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MONETARY POLICY AND MACROECONOMIC VARIABLE PERFORMANCES IN NIGERIA; BOUNDS TEST, ARDL AND ECM APPROACH

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ABSTRACT

The aim of this study is to examine the relationship between monetary policy and performances of macroeconomic variables in Nigeria. Data were collected from the Central Bank of Nigeria Statistical Bulletin. Bounds Test ECM and ARDL model was utilized to address the objective of this study. Consequently, the findings from the study showed that monetary policy and exchange rate have a positive relationship in both short run and long run. Similarly, monetary policy and inflation rate have an insignificant negative relationship in the short run, but reverse is the case in the long run. However, monetary policy and real GDP have an insignificant negative relationship with each other in the short run meanwhile, the relationship becomes positive in the long run. This paper makes the following vital policy recommendations for the, policy makers in Nigeria that as a matter of urgency the monetary authorities should embark on contrtionary monetary policy.

1. INTRODUCTION

Monetary policy is one of the viable tools used by the monetary authorities to stabilize macroeconomic variables such as interest rate, inflation rate and exchange rate in an economy. The performances of these macroeconomic variables are critical factors that determine the competitiveness or otherwise of the economy. In Nigeria, the monetary policy is primarily formulated to maintain price and exchange rate stability with a view to achieving sustainable economic growth and competitive external sector (Sanusi, 2012).However, the majority of the countries in Africa, Nigeria inclusive are faced with the challenges of perpetual price-instability, unimaginable level of unemployment rate, high volatility in exchange rates, inequitable distribution of income, unfavourable balance of payments, low growth rate and high level of poverty. In Nigeria, an attempt to ensure the proper management of these macroeconomic variables has swung the policy makers into several policy formulations. Interestingly, the monetary authorities are saddled with the responsibility of managing the country`s macroeconomic variables through the Central Bank of Nigeria. One of the policy tools the apex bank normally uses to stabilize any disequilibrium in macroeconomic variables is monetary policy. The Central Bank in its own wisdom applies the policy to primarily regulate the stock of money and the cost of credit based on the economic circumstances of the country.

Consequently, in the last three decades, despite the fact that the Nigerian government has embarked on several financial sector reforms with a view to ensuring the proper coordination of the country`s macroeconomic variables. Yet, a cursory look at the Nigerian macroeconomic data show that the economy is highly bewildered with the macroeconomic problems. This has generated the issue of concern among the scholars in the recent time. An attempt to investigate the effectiveness of monetary policy in tackling macroeconomic problems in Nigeria has generated more heat than light in terms of results and policy recommendations. See (Adigwe, Echekoba and Justus, 2015: Imoisi et al, 2014: Amassoma et al, 2011: Udah, 2008: Orji, 2006: Christopher et al, 2006). In view of the above inconclusive results of the past studies there is a critical need for further studies on this subject matter. The uniqueness of this study also lies in the adoption of another methodology which the bulk of the past studies have failed to utilize. Therefore, this study will contribute to the existing

literature by establishing the nature of relationship which exists between monetary policy and macroeconomic variable performances in Nigeria.Besides the introduction, this paper is organized as follows: section two reviews the related literature meanwhile section three presents the research methodology, discusses the estimated results, summarized and concluded accordingly

2. LITERATURE REVIEW

In this section, an attempt was made to critically review past studies on nexus between monetary policy and macroeconomic variables in developing countries and Nigeria in particular.Amassoma et al (2011) employed a simplified Ordinary Least Squared technique alongside and co-integration tests to examine the relationship between monetary policy and macroeconomic variables in Nigeria between 1986 and 2009. The findings that originated in the study concluded that there has been improvement in the implementation of monetary policy over the years in Nigeria. Also, monetary policy exacted a significant effect on money supply and exchange rate meanwhile it exacted an insignificant influence on price instability. This implies that monetary policy had a significant effect on the maintenance of price stability in the country. In another study, Adam and Tweneboah (2008) adopted cointegration test and Vector Error Correction model (VECM) to estimate the impact of macroeconomic variables on stock prices in Ghana. It was discovered that both the long run and short run dynamic relationships existed. Similarly, Deverenx (2001) submitted that the monetary policy rule at its best should be able to stabilize inflation in an open economy. The author emphasized that monetary policy strictly targeted at inflation is much more relevant in limited pass-through economy, if consumer prices inflation are the primary concern of the monetary authorities.

