

Monetary Policy Approach to Headline Inflation Control in Nigeria: Evidence from 1985-2018

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Abstract -- Monetary policy remains one of the channels for controlling high inflation. Effective control of headline inflation using monetary policy measures depends on the degree of relationship that exists between the variables. In the light of this, the paper explores the relation between monetary policy and headline inflation with the aim of determining the effectiveness of monetary policy measures in curbing high headline inflation in Nigeria. The series employed are stationary at level and first difference respectively, after testing them for unit roots using Phillips-Perron and Zivot-Andrews structural break consistent unit root tests. The study adopts the Autoregressive distributed lag (ARDL) approach, Bound test, and Error Correction Model (ECM) for empirical analyses of the variables. The paper establishes the following: (a) exchange rate and headline inflation share strong negative relation both in the short-term and long-term; (b) Treasury bill rate exerts statistically significant positive influence on inflation in the long-run; and (c) strong interaction exists between deposit rate and headline inflation in the short-run. We also find cointegrating relationships between monetary policy and headline inflation in Nigeria.

Keywords -- Headline inflation, Monetary policy, Exchange rate, Deposit rate, and ARDL

I. INTRODUCTION

Inflation stability remains a major attribute of a stable, flourishing economy. One of the key responsibilities of monetary authorities across the world includes inflation control, and ensuring its sustenance over a long period. In Nigeria, the maintenance of general price level stability remains a major mandate of the Central Bank of Nigeria (CBN). High rates of inflation in Nigeria could be attributed to operations of poor fiscal/monetary policies, economic shocks (including, the recent ones), the import-dependent nature of the economy, and other socio-economic factors. The positive effects of the diversification policies of successive governments in Nigeria may not have started trickling in, that is, if the policies were effectively designed and executed. To adequately contain rising headline inflation in the country via monetary policy measures, the success of such inflation stability driven policies should depend on the degree of association between the former and the later. In the light of this, this paper investigates the relation between monetary policy and high headline inflation in Nigeria.

The Nigerian economy has undergone various downturns since the 1980s with spiraling inflation contributing to the

economic upheavals. The monetary authority has, to a good extent, remained responsive to the economic dynamics of money supply and undue fluctuations in the general price level using different policy measures such as monetary targeting and inflation targeting. Rising headline inflation was serious prior to the global financial crisis of 2008 especially in the military era. More often than not, the CBN failed in some of its policy thrusts to maintain liquidity balance in the financial system, due to undue political interference from the military. Other factors that contributed to such poor outcomes of the monetary measures adopted in those years include, fiscal policy indiscipline, corruption and other macroeconomic policy inadequacies that characterized the military periods. In the 1990s, for instance, the country witnessed the highest inflation rates since her independence in 1960. With the exception of the military era that saw the imposition of the whims of the military leaders on the CBN as against the professional and competent conducts required of such essential monetary institution, the Bank has performed better in its management of liquidity and high headline inflation in the economy.

For instance, in responding to the liquidity squeeze that ensued following the 2008 global financial crisis, the monetary authority employed expansionary monetary measures by easing the monetary policy rate (MPR), a benchmark rate that dictates the direction of other money market rates, from 10.25% to 6%. In addition, the cash reserve requirement (CRR) and the liquidity ratio (LR) were reduced from 4% and 40% to 2% and 30% respectively. Some years after the operation of the contractionary measures, the headline inflation began to rise again (Tule et al., 2019).

A closer look at the various economic downturns that have befallen Nigeria since the 1980s (when the significant part of the money market was liberalized with the adoption of the Structural Adjustment Programme-SAP in 1986), starting from the military era down to the global financial crisis (2007-2009), then to the recent economic recession of 2016, hikes in headline inflation have been a common feature to those period Of uncertainties. In consideration of the above and the reactions of the CBN to periods of economic uncertainties with the aim of ensuring general price level stability, we will examine whether monetary policy measures still achieve the set objective of reducing high headline inflation.

