unemployment rate and achieve other macroeconomic objectives. The indirect measures of Monetary Policy Rate (MPR) and Cash Reserve Ratio (CRR) amongst others have remained

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outstanding in the CBN's efforts to stimulate the productivity and labour absorption capacity of the private sector. Despite the various monetary policy measures applied by the CBN, the stakeholders in the private sector have consistently criticized them, arguing that they as do not create adequate opportunity for profitability (Amassoma, 2015). The unemployment rate in Nigeria has continued to fluctuate since 1970 and increased to 24 percent in 2013 compared with its rates of 21.1 percent in 2010 and 19.7 percent in 2009 (Eze & Nwambeke 2015). According to the National Bureau of Statistics (2014), the rural area has higher rate of unemployment compared to the urban areas. This is can be attributed to the availability of little or no employment opportunities in the rural area.

The Nigerian policy environment has been characterized by controversies regarding the role monetary policy plays in reducing inflation and unemployment. Aside confusion on the specific role of monetary policy, the process of monetary policy implementation has been described by many stakeholders as inconsistent and in turn limits its effectiveness. Despite the monetary policy reforms introduced in Nigeria in the post Structural Adjustment Programme (SAP) era, inflation and unemployment still remain dominant macroeconomic problems in Nigeria. This has raised concern among scholars, policy makers and other stakeholders in the Nigerian economy on how changes in inflation and unemployment respond to shocks in monetary policy. It is against this backdrop that this paper provides some insights into the effectiveness of monetary policy measures on inflation and unemployment in Nigeria between 1980 and 2015.

It is important to note that despite the existing monetary policy measures geared towards ensuring macroeconomic stability, the high inflationary pressures and unemployment rate continue to persist with an adverse effect on the value of the naira and pace of economic growth and development. The increase in inflation and unemployment rates continues to pose a major challenge to the CBN and other stakeholders in the Nigerian economy. This has subsequently raised concern about the credibility of monetary policy measures initiated by the CBN in achieving price stability and low level of unemployment. It is against this backdrop that this paper provides some insights into the effectiveness of monetary policy measures on inflation and unemployment in Nigeria between 1980 and 2015.

REVIEW OF RELATED LITERATURE

Theoretical Framework

Quantity Theory of Money

The quantity theory of money emerged in the 16th century following the works of some classical economists. It assumes that the outstanding effect of increase in money supply is the proportional increase in the general price level. Therefore, it views inflation as a function of excessive growth in money supply. The proponents of the quantity theory of money argue that at full employment, the velocity (V) of money supply and number of transaction (T) are constant. Consequent upon this, an increase in money supply will generate a positive effect in the general price level. Ahiabor (2013) opines that the quantity theory of money provides an insight into how expansionary monetary policy causes an upward trend in the price level. David Hume (1711-1776) offered the initial insight into the sectoral linkage of the effect of the change in the quantity of money. This formed basis for the development and extension of the quantity theory of money. Irving Fisher

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(1876-1947) posits that there are two parties to any transaction in any economy. These include the buyer and seller; and as such the value of sales must correspond with the value of receipts. He further explains the quantity theory of money with the development of the equation of exchange. This equation is explained below:

$$MV = PT \quad (2.1)$$

Where: M = money supply, V = velocity of money in circulation, T = number of transactions, P = aggregate price level

$$P = \frac{MV}{T} \quad (2.2)$$

Expressing the relationship between the money stock and general price level in elasticity form below:

$$\frac{\Delta P}{\Delta M} x \frac{M}{P} \quad (2.3)$$

Taken total differentiation of equation (1)

$$MdV + VdM = PdT + TdP \quad (4)$$

Given that Y and V are constant at full employment, differentiating them gives zero coefficient at full employment. Thus, we have:

$$VdM = TdP \quad (2.4)$$

The elasticity representation of the relationship between money stock and general price level is restated as:

$$\frac{\Delta P}{\Delta M} = \frac{V}{T} \quad (2.5)$$

Substitute equation (6) into (3)

$$\frac{V}{T} = \frac{M}{P} \quad (2.6)$$

From equation (2), $V = \frac{PT}{M}$ substituting this into equation (2.6)

$$\frac{1}{T} x \frac{PT}{M} x \frac{M}{P} = 1 \quad (2.7)$$

It is evident from equation (2.7) that the general price level, a measure of inflation is directly related with the growth of money supply. However, the quantity theory of money is criticized for its unrealistic assumptions about the existence of full employment of resources and constant expenditure.

