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Monetary Policy Instruments and Inflation Rate in Nigeria

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Abstract:- This research work examined the impact of monetary policy instruments on inflation rate in Nigeria within the epoch of 1981 to 2022. Data was sourced from CBN statistical bulletin. Inflation rate (INF) was utilized as an endogenous variable while the exogenous variables were interest rate (ITR), exchange rate (EXR), Open market operation proxied by treasury bill rate (TBR), reserve requirement ratio (RRR) and money supply (MS) used as controlled variable. Consequently, this research made use of Ex-Post Factor research design in which multiple regression method of analysis was used. Augmented Dickey Fuller (ADF), Philip Perron (PP), Zivot-Andrews (ZA) and Dynamic ARDL were employed as the research techniques, specifically for unit root tests and estimation of the long run and short run relationship of the variable. The outcomes indicated that: interest rate has negative and significant impact on inflation rate in Nigeria by contributing to 2.57% and 2.03% decrease in INF in short and long run periods respectively. On the other hand, Open market operation proxied by treasury bill rate has positive and significant impact on inflation rate in Nigeria by contributing to 0.11% and 0.005% increase in INF in short and long run periods respectively. On the contrary, reserve requirement ratio negatively and insignificantly impacted on inflation rate by leading to 0.26% and 0.04% decrease in INF in the short and long run periods respectively. Similarly, exchange rate had adverse and significant effect on rate of inflation in Nigeria by contributing to 10.9% and 2.6% decrease in INF in both the short and long run periods respectively. Lastly, supply of money has positive and significant effect on inflation rate in Nigeria by contributing to 0.46% and 0.66% increase in INF in the short and long run periods respectively. Consequently, this work recommends that CBN should maintain a contractionary monetary policy with the capacity to restrain too much supply of money, so as to mitigate rate of inflation in the country. This measure will drastically minimize the volume of money circulating outside the banks which is identified as responsible for the rising rate of inflation in Nigeria. Again, CBN should liberalize interest rate such that will reduce prime lending rate and thereby encourage productive investment which will reduce inflation rate in Nigeria.

Keywords: *Monetary Policy Instruments, inflation rate, ARDL, Nigeria.*

1. Introduction

Monetary policy is one of the major macroeconomic policies used by central bank of a country, in order to achieve macro-economic goals. These goals include price stability, sustainable economic expansion, job creation, balance of payments equilibrium, and exchange rate stableness (Ajisafe, Adesini & Okunade, 2022). To actualize these goals, monetary policy instruments are often utilized by central bank of a country to influence and stabilize economic activities in the economy (Ibrahm and Enofe, 2021). These monetary policy instruments often used by this agency comprise Open Market Operation (OMO), interest rate, cash reserve requirement, discount rate, liquidity ratio, selective credit control, moral suasion, (Udochukwu, 2021).