The success of responding to a macroeconomic imbalance as spiraling inflation using monetary targeting depends largely on the association between the two indicators. It should be noted that industrialized countries record relatively lower inflation rates compared to their counterparts, the developing countries (see Gobbi, Mazzocchi, Tamborini, 2018; Bernanke and Mishkin, 1997). Monetary authorities in the developed countries are wont to adopt inflation targeting as a policy measure. Notwithstanding, inflation targeting should be viewed as a framework and not a rule (Bernanke and Mishkin, 1997). Ironically, the monetary authorities in the industrialized nations work to stave-off deflationary pressure, while their counterparts in the developing countries struggle to control high and rising inflation. One of the major disadvantages of high or rising headline inflation is the problem of capital flight. Investors, especially foreign investors, tend to lose their investments due to depreciation of the host currency, since an inverse relationship exists between inflation rate and value of money. Inflation stability experienced in the industrialized countries is not unconnected to the high volume of economic activities (including enhanced productive activities that breed increasing wealth), availability of adequate infrastructure, relatively low cost of funds, among others; most of which are not adequately provided for in the third world countries. In the light of this divide, we focus on a developing country that, more of often than not, struggles to attain a single digit inflation rate. Interestingly, to the monetary authority in Nigeria, achieving a single digit is considered “a mission accomplished”, the relatively high single rate notwithstanding.

Following the review of recent papers, we observed that studies on the subject are more of panel studies than country-specific studies. Only few country-specific studies were done on the subject of interest, while fewer of those studies focused on the developing countries (see Bahmani-Oskooee, 1995; Ashra, Chattopadhyay, and Chaudhuri 2004; Bomberger and Makinen, 1979; Darrat and Arize, 1990; and Kia, 2006). Our review of the papers, though not exhaustive, shows that none focused exactly on the connection between monetary policy and general price level as it relates to a developing country, using the same monetary indicators adopted in this study, to the best of our knowledge. This study covers this gap in literature by focusing on monetary policy and the headline inflation, exploring other aspects of the relation such as long-run and short-run relations, and the influence of the former on the latter. We also check, in the light of the exogenous shocks influencing economic performances in Nigeria, whether conventional monetary policy methods used by the monetary watchdog in Nigeria are still expedient in mitigating the unwanted high headline inflation in the economy, or adopt innovative approaches in discharging this responsibility. Moreover, other studies reviewed adopted models different from the one employed in this study. The paper adopts the Autoregressive distributed lag (ARDL) approach. Apart from being a dynamic model, the ARDL has other advantages one of which includes, the permission of blend of variables with

different stationarity properties. Essentially, the monetary policy variables adopted in the study as the explanatory variables were purposely selected such that other studies, based on the papers reviewed, had not used the same set of variables. In this paper, we employ as monetary policy indicators, the Treasury bill rate, the deposit rate, exchange rate and the broad money. In addition, the study employs recent data to empirically carry out its set objective. This way, the paper also contributes to literature.

Other parts of the paper such as parts 2 and 3 focus on the literature and methodology respectively; while part 4 captures data presentation and analysis. Part 5 presents the empirical results from the estimations carried out, and section 6 houses the discussion of the results. Conclusions of the paper are contained in section 7.

A. Literature Review

According to Bernanke and Mishkin (1997), inflation targeting described as the range of expected inflation rates for a predetermined period is considered a framework rather than a rule used by the monetary authority for the achievement of defined monetary objectives. The paper posits that using inflation targeting as a “goal variable” (i.e., the final goal) which is achieved with the deployment of monetary variables, remains more effective than using the reverse. The reverse-monetary targeting or intermediate targets implies meeting the defined goal(s) of a monetary policy by implementing the preset targets of some monetary indicators such as the exchange rate, money supply, monetary policy rate, etc. By this strategy, the goal variable (attainment of defined inflation rate or range of rates) is pursued rather indirectly. Bernanke and Mishkin (1997) argue that intermediate targets, by the experiences of industrialized economies, have shown to be unpredictable.

Behind the use of monetary targeting or the intermediate target to accomplish a macroeconomic goal such as inflation stability lies a problem. From the assertion of Friedman (1990), adjusting the quantity of money to a certain level in economies that practice the fractional reserve system can be reached with the use of monetary policy through two different channels- quantity variable and price variable. By adopting both the quantity variable and the price variable, the monetary authority works towards influencing the reserves of banks and other financial institutions, a move that affects their ability to create credits. However, this is different from determining the stock of money in the economic system exogenously by the monetary authority. By this method, the central bank adjusts its own “deposit liabilities” to influence the monetary base in the economy. The choice of monetary instruments to constitute a monetary policy can be a tough one.