Keynesian Theory of Unemployment

This theory originated from Keynes (1936) publication of "The General Theory of Employment, Interest and Money". Keynes argued that short-run changes in real output and employment is influenced by changes in aggregate demand. For the Keynesians, the rigidity of some process provides the platform for monetary policy to produce real effects on output and employment. The

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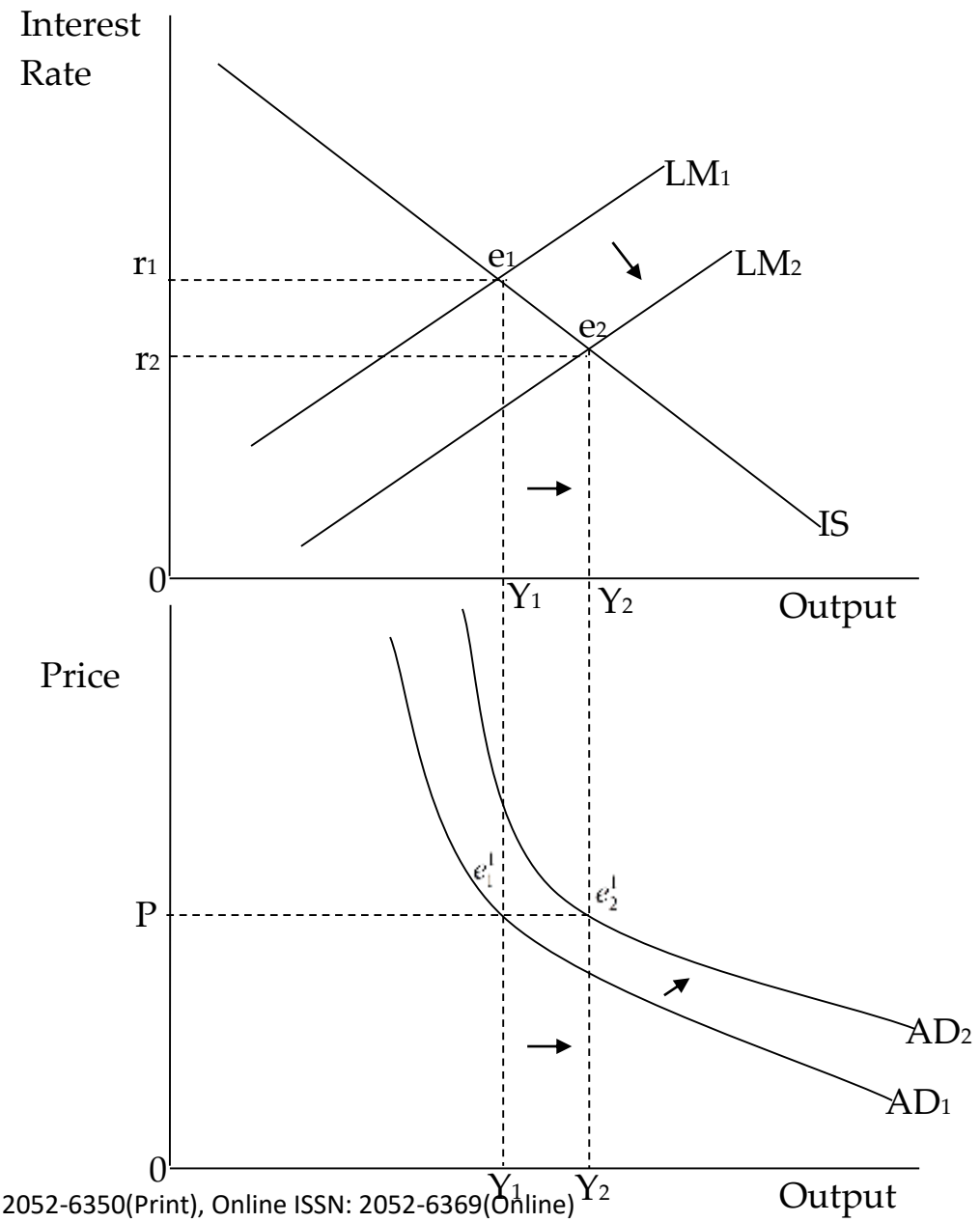
Keynesian theory of unemployment has evolved overtime with the emergency of the New-Keynesianism. Blanchard & Gali (2006) assert that the New Keynesian model provides the baseline for monetary policy analysis in the presence of nominal rigidities. It is important to note that many central banks adopt the New Keynesian model as the bedrock of medium-scale models. Based on the New Keynesian assumptions, employment can be influenced through the mechanism of aggregate demand. Moreover, the theory advocated for countries to focus on monetary policy as a medium of influencing aggregate demand and in turn employment. This is illustrated using IS-LM framework.