In Nigeria's economy, the pivotal role of this monetary policy is to maintain internal price and exchange rate firmness, as it is paramount for the achievement of sustainable expansion and external sector profitability (Awogbemi, 2022). Off course, this can majorly been achieved by encouraging capital formation through increase in savings, thereby availing investors, the adequate finances for investment through the suitable interest rate composition; reducing unnecessary changes in the exchange rate, and also ensuring adequate bank supervision. The whole essence of this, is to ensure financial sector soundness, which invariably, will lead to maintenance of efficient payments system (Atuma & Eze, 2017). If all these as discus come into play, it simply suggests that monetary policy is actually powerful in ensuring short term macroeconomic stability. This could be due to its oftenness in changing the policy instruments. That is why, economists see monetary policy as a paramount policy in which nations can adopt for the accurate maintenance of domestic price and exchange rate stability. However, the rising trend of inflation in Nigeria especially in recent times has raised great concerns about the efficacy of monetary policy measures in moderating prices. For instance, considering the trend of inflation and monetary policy instruments like rate of interest and exchange, reserve requirement ratio and Open market operation for five (5) years interval, it was observed that in 1981, inflation and interest rate were 10.31% and 5% respectively, while exchange rate was 0.62%, and Open market operation was 5%. In 1986, interest rate increased to 10%, exchange rate increased to 1.75%, and Open market operation increased to 8.50%; while that of inflation rate was 5.7%. This implies that the increase in monetary policy instruments in Nigeria does not bring a corresponding increase in reduction in the country. Similar effect was observed in 1991 when inflation rate was 13%, interest rate increased to 18.5%, exchange rate increased to 9.91%, and Open market operation increased to 15%. In 1996 inflation rate increased to 29.3%, interest rate decreased to 13.5%, exchange rate increased to 21.9%, reserve requirement ratio was 16.95% and Open market operation decreased to 12.25%. In 2001, inflation rate was 18.9%, interest rate stood at 13.5%, while that exchange decreased to 111.7%, reserve requirement ratio increased to 125.26% and Open market operation increased to 12.95%. In 2006, inflation rate was 8.2%, interest rate decreased to 13%, exchange rate increased to 128.65%, reserve requirement ratio increased to 206.51 % of deposit and Open market operation decreased to 8.80%. In the year 2011, inflation rate was 10.8%, interest rate decreased to 6.13% of principal, exchange rate increased to 153%, reserve requirement ratio increased to 77.05 % of deposit and Open market operation increased to 16.75%. In the year 2016, inflation rate was 15.7%, rate of interest rose to 13.6% of principal, while that of exchange even declined to 97.27%, Open market operation rose to 18.50%. Lastly, in 2021, gross domestic product increased to 3.6%, interest rate decreased to 5% of principal, exchange rate decreased to 43.58% of GDP and Open market operation decreased to 10% (CBN, 2022).

It is anticipated, for example that reduced rate of interest, due to accessibility of funds in the country, should cause the expansion of the internal investment vis-a-vis economic expansion and this will eventually reduce inflation rate. But after observing the trend of monetary policy variables, it is observed that there is contradiction in relation to the theory as increase or decrease in monetary policy instruments do not lead to proportionate rise or fall in inflation rate in Nigeria. The inauspicious economic effects of these aberrant in the nations' economic acts are the cyclic rise in the nation's state of joblessness and exchange rate to as high as 5.76% and 18.8% in 2022 respectively; together with external sector instabilities; and these elements are widely speculated as factors that can reduce the the geometric expansion of a nation. It is against this background that this research work attempt to examine the impact of monetary policy instruments on inflation rate in Nigeria. Specifically, the objectives of this work are to: (I) determine the extent at which interest rate impact on inflation rate in Nigeria, (ii) evaluate the magnitude at which exchange rate impacts on inflation rate in Nigeria, (iii) ascertain if open market operation significantly impacts on inflation rate in Nigeria, (iv) determine the extent at which reserve requirement ratio impacts inflation rate in Nigeria, and lastly, (v) examine the rate of impact of money supply on inflation rate in Nigeria.

2. Literature Review

In the work carried out by Tonprebofa (2023) titled dynamics of monetary policy and inflation in Nigeria. Utilizing Error Correction model (ECM), this researcher found that money supply and exchange rate, and all the included monetary policy variables have paramount effect on the inflation rate. Hence, he recommended that the CBN

should stay convergent on its current foreign rate of exchange, together with her discretionary utilization of the monetary policy tools so as to be able to maintain 6-9% inflation threshold fin Nigeria.

In another study titled effectiveness of monetary policy in controlling inflation in Nigeria, Tamunonimim (2016) adopted ECM with the data ranging from 1985–2012. The results of his analysis revealed dimensionality, corresponding with the Eigenvalue situation index, and discrepancy généraux.

Fasewa and Aderinto (2023) in a study of the consequence of government spending on inflation in Nigeria, applied ARDL for the period 1981 – 2019 found that in the short run administration capital spending has a paramount negative effect on inflation but capital expenditure has direct important effect on inflation in Nigeria.