Coneri and Ziba (2001) modelled the relationship between monetary policy and exchange rate in 42 middle-income developing economies. It was argued from the study that both monetary policy and open trade policies were necessary conditions exchange rate stability. Meanwhile, exchange rate stability was negatively affected by demand shocks on crude oil and agricultural exports. Consequently, Umar (2013) investigated the relationship between the monetary policy and exchange rate in Nigeria between 1980 and 2011 with the application of Granger causality test and Error Correction Model (ECM). The author established that the supply of money supply and exchange rate had a significant direct relationship with each other but reverse was the case of monetary policy rate and liquidity ratio on exchange rate. In another work, Ajisafe and Folorunsho (2012) adopted co-integration and error correction model to evaluate the relative effectiveness of monetary and fiscal policies on macroeconomic variables in Nigeria from 1970 to 1998. It was concluded from the study that monetary policy had a greater effect on the Nigerian macroeconomic variables than fiscal policy.In conclusion, from the above reviewed literature the studies on nexus between monetary policy and macroeconomic variables are still on going and there is not yet a consensus about their relationship. Hence, the relevance of this work.

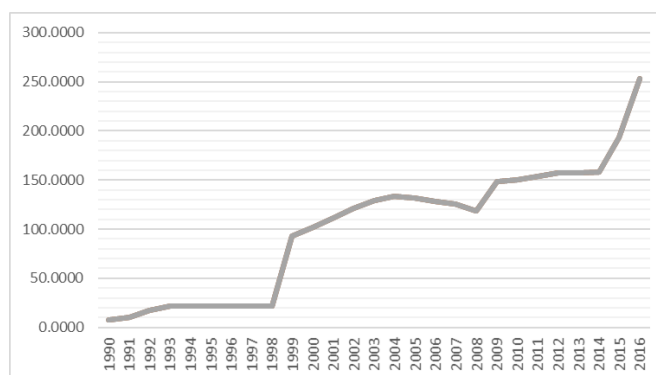### 2.1 An Overview of Some Selected Macro Economic Variables In Nigeria

Fig. 1. Exchange Rate in Nigeria

Source: Authors' Computation (2020)

Figure1 shows exchange rate dynamics in Nigeria between 1990 and 2016. It could be pinpointed from the figure above that between 1993 and 1998 the exchange rate was relatively stable in the country. However, from the beginning of the fourth republic in Nigeria in 1999, exchange rate rose sporadically, since then this variable has continued to rise and as a result of this, the country`s currency has been continuously depreciating. Meanwhile, the likely reasons for this unfavorable exchange rate condition in this country are: over dependency of the Nigerian economy on the crude oil in which its price has been volatile in the global market. Also, the country imported majority of items for its domestic consumption on daily basis. This has put pressure on foreign exchange market in Nigeria during these periods, and thereby reducing the purchasing power of Nigeria`s currency in the global market.
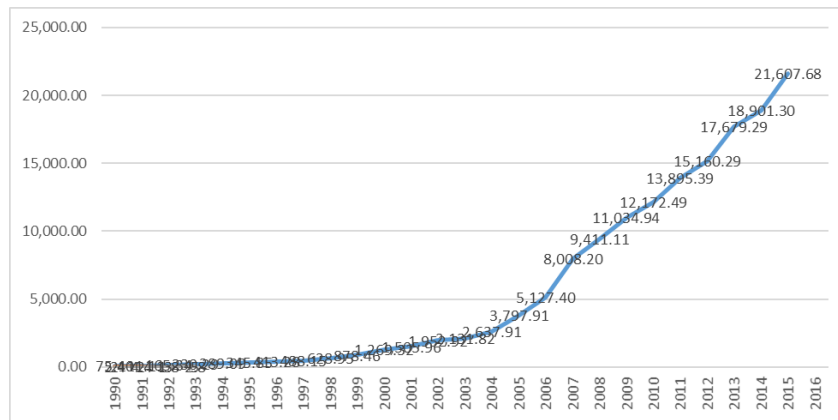
Fig.2. Broad Money Supply in Nigeria

Source: Authors' Computation (2020)

Figure1 shows broad money supply in Nigeria between 1990 and 2016. It could be established that between 1990 and 1998, broad money supply was relatively stable. 1999 marked the beginning of expansion of broad money supply in the country in which the variable has been on increase. This implies that the monetary authorities likely adopted expansionary monetary policy within these periods.
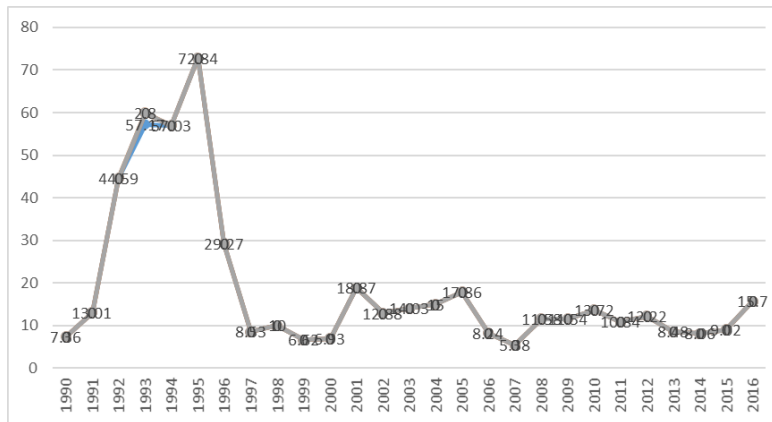