Figure 2.1: LM-IS framework



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Following New Keynesians postulations, the government can stimulate aggregate demand to generate employment through the activities of the central bank. The central bank through its indirect policy measures can reduce the level of interest rate to increase investment and in turn create employment opportunities. The adoption of expansionary monetary policy as indicated in figure 2.1 leads to the outward shift of the LM curve from L_1 to LM_2 which causes interest rate to decline from r_1 to r_2 as the economy moves from e_1 to e_2 due to increase in investment and output from Y_1 to Y_2. In the second part of the graph, aggregate demand is stimulated due to increase in output which boosts the labour absorptive capacity of the economy through job creation.

Despite its contribution to economic literature, criticisms have trailed the Keynesian theory of unemployment. Specifically, it was criticized for not providing clear insight into the microeconomic foundations of its model and for assuming that changes in aggregate demand rather than real factors cause fluctuations in employment.

Emerging Facts on Inflationary Pressures and Unemployment in Nigeria

The distortions in macroeconomic outcomes in terms of instability in the price level and rising levels of unemployment have continue to dominate public discourses in Nigeria. The inflation rate which stood at 6.1 percent in 1960 increased to 40.9 percent in 1989, 57.2 percent in 1993 and rose to a record high of 72.8 percent in 1995 (Olowo, 2003). The period of 1997 and 1999 was characterized by single digit inflation of 8.5 percent and 6.6 percent respectively. The single digit inflationary pressure that prevailed in Nigeria in the late 1990s was partly attributed to improved performance of the agricultural sector. Despite this moderate inflationary pressure, overall government efforts at reducing inflation have been limited by focusing monetary policy on monetarist view of inflation at the expense of structuralism which seems unrealistic in the Nigerian context.

The rate of inflation tends to fluctuate in Nigeria given the poor monetary policy management. The period 2000 to 2009 was characterized by low inflation pressure as the average inflation declined to 12.31 percent (Kelikume, 2013). Unfortunately, the contraction of monetary policy stance of the CBN impairs the ultimate objective of price stability as changes in the price level remains sensitive to contraction in monetary policy. The raising of monetary policy rate (MRR) to 275 basis points in January 2011 caused inflation rate to increase to 12.47 percent in November 2012 (CBN, 2012). This upward trend in the price level limited the purchasing power of the naira as its value declined. The inflation rate in Nigeria in 2013 and 2014 as reported by the International Monetary Fund (IMF, 2015) is 8.5 percent and 8.1 percent respectively. This single digit inflation that prevailed during these periods (2013 and 2014) is described as the outcome of the CBN's efforts to keep inflation under control.

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Another problem ravaging the Nigerian economy is unemployment. Evidences from several researches and reports of various agencies and organizations indicate that the unemployment rate in Nigeria has continued to rise since three decades. The unemployment rate in Nigeria increased to 6.4 percent in 1980 from its previous rate of 4.3 percent in 1970 (CBN, 2003). The increased trend of unemployment that prevailed in 1980 was described by Njoku & Ihugba (2011) as a derivative of the economic downturn that engulfed the Nigerian economy in late 1970s.

The adoption of Structural Adjustment Programme (SAP) in 1986 heralded a significant turnaround in job creation in Nigeria. The unemployment rate in Nigeria declined to a record low of 1.9 percent in 1995 (Akintoye, 2003). Despite the rich resource endowment and huge revenue accruable to Nigeria from exports of crude oil and other natural resources, majority of Nigerians still live below the poverty line due to rising level of unemployment. The rising levels of unemployment could be to increasing cases of corruption, poor management practice, relegation of agricultural sector to the background, poor state of socio-economic infrastructure and lack of purposeful leadership among others. According to World Bank (2013) the unemployment rate in Nigeria increased from 13.1 percent in 2000 to 21.9 percent in 2010 due to structural macroeconomic problems prevalent in the country.