Awogbemi (2022) researched on the topic titled, the effectiveness of monetary policy on Nigeria's economic expansion. This researcher utilized descriptive statics and ordinary least squares method and his result showed that liquidity ratio had an inverse effect on the Nigeria's economy while money supply variable had a verse and paramount effect on Nigeria's economic expansion within the time of research.

Examining the association between monetary policy instruments and economic expansion in Nigeria Ibrahim & Enofe (2021) utilized the ARDL method and their results revealed that rate of interest and broad money had a direct and paramount effect on economic expansion in the Nigeria.

Ovat, Ishaku, Ugbaka & Ifere (2022) studied the impact of monetary policy rate on the economic expansion in Nigeria. Adopting Ordinary Least Squares Method, these researchers found that monetary policy rate has a negative but significant effect on economic expansion, real rate of exchange had an indirect association and paramount impact on economic expansion in Nigeria.

The outcome of the work titled effect of monetary policy instruments on output in Nigeria, carried out by Ajisafe, Adesini & Okunade (2022) using VECM, shoed the existence of a long-run relationship between expected and unexpected monetary policy and output in Nigeria.

Investigating the impact of monetary policy on inflation and economic expansion in Nigeria, Okoh & Otene (2020) utilized vector Auto-regression Technique (VAR) and found that money supply has a direct effect on economic expansion in Nigeria.

Other studies with conflicting impact of monetary policy instruments on economic expansion and development of a country include Hassaini, Gylych, Abdurahman & Murat (2020), Oluseyi,, John & Udoye (2018), Ezeaku, Ibe, Igwuanyi, Modebe & Agbaeze (2018), Tude, Ogundele & Apinran (2018), Ufoeze, Odimgbe, Ezeabalisi & Alajekwu (2018), Saghir, Hadiqa, & Syed (2022), Khaysy, Thiphavanh, Vaiyoth, Phiengsanith, Visanu, & Vonsy (2021), Oyakegha & Arepo (2022), Nwankwor, Ikeora, & Ogini (2022), Timothy (2022), etc. The contradictory outcomes could be traced to divergency in methodology, range of data, or even the dataset.

3. Theoretical Framework

3.1 Quantity Theory of Money

The idea of the quantity theory of money has roots in the 16th century with personalities like Jean Bodin. However, it was apparently formalized by Irving Fisher in the early 20th century through his equation of exchange (MV=PT), and later restated and popularized in modern times by Milton Friedman as a cornerstone of monetarism. This theory upholds that inflation is ascertained by the variations in money supply, under the assumption that the velocity of money in circulation and the amount of transactions of commodities remain constant. Infact, according to this quantity theory of money, variation in money provision would lead to a rise or fall in the broad level of price (Awogbemi, 2022).

4. Methodology

This research work employs multiple regression method in which Autoregressive distributed lag model (ARDL) method is used as the analytical technique, simply to determine the relationships between inflation rate (INF) known as the endogenous variable and interest rate (ITR), exchange rate (EXR), Open market operation proxied

by (Treasury bills rate), and reserve requirement ratio (RRR) known as independent variables. Hence, in order to actualize the aims of this research, our model is therefore stated as thus:

$$INF = f(ITR, EXR, TBR, RRR, MS) \quad (1)$$

Equation 1 is therefore stateed in its functional form as thus:

$$INF_t = \beta 0 + \beta_1 ITR_{t-1} + \beta_2 EXR_{t-1} + \beta_3 TBR_{t-1} + \beta_4 RRR_{t-1} + \beta_5 MS\ t_{-1} + £_t \quad (2)$$

Where INF = inflation rate, ITR= interest rate, EXR= exchange rate as,

TBR= Treasury bills rate, and RRR =reserve requirement ratio, MS = money supply,

β_1- β_4 are regression coefficients of exogenous variables, while $£_t$ = Error Term.