Concerning the monetary instruments that can be used to pursue the objective of a monetary policy, Friedman (1990) argues that the monetary authority must decide whether to adopt the price variable or the quantity variable. The decision over the one to choose remains a difficult task, hence the

instrument problem (Friedman, 1990). This dilemma is largely observed in the use of open market operations, which involve buying and selling of government financial instruments with the aim of controlling money supply and by implication achieve a predetermined range of inflation rate or a particular rate over a given period. The price variable is made up of the monetary instruments as the monetary policy rate (a benchmark rate used by the CBN), the discount rate, and the Treasury bill rate, among other related rates. Whereas, the quantity variable concerns the application of the monetary instruments such as the liquidity reserve, cash required reserve (CRR), monetary base, etc. By this notion, Friedman (1990) indirectly suggests that achieving inflation stability via monetary policy, to a good extent, depends on the choice made by the monetary authority over the two options. Making an optimal choice by the monetary authority remains an effective means of achieving the guidelines captured in a policy rule.

Alluding to this position, Taylor (1993) asserts that applying monetary policy in a manner that makes it extremely difficult for the policy holders to make some adjustments in order to accommodate some changes in the economy while operation of the policy is on-going may not be practical and expedient. Taylor (1993) upholds that permitting policy makers to follow general principles of policy rule, while allowing them to decide the policy pace augurs well for optimal decision making, which is essential for result oriented monetary policy for inflation stability.

Taylor (1993) advocates for monetary tightening measures such as increasing interest rate, if inflation rate drifts upward for a longer period. However, sticking to increased interest rate, when high inflation rate would last for a short period or phases out after some time would be considered ineffective. We reviewed the empirical literature of related studies.

Lo and Granato (2008) deploy regression analysis in a panel study that cover 18 countries, and find out that inflation shocks phase out faster in more liberalized economies than closed economies. The paper shows that a policy change from monetary authorities is implemented when inflation rate rises above the expected limits largely due to widely held general assertion that rising inflation impairs the economy. The study views international trade as an exogenous force that dictates authority to variations in inflation. The finding corroborates the view of Temple (2002) that free-market economies suffer the monetary policy responses adopted by the monetary relatively high inflation, thus necessitating more serious responses to inflation disturbances by the monetary authorities. Kia (2006) employs quarterly data covering the period, 1970-2002 in a study that explores the association between monetary policy, fiscal policy and the price level in Iran. The paper finds a positive, significant relation between monetary policy and inflation. Lovcha and Perez-Laborda (2018) check the connection between monetary policy (interest rate), real activity (output gap) and inflation in the United States using the fractionally integrated vector

autoregressive model (FIVAR) and vector autoregressive model (VAR). They establish a relation between the variables, and assert that inflation and real activity respond to monetary policy shocks, and evidence of long memory obtains more in output and inflation. In a study that investigates the relation between trend inflation and monetary policy regimes in Japan for a period of 30 years, Okimoto (2018) finds a strong relation between trend inflation and monetary policy regimes. Turdaliev (2019) explores the link between heterogeneous populations, monetary policy and inflation in the OECD countries, and the study establishes a connection between the variables. Mandler (2012) studies the regime effects of monetary policy disturbances on inflation in the United States of America using threshold vector autoregression. The result shows that inflation responds strongly to the regimes of monetary policy shocks used in the US. According to the study, the response of inflation to the regimes of a policy depends on the level of inflation.

II. METHODOLOGY

The paper is set out to investigate the relationship between the monetary policy and inflation in Nigeria. The monetary policy indicators used in this study are the Treasury bill rate, deposit rate, exchange rate, and broad money, which constitute the explanatory variables, and inflation is the dependent variable. Sequel to this, we present the following:

$$INF_t = \beta_0 + \beta_1 TBR_t + \beta_2 DPR_t + \beta_3 InEXR_t + \beta_4 InM2_t + \varepsilon_t \quad \text{eq. 1}$$

Where: INF denotes inflation rate; TBR is the Treasury bill rate; DPR is deposit rate; In EXR stands for exchange rate; and ε_t is the disturbance term.