Fig.3. Inflatione Rate in Nigeria

Source: Authors' Computation (2020)

According to figure 3, inflation rate has rose from 1991 and got to its peak in 1995 after which it declined sharply in 1996 and 1997 respectively. Since this period, inflation rate has been fluctuating in Nigeria. The implication of this, is that the uncertainty in the level of inflation in the country makes it difficult to predict the purchasing power of naira in the country.

3. METHODOLOGY

Secondary data from 1990 to 2018 were utilized for the analysis of this work. Effort was made to extract data on exchange rate, broad money supply, inflation rate and real GDP from the Central Bank of Nigeria (CBN) statistical bulletin 2018 edition. Consequently, the paper employed E-Views software to run the data.

3.1 Model Specification

The model for this study can be specified in the general form as follows:

$$BMS = F(RGDP, INFL, EXCR) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (I)$$

Model (I) could be written in an explicit form as follows.

$$LnBMS_t = \beta_1 + \beta_2 Ln\, RGDP_t + \beta_3\, INFL + \beta_4 LnEXR_t + \mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (II)$$

3.2 ARDL Model Specification

Various diagnostic tests such as unit root test and Bound Test performed on the variables of interest motivated the choice of ARDL and ECM for this paper. Due to different orders of integration of the variables i.e. I(1) and I(0), the paper

utilizes autoregressive lag model to address its objective [Pesaran, Shin and Smith, 2001: Pesaran and Pesaran, 1997]. In a general form, ARDL model can be specified as follows:

$$\text{ARDL (1, 1) model: } Yt = \mu + \alpha1Yt\text{-}1 + \beta oXt + \beta1Xt\text{-}1 + Ut. \dots\dots\dots\dots\dots\dots\dots\dots\text{ (III)}$$

Meanwhile, Yt and Xt are stationary variables, and Ut is a white noise.

Therefore, in an explicit way the model to capture the analysis of this work could be stated thus:

$$\Delta LnBMS_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \ \Delta Ln\ BMS_{t-1} + \sum_{i=0}^{p} \beta_2 \Delta LnRGDP_{t-1} + \sum_{i=0}^{p} \beta_3 \Delta\ INFL_{t-1} + \sum_{i=0}^{p} \beta_4 \Delta\ LnEXR_{t-1} +$$

$$ECM_{t-1} + \ \theta_1 LnRGDP_{t-1} + \ \theta_2 INFL_{t-1} + \ \theta_3\ LnEXR_{t-1+} \ \mu i \text{ ----- (IV)}$$

Where EXR proxies exchange rate, BMS denotes broad monetary supply which is used to proxy monetary policy, RGDP captures real gross domestic product, INFL is used to represent inflation rate and μi is error term. t =1990-2018. Meanwhile,

term β_1-β_4 is short run parameters/ coefficients meanwhile,$\theta_1 - \theta_3$ is long run parameters. It is expected that β_1, $\beta_3, \beta_4, \theta_2, \theta_3 <0$ and $\beta_2, \theta_1 > 0$

Table 1.   Unit Root Test

Variables	ADF Test			PP Test		
	Level	1st Diff.	Remarks	Level	1st Diff.	Remarks
EXR	-2.98104**	-2.98623**	I (1)	-2.98104**	-2.98623**	I (1)
BSM	-2.98104**		I(0)	-2.98104**		I(0)
INFL	-2.98104**	-2.98623**	I (1)	-2.98104**	-2.98623**	I (1)
RGDP	-2.98104**		I(0)	-2.98104**		I(0)

Source: CBN, 2017: Authors` Computation (2020)   ***5% level*

The results of unit root tests estimated with application of the standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. This test is very important due to the problem of spurious regression which could emanate from the analysis of time series data if such data is not stationary. However, the estimated results in the above table clearly confirmed that the data are a mixture of I (0) and I (1).