5. Results

Table 1: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variables	Level			First Difference			Remarks
	t-Statistics	5% critical value	p-value	t-statistics	5%-critical value	p-value	
INF	-3.050	-2.955	0.0304	---------	--------	---------	I(0)
ITR	-2.767	-2.955	0.0632	-7.340	-2.958	0.0000	I(1)
TBR	-3.489	-2.955	0.0083	--------	--------	---------	I(0)
LRRR	-0.378	-2.955	0.9137	-5.202	-2.958	0.0000	I(1)
LEXR	-2.052	-2.955	0.2641	-5.470	-2.958	0.0000	I(1)
LMS	-2.455	-2.955	0.6557	-3.200	-2.958	0.0280	I(1)

Table 2: Philips-Perron Unit Root Test Results

Variables	Level			First Difference			Remarks
	t-Statistics	5% critical value	p-value	t-statistics	5%-critical value	p-value	
INF	-3.020	-2.955	0.0331	--------	--------	---------	I(0)
ITR	-2.704	-2.955	0.0734	-7.476	-2.958	0.0000	I(1)
TBR	-3.448	-2.955	0.0094	--------	--------	---------	I(0)
LRRR	-0.452	-2.955	0.9010	-5.203	-2.958	0.0000	I(1)
LEXR	-2.101	-2.955	0.2441	-5.458	-2.958	0.0000	I(1)
LMS	-1.231	-2.955	0.0707	-3.769	-2.958	0.0054	I(1)

Sources: **Researcher's computation from Stata 16**

Both ADF and PP unit root test as presented in table 1 & 2, showed that treasury bill rate (TBR) and inflation rate (INF) were stationary at level, whereas money supply (MS), interest rate (INT), exchange rate (EXR) and reserve requirement ratio (RRR) were stationary at first difference. These tests of unit root outcomes, actually confirms the presence of a different order of integration amongst the parameters of interest, Hence, Estat Ectest- Bound test is adopted to check for the existence of long run association amongest the parameters of interest.

Table 3: Bound Test Result

Kripfganz and Schneider (2020) critical values and approximate p-values **t = -6.310**			**F = 6.907**
10%	5%	1%	p-value
I(0) I(1)	I(0) I(1)	I(0) I(1)	I(0) I(1)
F 2.398 3.485	2.888 4.120	4.068 5.635	0.000 0.003
t -2.516 -3.629	-2.875 -4.048	-3.608 -4.897	0.000 0.000

Sources: **Researcher's computation from Stata 16**

Table 4 shows the existence of long-run relationship monetary policy instruments and economic expansion in Nigeria within the periods of the study as computed *F* value of (6.907) is bigger than 4.120 upper bound at 5% level of significance.

Table 4: ARDL Short-run Coefficients Test

Variable coef	**std. Err.**	**t-Statistic**	**prob**	**95%**
INF .6122863	.1530246	4.00	0.000 .2993157	.9252568
ITR -2.465666	.5476134	-4.50	0.000 -3.585661	-1.345671
TBR .110524	.6286824	0.18	0.862 1.396324	1.175276
LRRR -.255294	.1093185	-2.34	0.034 -.4883007	-.0222872
LEXR -10.9727	6.939879	-1.58	0.125 -25.16634	3.220947
LMS .4642958	.1115061	4.16	0.001 .7019654	.2266262
R^2 = 0.7389; Adj R^2 = 0.6744				

Sources: **Researcher's computation from Stata 16**

Table 5 illustrates the short-run coefficients test results of the ARDL model. The results indicated that interest rate (ITR) and reserve requirement ratio (RESR) with the coefficient of -2.465666 and -.255294 and p-value of 0.000 and 0.034 have negative impact on inflation rate in Nigeria, as well as significant in the short-run. Similarly, the coefficient of exchange rate (EXR) being -10.9727 with associate p-value of 0.125, implies negative association between exchange rate and inflation rate; but statistically not significant in the short-run in Nigeria. However, the coefficient of money supply (MS) being .4642958 with associate p-value of 0.001, implies positive association between money supply and and INF; and as well, statistically significant in the short-run in Nigeria. Similarly, treasury bill rate (TBR) being .110524 with associate p-value of 0.862, implies positive association between treasury bill rate and INF; but statistically not significant in the short-run in Nigeria. The above result shows that the R^2 is 0.7389, which implies that the model explains about 73.89% of the total variations in INF are explained by the independent variables during the period of the study.