Our choice for ARDL, as advised by Pesaran and Shin (2001), is informed by its superiority over other regression approaches. Its advantages include: (1) it is a dynamic model, a characteristic that makes it less susceptible to autocorrelation and other shortcomings exhibited by other regression models; (2) it permits the variables to adopt different lag structure; (3) it has the capacity to accept a combination of variables with different stationarity properties. We therefore follow

Arize, Kalu, and Nkwor (2017) to employ the ARDL approach for this study. The traditional augmented-ARDL is presented thus:

$$\phi(L,p)y_t = \sum_{i=1}^k \beta_i(L,p) x_{it} + \delta'w_t + \mu_t \quad \text{eq. 2}$$

where

$$\phi(L,p) = 1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_p L^p \quad \text{and} \\ \beta_i(L,p) = \beta_{i1} + \beta_{i1} L + \beta_{i2} + \dots + \beta_{iqi} L_i^{qi} \quad i = 1, 2, \dots, k \quad \text{eq. 3}$$

and where L is a lag operator, and w_t stands for an $s \times 1$ vector of deterministic variables. The choice for optimal lag is made with the aid of Akaike information criteria (AIC). The optimal lag remains the lag with the smallest amount of information criterion.

The Bound test approach is used to establish cointegrating relationships between the variables. Following Pesaran and Shin (2001), the Bound test has two critical values, the upper bound and the lower bound. The decision for cointegration is reached using the test statistic and the critical values. As a decision guide, the null hypothesis of no long-run relationship obtains. The null hypothesis is rejected, if the test statistic is greater than the upper bound and lower bound values. On the other hand, we fail to reject the null where the test statistic is less than the lower bound and by implication the upper bound. Decision will be inconclusive should the F-statistic falls between the lower bound and the upper bound values.

Having found cointegration among the variables, we deploy error correction model to determine the short-run parameters in addition to long-run estimates. The error correction model is shown below:

$$INF_t = \beta_0 + \beta_1 TBR_{t-1} + \beta_2 DPR_{t-2} + \beta_3 InEXR_{t-1} + \beta_4 InM2_{t-1} + \psi ecm_{t-1} \quad \text{eq. 4}$$

Where β_0 is the drift, $\beta_1 - \beta_4$ are short-run parameters, and ψecm_{t-1} is the adjustment profile, which is expected to be negative and statistically significant.

A. Analysis and Presentation of Data

I) Data Description: The sets of data used in this study are annual series sourced from the Statistical Bulletin of the Central Bank of Nigeria (CBN) and the International Financial Statistics (IFS), covering a period of 34 years, 1985 - 2018. The beginning date coincides almost with the period a major reform (the Structural Adjustment Programme- SAP) in the history of the Nigerian financial sector was adopted. And, the ending year corresponds to the exit of economic recession that engulfed the country from 2016. Data other than inflation series were obtained from the Bulletin.

The study employs annual data for all the variables of the study. For inflation rate (the dependent variable), we use annual series so as to smoothen out temporary fluctuations in the variable (Taylor, 1993). The same time frequency is adopted for the explanatory variables in order to align them with the time interval of the dependent variable. The explanatory variables are the monetary policy variables; namely, Treasury bill rate (TBR), deposit rate (DPR), exchange rate (EXR), and money supply proxied by the broad money (M2). A look at the Table 1 shows the data properties of the series employed in this study. For the interest rates, the mean of the Treasury bill rates is similar with the deposit rates; both are approximately equal to 12 per cent. Within the period under review, the exchange rate of the Naira to the dollar goes for N99.00 per 1USD (United States dollar), on average. The average inflation rate for the period, 1985-2018 stands at 19.58%. This rate is deemed stable because it exceeds other annual rates after the country exited the military rule in 1999. The variables used in this paper are explained below.

Inflation rates: In this paper, the inflation used is the headline inflation, which is the total of inflation in an economy. It can also be referred to as composite consumer price index.

Treasury bill rate: Treasury bill rate is the money market rate at which the Treasury bill, a short term security of the CBN is transacted.

Deposit rate: another interest rate employed in this paper is the deposit rate. It represents a weighted average of twelve months used by the deposit money banks (DMBs) in Nigeria.

Exchange rate: The foreign exchange market in Nigeria operates a pence rate exchange system. With this exchange rate system, the Naira is quoted in variable units relative to the USD, which is expressed as a fixed unit. The exchange rates utilized in the study represent the annual average of the Naira relative to the USD within the period under consideration. The United States dollar (USD) is still a major foreign currency in the foreign exchange markets in Nigeria, hence we use the exchange rate, USD/Naira.