The double digit unemployment rate continues to persist as the percentage of the total population that are unemployed rose to all time high of 23.9 percent in 2011 from its previous rate of 21.1 percent in 2010 (National Bureau of Statistics, 2012). The large turnout of graduates from tertiary institutions and poor absorptive capacity of the job market in Nigeria has worsened the unemployment problem. The distribution of unemployed persons as reported by CBN (2012) indicates that 15.5 percent college undergraduates, 23.8 percent polytechnic graduates and 43.7 percent university graduates are unemployed. Aside the increasing number of unemployed persons, the CIA World Fact Book (2012) reports that an estimated population of 13.9 million Nigerians are underemployed which results from distortions in the labour market and wage pattern prevalent in Nigeria.

Empirical Literature

Several macroeconomic researches have investigated transmission mechanism through which monetary policy influences unemployment and price stability. These studies have led to varying findings. Ahiabor (2013) examined the effects of monetary policy on inflationary pressures in Ghana using one year moving average data between 1985 and 2009. The regressors included in the model are interest rate, money supply and exchange rate. The estimation technique employed by the study to analyze the data is the Ordinary Least Square (OLS). The results indicate that money supply and exchange rate exert positive influence on inflation while interest rate impacted negatively on inflation during the period under investigation. Therefore, the study suggested for

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the incorporation of fiscal and other non-monetary measures into policies geared towards curtailing inflationary pressures.

Stockhammer & Sturn (2011) assessed the impact of monetary policy on unemployment hysteresis in 19 countries of Organization for Economic Co-operation and Development (OECD) between 1980 and 2009. The explanatory variables included in the model are monetary easing, standard labour market institution variables and terms of trade shock. The results indicate that monetary easing and terms of trade shock strongly influenced unemployment while labour market institution variables exerted weak effect on unemployment hysteresis. The study suggested that monetary policy should emphasize more on changes in real interest rate given its strong impact on unemployment via monetary easing.

Cloyne & Hurtgen (2014) examined the macroeconomic impacts of monetary policy on the economy of United Kingdom. The study constructed new measure of monetary policy for the United Kingdom economy along the innovations paths. The findings reveal that a percentage increase in the monetary policy rate contacts inflation by 1 percent and output by 0.6 percent. Based on the findings, the study suggested that indirect instrument of interest rate should continue to be integrated into the measure monetary policy innovation in the United Kingdom. Amassoma (2015) analyzed the efficacy of monetary policy variables in curtailing the rate of unemployment in Nigeria using time series data from 1970 to 2013. The study utilized the Ordinary Least Squares and error correction techniques for the analysis of the data obtained from the CBN Statistical Bulletin and NBS. It was evident from the result that exchange rate exerts significant influence on unemployment during the period under investigation. Additionally, it was found that exchange rate granger causes unemployment. Owing to the findings, the study suggested for the adoption of appropriate monetary policy stance that will help in ensuring the availability of investment-accommodating interest rate in the Nigerian economy.

Gbadebo & Mohammed (2015) explored the efficacy of monetary policy in control of inflation in Nigeria using quarterly time series data between 1980 and 2012. Both cointegration and error correction techniques were employed to analyse the required data. The regressors included in the model are interest rate, money supply, exchange rate and oil-price. The result indicates that inflation is influenced by all the regressors. It was equally observed that money supply exerts a significant influence on inflation in both short and long term. Owing to the findings, the study recommended for the monetary policy measures to be supported by some necessary fiscal policies in order to ensure overall stabilization of economy.

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RESEARCH METHOD

Analytical Framework

This paper adopts two multivariate dynamic models. The first model with inflation (IFS) as the dependent variable anchors on the work of Ahiabor (2013) with modification due to the extension of the explanatory variables and period of study. The second model with unemployment (UNP) as the dependent variable builds on the work of Amassoma (2015) and increases the number of regressors and study period. The models are expressed as error correction mechanism as follows:

$$\Delta IFS = \alpha_0 + \sum_{i=1}^{a} m_1 \Delta IFS_{t-i} + \sum_{i=1}^{a} m_2 \Delta InMSL_{t-i} + \sum_{i=1}^{a} m_3 \Delta IRE_{t-i} + \sum_{i=1}^{a} m_4 \Delta CRO_{t-i}$$