Table 2.   ARDL Bounds Test

Included observations: 26		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	10.64935	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
5%	3.23	4.35

Authors` Computation (2020)

The dataset for this study is a combination of stationarity and non-stationarity data. Therefore, it is expedient to examine the existence or otherwise of the long run equilibrium relationship among these variables using Bound Test [Pesaran, Shin and Smith, 2001: Pesaran and Pesaran, 1997]. The result presented in the above table shows that the Null hypothesis of no long run relationship could not be accepted because the upper and lower Critical Value Bounds at all level of significance is less than the value of F-Statistic. Hence, there is a presence of cointegrating relationship among the variables in the model. This outcome necessitates the estimation of both short run relationship and long run relationship among these variables.

Dependent Variable: LnBMS

Table 3.   Parsimonious Short Run and Long Run Regression Estimates

Short Run	coefficient	T-statistics	Long Run	coefficient	T-statistics
D(LEXT(-1)	4.560393	1.234106	LEXT(-1)	10.65575	4.756861
D(INF(-1)	-2.477626	0.304079	INF(-1)	53.97222	2.776147
D(LRGDP(-1)	-5.6E-149	0.191921	LRGDP(-1)	1.6E-147	0.651656
ECM	-0.586342	5.250370	R-squared	0.637849	
R-Squared	0.685662		A.R-squared	0.565418	
Adj.R-Squared	0.607078		DWstat	2.297681	
DWstat	1.826583				

Source; Authors` Computation (2020)

The table above presents the ARDL result of both the short and long run relationship between the variables. The estimated result shows that monetary policy and exchange rate have a positive relationship in both short run and long run, though not statistically significant in the short run. This implies that as broad money supply increases, exchange rate increases in the country. In the long run, a unit change in exchange rate leads to about 11% increment in broad money supply in Nigeria. It could be established in this study that one of the major macro-economic variables behind the perpetual expansionary monetary policy in the country is as a result of continuous exchange rate fluctuation in the country. This finding is in line with the submission of Umar (2013) and Zulu and Paul (2008). However, Paul, Kalu and Paul (2017) presented opposite finding. Similarly, monetary policy and inflation rate have an insignificant negative relationship in the short run, but reverse is the case in the long run. The policy causes increases in the instability of the economy in the long run in Nigeria. In the short run, if inflation rate changes by a unit, monetary policy decreases by 2.5%. However, in the long run, a unit change in inflation rate brings about 54% increment in broad money supply. This implies that in the short run expansionary monetary policy might not cause instability in the Nigerian economy but in the long run it causes instability in the country.

This submission is validated by Imoisi et al (2014) despite the fact different methodology was adopted. However, monetary policy and real GDP have an insignificant negative relationship with each other in the short run. Meanwhile, the relationship becomes positive in the long run, though not significant as well. This implies that the monetary policy is not effective in causing economic growth in the short run but could only propel economic growth in Nigeria in the long run. This finding is supported by the works of Adigwe, Echekoba and Justus (2015) and Imoisi et al (2014)] with the application of different methodologies.In addition, the result from the ECM (-1) coefficient is negative and significant at 5% level of significance. It could be deduced that the error correction model reveals that about 58 percent of total disequilibrium due to external shock in the previous year is corrected in the current year. Hence, it will take about one and half years for the system to adjust back to its long run equilibrium path. Therefore, it is important to state that monetary policy requires a time lag before its impact could be ventilated to the desired impact on some selected macro-economic variables like inflation rate, exchange rate and real GDP in Nigeria.

4. CONCLUSION AND RECOMMENDATIONS

This paper has examined the relationship between monetary policy and macroeconomic variable performances in Nigeria between the periods of 1990 and 2018 using Bound Test and ARDL model. The findings of this study could be summarized below; the error correction term showed that about 58% of the total disequilibrium in the previous year was corrected in the current year. Monetary policy is not having a favourable impact on the exchange rate and inflation rate in Nigeria in the long run. Also, monetary policy have insignificant impact on economic growth in the country. Consequently, due to the findings that emerged in this study, this paper makes the following vital policy recommendations for the monetary authorities, policy makers, financial institutions regulators and future researchers. Since the monetary policy does not have a favourable relationship with exchange rate and inflation rate in Nigeria currently, as a matter of urgency the monetary authorities should embark on contractionary monetary policy by decreasing the level of broad money supply and this will eventually lower inflation rate and exchange rate depreciation in the country. Furthermore, it is instructive that the monetary policy should be geared towards stability of macroeconomic variables with a view to achieving a sustainable economic growth in the country and the policy makers in the country should be informed that monetary policy requires a time lag before its impact could be migrated to the desired impact on macro-economic variables in the country.

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