Table 5: ARDL Long-run Coefficients Test Results

Variable Coef.	**Std.Err t-Stat**	**Prob**	**95%Conf.**	**Interval**
ECT -.9801553	.1553266	-6.31	0.000 -1.297834	-.6624767
ITR -2.026812	.8521972	-2.38	0.024 -.2838727	-3.769751
TBR 0.005255	.0051817	1.01	0.321 .0159741	.0054641
LRRR -.0413272	0146193	-2.83 0.013	-.0101668	-.0724876
LEXR -2.635483	1.191967	-2.21 0.043	-.0948656	-5.176187
LMS .6595432	.2242561	2.94	0.026 1.208278	.1108083

Variable Coef.	Std.Err t-Stat	Prob	95%Conf.	Interval
Cons 8.530587	1.56452	5.45	0.000 5.195891	11.86528

Sources: Researcher's computation from Stata 16

From Table 5 above, we observed that ECT value is -.9801553, and p-value being 0.000, shows significance at 5 percent critical value. It is also discovered in the result that interest rate (ITR), reserve requirement ratio (LRRR) and exchange rate (EXR) with the coefficient of -2.026812, -.0413272 and -2.635483 and p-value of 0.024, 0.013 and 0.043 have negative impact on inflation rate in Nigeria and as well, significant in the long-run. However, the coefficient money supply being .6595432 with associate p-value of 0.026, showed direct relationship between the supply of money and inflation rate and as well, significant in the long-run in Nigeria. Similarly, treasury bill rate (TBR) being .005255 with associate p-value of 0.321, implies positive association between treasury bill rate and INF; but not significant in the long-run in Nigeria.

6. Conclusion

From the time economics started, the desired goal of every sound government has been to achieve and maintain macroeconomic goals. These goal as we know include full employment, price stability, high and sustainable economic expansion. However, achievement of these objectives is not semiautomatic, but needs policy direction; and one of these policies is monetary policy with its working instruments. Hence, the study investigated the effect of monetary policy instruments on inflation rate in Nigeria for the period of 1981-2022. Autoregressive distributed lag (ARDL) model as a technique of analysis is utilized in the investigation since unit root test showed the existence of mixed order of integration. The variables modeled in the research include inflation rate (INF-dependent variable) and the independent variables include interest rate (ITR), exchange rate (EXR), open market operation proxied by treasury bill rate (TBR), reserve requirement ratio (RRR) and money supply (MS). The results estimated showed that rate of interest, reserve requirement ratio and exchange rate had inverse and significant effect on rate of inflation in Nigeria. The results also showed that the supply of money exerted direct and paramount impact onrate of inflation, both in short-run and long-run. Again, open market operation proxied by rate of treasury bill impacted positively and statistically insignificant on inflation rate in Nigeria. Consequently, the research hereby maintain that monetary policy instruments are very good measure towards the curtailing inflation rate in the country.

7. Recommendations

1. Since interest rate negatively and significantly impacts on inflation rate in Nigeria, CBN should liberalize interest rate such that will emasculate prime lending rate and thereby stimulating productive investment which will reduce inflation rate in Nigeria.
2. As exchange rate negatively and significantly impacts on inflation rate in Nigeria, Central Bank of Nigeria should come up with policy which has the ability of strengthening exchange rate so that it will emasculate inflation rate through investment in Nigeria.
3. Having found that open market operation proxied by treasury bill positively and significantly impacts on inflation rate in Nigeria, CBN should lessened her purchases so as to reduce excess funds that exacerbate aggregate demand in the economy
4. Since reserve requirement ratio negatively and insignificantly impacts on inflation rate in Nigeria, CBN should embark on policies that would increase the commercial bank reserve as that would increase the availability of fund to the domestic investors in the country.

As observed that the supply of money directly and significantly impacts on rate of inflation in Nigeria, CBN should maintain a contractionary monetary policy with the capacity to restrain too much supply of money, so as to mitigate rate of inflation in the country.

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