$$+ \sum_{i=1}^{a} m_5 \Delta InCPS_{t-i} + \sum_{i=1}^{a} m_6 \Delta InEXT_{t-i} + \delta ECM_{t-1} + \mu_t \quad (3.1)$$

$$\Delta UNP = \beta_0 + \sum_{i=1}^{b} z_1 \Delta UNP_{t-i} + \sum_{i=1}^{b} z_2 \Delta InMSL_{t-i} + \sum_{i=1}^{b} z_3 \Delta IRE_{t-i} + \sum_{i=1}^{b} z_4 \Delta CRO_{t-i}$$

$$+ \sum_{i=1}^{b} z_5 \Delta InCPS_{t-i} + \sum_{i=1}^{b} z_6 \Delta InEXT_{t-i} + \phi ECM_{t-1} + w_t \quad (3.2)$$

Where: Where: IFS = Inflation rate, UNP = Unemployment rate, MSL = Broad money supply, IRE = Interest rate, CPS = Credit to the private sector, CRO = Cash reserve ratio, EXT = Exchange rate and In = natural log transformation. α_0 *and* β_0 = constant parameters, $m_1 - m_6$ and $z_1 - z_6$ = short-run coefficients of the lagged regressors, a and b = leg length, Δ = first difference operator, ϕ *and* δ = coefficients of the ECM which estimates the speed at which the model converges to equilibrium in the long-run while μ_t *and* w_t = Random error term.

Variable Description

a. **Dependent Variables**

i. **Inflation rate (IRR):** This measures the percentage change in the overall prices of goods and services. It involves persistent and rapid rise in commodity prices overtime (Iyali, Success and Success, 2012). The inflation used in this study is measured annually.

ii. **Unemployment rate (UNP):** Unemployment rate measures the percentage of the total population that are unemployed.

b. **Explanatory Variables**

i. Money supply (MSL): Money supply entails the aggregate money in the economy. It will specifically be measured in this study by the broad money supply (M_2) which CBN (2011) describes as narrow money, savings and time savings as well as foreign denominated deposits. Increase in money supply is expected to impact positively on inflation rate and negatively on unemployment rate.

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ii. **Interest rate (IRE):** Interest rate measures the cost of every amount borrowed usually measured in percentage. An increase in interest rate is expected to decrease the inflation rate due to decline in monetary easing. Conversely, increase in interest is expected to increase unemployment rate due to reduced access to loanable funds which contracts investment.

iii. **Cash reserve ratio (CRO):** The measures the proportion of total deposits of customers, which banks are required to hold as reserves with the central bank. An increase in cash reserve ratio is expected to reduce inflation due to decline in loan-granting ability of deposit money banks. On the other hand, an increase in cash reserve ratio is expected to increase the unemployment rate due to reduction in the liquidity of deposit money banks.

iv. **Credit to the private sector (CRS):** This measures loan and other account receivables provided to the private sector of the Nigerian economy in accordance with the CBN's monetary policy measure of direct credit control. An increase in the credit available to the private sector is expected to trigger inflation due to increase in the volume of money in circulation. On the other hand, unemployment is expected to decrease if the credit available to the private sector increases due expansion of firms which increases their labour absorptive capacity.

v. **Exchange rate (EXT):** This measures the price of a currency in terms of another. The nominal exchange rate will be used in this study which captures the price of the naira in terms of United States dollars. An increase in the exchange rate is expected to trigger inflation and unemployment given the large dependent of the Nigerian economy on importation.

Method of Data Analysis

The paper applied error correction mechanism (ECM) in estimating the link between monetary policy measures and macroeconomic stability. The ECM was necessitated following the difference stationarity of the series. Additionally, both statistical and diagnosis tests were conducted to ascertain the statistically significant of the regressors and stationarity status of each of the variables in the model. The detail explanations of these tests are provided as follows:

i. **Unit root test:** The stationarity status of each of the variables in the model was determined via unit root test. Notably, the Augmented Dickey-Fuller (ADF) test was used for the conduct of this test. Thus, the generalized ADF model is stated as:

$$\Delta W_t = \mu_0 + \mu_1 W_{t-1} + \sum_{i=1}^{K} \phi_i \Delta W_{t-i} + e_t \qquad (3.3)$$

Where: W_t = variables under study, μ_1 and ϕ_i = parameter estimate of the variables, k = lag length, Δ= First difference operator and e_t = stochastic error term

ii. **Co-integration test:** The existence of long-run relationship among the variables was examined via co-integration test. Specifically, the Johansen co-integration test was applied for this analysis.