Money supply: we use the broad money (M2) as a measure of money supply. The Nigerian financial sector basically recognizes two types of money supply, viz, narrow money (M1) and broad money (M2). Broad money, which is viewed as the overall liquidity in the economy, comprises the base money, savings accounts deposits, demand deposits, fixed deposits, and deposits in foreign currency (Alade and Tule, 2017).

Table 1: Descriptive Statistics

| Variables | Mean | Standard deviation | Minimum | Maximum |
|-----------|---------|--------------------|---------|----------|
| INF | 19.58 | 18.13 | 5.39 | 72.84 |
| TBR | 12.44 | 4.59 | 3.72 | 26.90 |
| DPR | 12.18 | 5.04 | 4.70 | 23.99 |
| EXR | 98.88 | 86.42 | 0.89 | 306.08 |
| M2 | 5757.67 | 7753.02 | 22.30 | 25079.72 |

Table 2: Unit Root Tests Results

| Variables | Phillips-Perron unit root test results | | | Zivot-Andrews structural break consistent unit root test results | | |
|-----------|--|----------------------|---------|--|------------|---------|
| | Perron test Stat | Critical Values (5%) | Remarks | ZAU Stat | Break Date | Remarks |
| INF | -6.72 | -2.96 | 1 | -5.35 | 1996 | 0 |
| TBR | -7.06 | -2.96 | 1 | -6.73 | 1994 | 1 |
| DPR | -6.62 | -2.96 | 1 | -5.19 | 1996 | 0 |
| InEXR | -3.68 | -2.9 | 0 | -5.09 | 1999 | 0 |
| InM2 | -3.70 | -2.96 | 1 | -7.39 | 2013 | 1 |

Note: Critical values for Zivot-Andrews Unit Root Test are -5.34 and -4.93 at 1% and 5% respectively.

Critical value for Phillips-Perron Unit Root Test at 1% significance level for In EXR is -3.65, while INF, TBR, DPR and InM2 share the value -3.653730 respectively. We estimate the Phillip-Perron test based on Bartlett kernel with the support of Newey-West bandwidth.

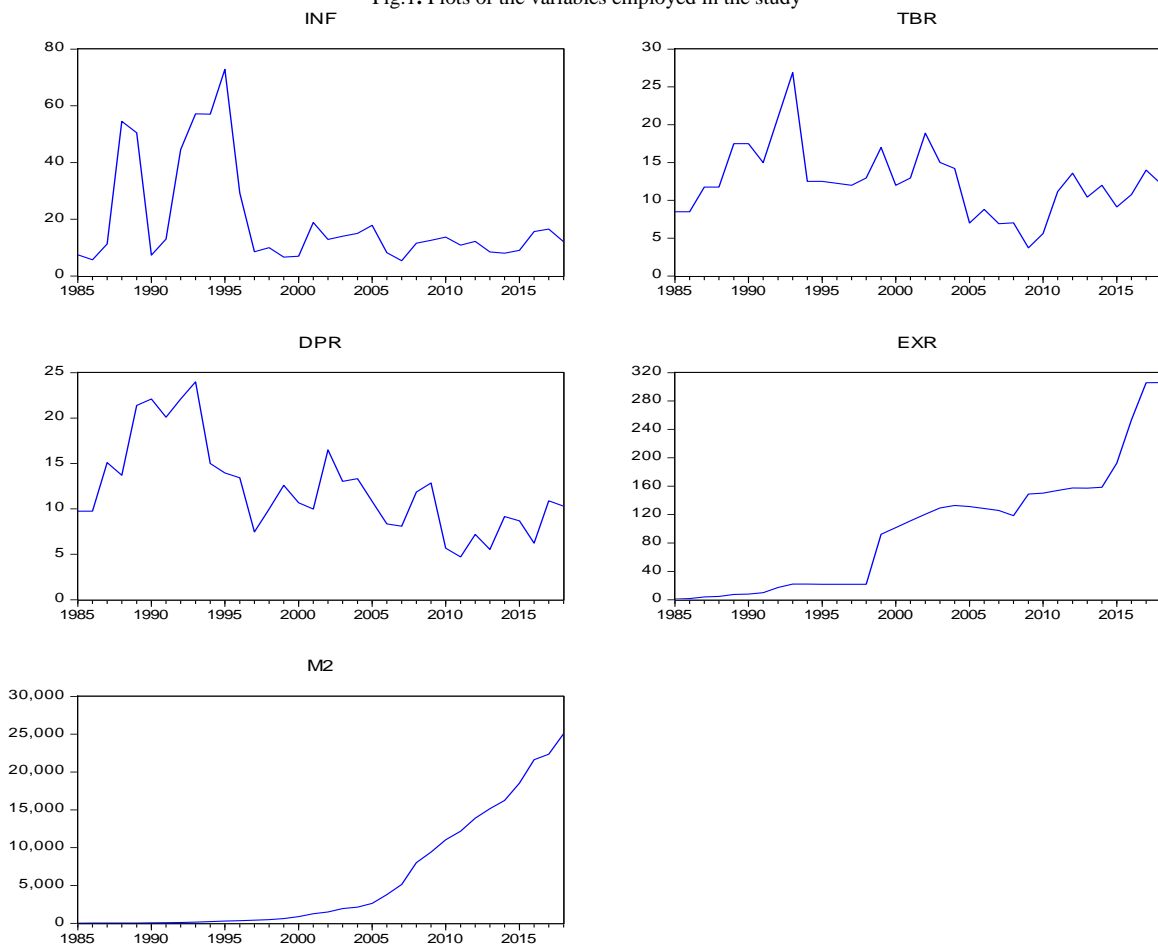
The PP test equation allows for intercept only.

II) *Stationarity Test:* To obtain valid and reliable estimates necessary for effective decisions and predictions, we test the variables for unit roots. Following the Phillips and Perron (1988), we run Phillip-Perron (PP) unit root test which is adjudged superior to the traditional Augmented Dickey Fuller (ADF) given structural breaks. The outcome of the PP test as shown in Table 2 indicates that the natural logarithm of exchange rate (InEXR) is stationary at level, while other variables (INF, TBR, DPR, and InM2) are integrated of order one respectively at 5% level of significance. The choice for Autoregressive distributed lag (ARDL) is justified given the stationarity properties of the variables, which is a mix of I(1) and I(0) variables.

III) *Test for Structural breaks:* As macroeconomic instruments, monetary policy variables display breaks due to change in policy positions and priorities of the government. We adopt the Zivot-Andrews structural breaks consistent unit root test as developed by Zivot and Andrews (1992). The structural break test is chosen in view of the fact that structural breaks dates are identified via endogenisation process, a feature lacked by unit root tests such as Augmented Dickey Fuller (ADF) and Phillip-Perron (PP). The plots of the time-series shown in fig. 1 reveal evidence of breaks; hence

validate our decision to employ the Zivot-Andrews structural breaks consistent unit root test. The outcome of the test shown in Table 2 indicates that the Treasury bill rates and money supply are integrated of order one at 1% significance level, while inflation is of order zero at 1% level. Deposit rates and exchange rates are stationary at level at 5% significance, respectively. As shown by Table 2, all the break dates excluding 2013 were in the 1990s. With the benefit of hindsight, the 1990s represent the military era largely characterized by economic instability with fiscal and monetary policy shortfalls, financial recklessness, misappropriation of public sector resources, lackluster attitude in budget implementation, corruption, spiraling inflation, among others. In contrast, the year 2013 was a bountiful period for the Nigeria economy under the civilian administration of President Goodluck Jonathan. The period saw abundant reap in revenue generation resulting from growth in crude oil sale and robust growth of some sectors of the economy especially the manufacturing sector, among other stout economic indicators, all of which contributed to the outcome of Nigeria being declared the richest economy in Africa in that year (Wikipedia, 2016).

Fig.1. Plots of the variables employed in the study



B. Empirical Results

We deploy the ARDL framework on the linear combination of the variables, having established their stationarity properties. As presented in Table 3, the deposit rates (DPR) exert a significant, negative impact on inflation at 5% level of significance. Also, the exchange rate (InEXR) has a negative and statistically significant influence on inflation. In addition, the lag values of inflation exhibit statistically significant positive and negative effects on inflation respectively, at 0.05 significance level. The findings of the diagnostic tests are displayed at the lower part of Table 3. We conduct the post-estimations to verify the reliability and validity of the ARDL results.