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4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics for the Variables

The descriptive statistics for each of the variables are summarized below in table 1.

Table 1: Summary of descriptive statistics for IFS, UNP, MSL, CRO, CRS, IRE and EXT

	IFS	UNP	MSL	CRO	CPS	IRE	EXT
Mean	19.44472	9.119444	3480.106	6.320278	3261.508	17.349	77.44917
Median	11.90000	7.450000	450.7130	6.550000	334.0816	17.545	83.00000
Maximum	72.84000	23.90000	17680.52	12.00000	18345.54	29.800	192.4400
Minimum	5.380000	1.900000	14.13000	1.000000	7.630000	7.5000	0.570000
Std. Dev.	17.75254	6.118208	5415.984	3.526755	5570.498	5.0524	64.88257
Skewness	1.670277	0.686126	1.452868	-0.020807	1.644417	0.0668	-0.010459
Probability	0.000040	0.186737	0.001345	0.207559	0.000096	0.9533	0.142517
Observations	36	36	36	36	36	36	36

Source: Author's Calculations from E-views 9

From the outcomes of the descriptive statistics in Table 1, it was observed that the average value of inflation (IFS), unemployment (UNP), money supply (MSL), cash reserve ratio (CRO) credit to the private sector (CRS) interest rate (IRE) and exchange rate (EXT) over the 36 years period are 19.444, 9.1194, 3480.106, 6.320278, 3261.508, 17.34917 and 77.449 respectively. It was equally found from the standard deviation of each of the series that IFS, UNP, CRO, IRE and EXT clustered around their respective mean values while MSL and CPS dispersed from their respective mean values. The normal distribution test indicates that at 5 percent level IFS, MSL and CRS are not normally distributed, indicating that the null hypotheses of normal distribution for these variables are rejected at 5 percent level.

4.2. Unit Root Test

Considering the peculiar feature of time series data which often tend to be non-stationary, the variables under consideration were subjected to stationarity tests and the outcome of the test is showed below in table 2

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Table 2: Summary of the Unit test result

Variable	ADF Statistics					REMARK
	Levels	Lag length	1st difference	Lag length	2nd diff.	
IFS	-3.250 (0.0256)	1	-5.876 (0.0000)	1	-	I(0)
UNP	-2.024 (0.275)	0	-5.834 (0.0000)	0	-	I(1)
Log(MSL)	-1.349 (0.857)	1	-2.550 (0.303)	0	-7.121 (0.000)	I (2)
CRO	-1.923 (0.621)	0	-5.169 (0.0010)	0	-	I (1)
Log(CRS)	-2.866 (0.185)	1	-4.201 (0.0113)	0	-	I (1)
IRE	-3.013 (0.1429)	0	-9.398 (0.0000)	0	-	I (1)
Log(EXT)	-0.5644 (0.9750)	0	-5.8916 (0.0001)	0	-	I (1)

Source: Author's Calculations from E-views 9

Note: Figures in the bracket are the probability values of the ADF statistics.

Table 2 clearly shows summary of the stationarity test for IFS, UNP, Log (MSL), CRO, Log(CRS), IRE, and Log(EXT). The respective lag length of each of the variables at both levels, first and second difference were automatically selected using Schwarz information criterion and it was uncovered that only inflation rate is stationary at levels, indicating that it is integrated of order zero. The non-stationarity of the other variables necessitated taken their respective first difference and they are found to be integrated of order one. Notably, the non-stationary of some of the variables at levels could be largely attributed to the peculiar features of time series data which are often non-stationary of levels.

Test for Cointegration

The fulfillment of the criteria for stationarity for the series prompted the test for the existence of long run relationship between the variables using Johansen cointegration approach. The result is outlined below in table 3.