The 87% R² shows the goodness of fit of the model, which implies that 87% variation in the dependent variable is explained by the explanatory variables put together, while the balance of 13% is caused by the un-modeled variables. The absence of autocorrelation, first reported by DW stat of approximately equal to 2 (a rule of thumb) is confirmed by a higher order, BG Serial Correlation LM test. In addition, the model is proved to be homoscedastic from the result of Breusch-Pagan-Godfrey test.

Table 3: ARDL Estimates

| Dependent variable: INF | | | | |
|-------------------------|-------------|------------|-------------|-------|
| Variable | Coefficient | Std. error | t-Statistic | Prob. |
| INF (-1) | 0.50 | 0.16 | 3.03 | 0.00 |
| INF(-2) | -0.78 | 0.18 | -4.32 | 0.00 |
| TBR | 0.29 | 0.54 | 0.53 | 0.61 |
| TBR(-1) | 0.39 | 0.84 | 0.46 | 0.65 |
| TBR(-2) | 1.52 | 0.84 | 1.81 | 0.09 |
| DPR | -1.90 | 0.85 | -2.23 | 0.04 |
| DPR(-1) | -0.09 | 1.17 | -0.08 | 0.94 |
| DPR(-2) | 1.08 | 0.84 | 1.28 | 0.22 |
| InEXR | -16.95 | 7.54 | -2.25 | 0.04 |
| InEXR(-1) | -5.82 | 5.64 | -1.03 | 0.32 |
| InM2 | 15.81 | 22.47 | 0.70 | 0.49 |
| InM2 (-1) | 0.65 | 27.62 | 0.02 | 0.98 |
| InM2 (-2) | 19.60 | 27.75 | 0.71 | 0.49 |
| InM2 (-3) | -45.91 | 30.43 | -1.51 | 0.15 |
| R2 | 87% | | | |
| Adj. R2 | 75% | | | |
| DW stat | 2.20 | | | |
| BG LM (F) | 0.11>0.05 | | | |
| BP (Het, F) | 0.41>0.05 | | | |

ARDL (2, 2, 2, 1, 3)

I) *Cointegration test*: We estimate for long-run relationships among the model variables using the ARDL bound test. As shown in Table 4, the F-stat 8.52 exceeds both upper and lower bound values at 1%, 2.5% and 5% level of significance respectively. It is a strong evidence of long-run relationships between monetary policy and inflation.

II) *Long-run elasticities*: In view of long-run relationship reported above, monetary policy variables can as well yield impact on inflation in the long-term, the outcome of which is presented in Table 6. A look at the Table shows that the Treasury bill rates have (in the long-run) a strong positive impact on inflation at 5% level of significance. In addition, exchange rates exert a long-run negative effect on inflation, which is statistically significant at 5% level.

III) *Error correction model*: Having ascertained the existence of long-run relationship among the variables of the model, we go further to estimate the error correction mechanism in order to determine the speed of adjustment to long-run equilibrium after a shock. The results of the error correction test presented in Table 4 indicate that the error correction term (ECM) is rightly signed and statistically significant at 0.05level. However, given the absolute value of the coefficient 1.28, the speed of adjustment cannot be correctly predicted. It can be reported from the outcome of Table 4 that deposit rates and exchange rates have statistically significant influence on the dependent variable at 5% level in the short-run. These two policy instruments of the monetary authority share inverse relationship with inflation in the short-term. The results corroborate the estimation outcome in Table 3.

Table 4: Cointegration Estimation Results

| Test statistic | ARDL Bound Test | | |
|----------------------|-----------------|----------|------|
| | Values | K | |
| F-statistic | 8.52 | 4 | |
| Critical bounds test | | | |
| Significance | I0 bound | I1 bound | |
| | 10% | 3.03 | 4.06 |
| | 5% | 3.47 | 4.57 |
| | 2.5% | 3.89 | 5.07 |
| | 1% | 4.4 | 5.72 |

Source: Author’s ARDL bound test computation
ARDL: Autoregressive distributed lag

Table 5: Error Correction Representation

ECM: Error correction mechanism

| Indices | ECM(-1) | D(TBR) | D(DPR) | D(InEXR) | D(InM2) |
|-------------|-----------|--------|-----------|-----------|---------|
| Coefficient | -1.28 | 0.29 | -1.90 | -16.95 | 15.81 |
| Std. error | 0.24 | 0.54 | 0.85 | 7.53 | 22.47 |
| t-Stat | -5.36 | 0.53 | -2.23 | -2.25 | 0.70 |
| P-value | 0.00<0.05 | - | 0.04<0.05 | 0.04<0.05 | - |