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Table 3A: Cointegration test result for Model 1

Series: IFS LOG(MSL) CRO LOG(CPS) LOG(EXT) IRE				
Trace test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.876063	150.9210	95.75366	0.0000
At most 1 *	0.611411	82.01769	69.81889	0.0039
At most 2 *	0.545578	50.82499	47.85613	0.0256
At most 3	0.293353	24.79697	29.79707	0.1688
At most 4	0.221834	13.33860	15.49471	0.1030
At most 5 *	0.142200	5.061669	3.841466	0.0245
Max-Eigen Test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.876063	68.90328	40.07757	0.0000
At most 1	0.611411	31.19269	33.87687	0.1012
At most 2	0.545578	26.02802	27.58434	0.0780
At most 3	0.293353	11.45837	21.13162	0.6016
At most 4	0.221834	8.276929	14.26460	0.3512
At most 5 *	0.142200	5.061669	3.841466	0.0245

Source: Author's Calculations from E-views 9

NB: * indicates rejection of null Hypothesis at 5 percent leve

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Table 3B: Cointegration test result for Model 2

Series: UNP LOG(MSL) CRO LOG(CPS) LOG(EXT) IRE				
Trace test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.815987	147.5184	95.75366	0.0000
At most 1 *	0.576166	91.65774	69.81889	0.0004
At most 2 *	0.523410	63.33011	47.85613	0.0009
At most 3 *	0.381744	38.87385	29.79707	0.0035
At most 4 *	0.315993	23.00569	15.49471	0.0031
At most 5 *	0.271928	10.47271	3.841466	0.0012
Max-Eigen test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.815987	55.86068	40.07757	0.0004
At most 1	0.576166	28.32764	33.87687	0.1988
At most 2	0.523410	24.45625	27.58434	0.1196
At most 3	0.381744	15.86816	21.13162	0.2326
At most 4	0.315993	12.53298	14.26460	0.0922
At most 5 *	0.271928	10.47271	3.841466	0.0012

Source: Author's Calculations from E-views 9

NB: * indicates rejection of null Hypothesis at 5 percent level

The cointegration test results for the two models reported in Table 3A and 3B revealed that the Trace and Max-Eigen statistics in model 1show evidence four and two cointegrating equations respectively, indicating that the variables have long run relationship. Similarly, it was uncovered from the Trace statistic presented in Table 3B that five cointegrating equations exists in model 2 while Max-Eigen statistics shows evidence of two cointegration equations. These indicate that the variables in both models have long run relationship and therefore, can be represented as an ECM.

Estimation of the ECM

The error correction model (ECM) is utilized to represent the relationship existing among the variables in each of the models and to estimate the speed at which they converge to equilibrium in the long run. However, the poor outcome of the ECM in terms of its over-parameterized nature due to the statistical insignificant of the short run lagged coefficients of the explanatory variables and ECM prompted their transformation to parsimonious error correction model reported in Tables 4A and 4B.

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Table 4A: Parsimonious ECM result for model 1

Dependent Variable: D(IFS)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(IFS(-1))	0.750613	0.154100	4.870936	0.0002
D(IFS(-3))	0.302017	0.135798	2.224025	0.0409
D(IRE)	-1.914814	0.477184	-4.012735	0.0010
D(IRE(-1))	-1.749590	0.583918	-2.996291	0.0085
D(IRE(-2))	-0.916185	0.450379	-2.034252	0.0589
D(CRO)	2.358011	0.706225	3.338894	0.0042
D(CRO(-3))	1.356880	0.714697	1.898539	0.0758
DLOG(MSL)	6.623746	14.77868	0.448196	0.6600
DLOG(MSL(-2))	-68.48809	23.12079	-2.962187	0.0092
DLOG(CPS(-1))	33.86476	15.06340	2.248148	0.0390
DLOG(CPS(-2))	57.88043	15.50295	3.733510	0.0018
DLOG(CPS(-3))	-23.74197	12.73366	-1.864505	0.0807
DLOG(EXT)	14.98776	6.515033	2.300489	0.0352
DLOG(EXT(-1))	11.02110	7.007320	1.572798	0.1353
ECM(-1)	-1.108855	0.162797	-6.811280	0.0000
C	-6.681997	4.884876	-1.367895	0.1903
R-squared	0.889206	Mean dependent var		-0.443437
Adjusted R-squared	0.785337	S.D. dependent var		16.10947
S.E. of regression	7.463800	Akaike info criterion		7.164859
Sum squared resid	891.3329	Schwarz criterion		7.897727
Log likelihood	-98.63775	Hannan-Quinn criter.		7.407784
F-statistic	8.560818	Durbin-Watson stat		2.438187
Prob(F-statistic)	0.000052			

Source: Author's Calculations from E-Views

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Table 4B: Parsimonious ECM result for model 2

Dependent Variable: D(UNP)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(UNP(-1))	0.611240	0.183635	3.328556	0.0043
D(UNP(-2))	0.587088	0.170461	3.444112	0.0033
D(IRE)	0.724243	0.157921	4.586100	0.0003
D(IRE(-1))	0.841120	0.147208	5.713826	0.0000
D(IRE(-3))	-0.336375	0.138955	-2.420748	0.0277
D(CRO(-1))	-0.153093	0.223507	-0.684958	0.5032
DLOG(MSL)	12.72301	5.159866	2.465764	0.0254
DLOG(MSL(-1))	-8.607761	5.748067	-1.497505	0.1537
DLOG(MSL(-3))	17.98906	6.745888	2.666670	0.0169
DLOG(CPS)	-10.68669	4.583572	-2.331520	0.0331
DLOG(CPS(-3))	-8.204393	4.815208	-1.703850	0.1077
DLOG(EXT)	-2.759946	1.876982	-1.470417	0.1608
DLOG(EXT(-1))	-3.073699	1.957748	-1.570018	0.1360
DLOG(EXT(-3))	-4.658316	1.829710	-2.545932	0.0216
ECM(-1)	-1.125186	0.196164	-5.735952	0.0000
C	1.383886	1.581916	0.874817	0.3946
R-squared	0.810160	Mean dependent var		0.159375
Adjusted R-squared	0.632186	S.D. dependent var		3.867554
S.E. of regression	2.345583	Akaike info criterion		4.849798
Sum squared resid	88.02814	Schwarz criterion		5.582666
Log likelihood	-61.59676	Hannan-Quinn criter.		5.092723
F-statistic	4.552108	Durbin-Watson stat		2.177484
Prob(F-statistic)	0.002274			

Source: Author's Calculations from E-views 9

From the estimated parsimonious ECM in Table 5A, it was observed from the short run behaviour of the variables in the first model that the lagged values of inflation have significant positive relationship with the current level of inflation. Similarly, the current values of cash reserve ratio and exchange rate as well as lagged values of credit to the private sector are positively and significantly related to inflation. On the contrary, the short run effect of contemporaneous and lagged values of interest rate on inflation is negative. Additionally, money supply exerts significant negative effect on inflation during the study period. The coefficient of the ECM met the statistical and a priori criteria as it appeared with the expected negative sign and significant at 5 percent level. This is a pointer that the model converges to equilibrium in the long run at a speed of 110 percent. The model has high coefficient of determination of 0.889, indicating that the explanatory variables

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jointly explained 88.9 percent variations in inflation rate. The entire model is equally significant and devoid of serial correlation at 5 percent level as depicted by the F-ratio and Durbin-Watson statistics.

The outcome of the estimated unemployment model (model 2) reveals that the lagged values of unemployment is positively related to its current value. Similarly, current and first lag of interest rate have significant positive effect on unemployment. The result also shows that the current and third lag of money supply has significant positive impact on unemployment rate. The short run impact of credit to the private sector and third lag of exchange rate on unemployment is negative. The error correction coefficient is properly signed and met the statistical criteria at 1 percent level. This is quite satisfactory as the model shows evidence of reconciling short run disequilibrium at a speed of 112 percent. Additionally, the model is of a good fit given that the explanatory variables jointly explain 81 percent variations in unemployment as depicted by the coefficient of determination. The Durbin Watson statistic (2.1) indicates the model is not serially correlated.

CONCLUSION

Monetary policy has over the years been perceived on theoretical grounds with some empirical evidences as key to price stability and considerably reducing the level of unemployment in emerging and Less Developed Countries (LDCs) alike. Therefore, empirical studies into the effectiveness of monetary policy measures in achieving these two core macroeconomic goals have assumed great relevance in economic literature of which this study is not an exception, but with focus on the Nigerian economy. On the account of the empirical findings of this study, it is concluded that the effectiveness of monetary in Nigeria manifests more in the short run than in the long run. Hence, broad money supply, interest rate, cash reserve ratio, exchange rate and credit to the private sector are important determinants of price stability and unemployment in Nigeria in the short run. It is therefore recommended that the design of monetary policy should be consistent with the Nigerian socio-economic environment in order to achieve intended and desirable results. Again, the CBN should adequately monitor the implementation of monetary policy in order to prevent or reduce bottlenecks that may impair its effectiveness in achieving goals of price stability and employment generation.

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