Table 6: Long-run elasticities

| Indices | TBR | DPR | InEXR | InM2 |
|-------------|-----------|-------|----------|-------|
| Coefficient | 1.72 | -0.71 | -17.83 | -7.71 |
| Std. error | 0.72 | 0.75 | 4.13 | 11.44 |
| t-Stat | 2.38 | -0.95 | -4.32 | -0.67 |
| P-value | 0.03<0.05 | - | 0.0<0.05 | - |

C. Discussion of results

The estimation results show that the exchange rate has a significant negative effect on inflation both in the short-run and long-run. It implies that the value of the Naira (relative to the USD) is inversely related to inflation rate. Therefore, a nominal increase in the price of the dollar, which means depreciation of the Naira value, would cause a rise in inflation rate, and vice versa. The finding reflects the undeveloped nature of the Nigeria economy, which is still largely an import-dependent economy. The country imports more (mostly mechanized goods) than it exports (mostly extractive resources). The unhealthy economic condition that follows creates scarcity of foreign currencies especially the USD in the foreign exchange markets in Nigeria, hence the frequent depreciation of the Naira since the inception of the Structural Adjustment programme (SAP) in 1986 to date, through the operations of floating and quasi-floating exchange rate policies. We find a strong inverse relationship between the deposit rate and headline inflation in the short-term. With low deposit rate, the fund savers in Nigeria are dispirited from saving significant portion of their funds with the deposit money banks (DMBs) thereby spending more of the unsaved funds on consumption and capital expenditure, the effect of which triggers rising inflation, other factors assume to be constant. In addition, inflation strongly and positively responds to fluctuations in the Treasury bill rate in the long-term. The result estimates on the Treasury bill suggest high Treasury bill rate, a market condition that attracts increased investments in the short-term security. The federal government, via the CBN uses the Treasury bill to raise funds from the money market in order to finance its recurring deficit annual budgets. The implication of expending borrowed capital in the economy raises the average general price level, other factors held constant. The study establishes cointegrating relationships between the components of monetary policy and inflation. It then means that a shock in the monetary instruments will sway the behavior of inflation. However, the speed of adjustment to long run equilibrium after a shock cannot be statistically predicted as found by this study.

III. CONCLUSIONS

The CBN deploys various regimes of monetary policy as occasion demands to control rising inflation in the economy. Tightening or easing policy regimes could be adopted to control increasing inflation. Inflation usually results when increasing stock of money exceeds economic productivity. Disturbances recorded by the economy especially in recent times, such as the global financial crisis of 2007-2009, and the economic recession of 2016-2017 have awoken the interest to re-assess the effectiveness of the traditional monetary policy measures used to curtail high headline inflation in the economy. The success of any policy rule used by the monetary authority depends on the level of relationship or sensitivity shared between inflation and monetary instruments. In view of this, the paper examines the connection between

monetary policy and rising headline inflation with the aim of proffering solution to achieving inflation stability. In the paper, we find strong relationship between monetary policy and headline inflation in Nigeria, and observe that shocks in monetary policy will cause spillover-over effects on headline inflation. The outcome corroborates the finding of Kia (2006). Therefore, the monetary authority can successfully use monetary policy measures to control rising headline inflation in the economy, in view of rising economic disturbances. Achieving inflation stability would facilitate appreciation of the value of the Naira with positive multiplier effects on the economy.

In the light of the finding on exchange rate and headline inflation rate, we recommend the adoption of effective policy against the current non-banking channels of remitting foreign currencies to Nigeria from abroad. Such a policy should create the framework that makes it easier for financial institutions in the country to access foreign currency remittances from abroad. We believe that successful operation of such a policy will ease the demand pressure on foreign currencies. This recommendation is sequel to the finding of Chowdhury (2016) that shows Nigeria as one of the top remittance-recipient developing countries in the world with her total remittance inflows constituting 7 per cent of the country's Gross Domestic Product (GDP). In addition, we advise for the operation of monetary tightening measures that will raise the deposit rate in order to attract more savings from the surplus units, albeit short-term, with the aim of curbing rising headline inflation rate in Nigeria.

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