Monetary Policy Instruments and Economic Growth in Nigeria; Realities

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Abstract. This study empirically explored the impact of monetary policy instruments on economic growth in Nigeria from the period 1986 to 2018. Autoregressive distributed lag model (ARDL) was employed for the long run and short run dynamic relationship between each of the policy variables; Money supply, Interest rate and Exchange rate, and the target variable; Gross domestic product. The estimated long run model shows that log of money supply has a positive impact on the log of GDP, Exchange rate in its current period is inversely related to the target variable, while its one period lag positively impacts the target variable. Also, the Interest rate in its current value exerts a positive and significant impact on economic growth in Nigeria. Similarly, in the short run, one period lag of the target positively impacts its current value, while the Exchange rate in its current and one period lag, significantly, exerts a negative and positive impact on economic growth respectively. The error correction mechanism coefficient shows that the speed of adjustment of the variables to equilibrium in the short run is 19%. Therefore, the study concludes that monetary policy instruments are significant in explaining economic growth in Nigeria. Also, it is recommended that necessary measures should be taken by the monetary authority to ensure proper use of the instruments by maintaining favorable interest rate, exchange rate and money supply in to attain the desired level of growth in the economy.

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1. Introduction:

The central bank tries to maintain price stability through controlling the level of money supply. Thus, monetary policy plays a stabilizing role in influencing economic growth through a number of instruments. However, the scope of such a role may be limited by the concurrent pursuit of other primary objectives of monetary policy, the nature of monetary policy transmission mechanism, and by other factors, including the uncertainty facing policy makers and the stance of economic policies. Since sustained increase in price levels is adjudged substantially to be a monetary phenomenon, monetary policy uses instruments to effectively check money supply with a view to maintaining price stability in the medium to long term. Amassoma, Nwosa, and Olaiya, (2011) suggest that sustainable long term growth is associated with lower price levels. In other words, high inflation is damaging to long-run economic performance and welfare. Monetary policy instruments has far reaching impact on financing conditions in the economy, not just the costs, but also the availability of credit, banks' willingness to assume specific risks, etc.

The goals of every monetary policy instruments is to achieve maximum employment, stable prices and moderate long-term interest rates. By implementing effective monetary policy, the CBN can maintain stable prices, thereby supporting conditions for long-term economic growth and

Maximum employment. Monetary policy instruments can be classified into two categories. These include the quantitative tools such as open market operation (OMO), discount rates, cost tools, stabilization securities, direct regulation of interest rates, liquidity ratio, etc. The second category includes the direct tools; moral suasion, credit guideline and so on.

A successful implementation of any monetary policy regime requires an accurate and informed assessment of how fast the effects of policy changes propagate to other parts of the economy and how large these effects are. This requires a thorough understanding of the mechanism through which monetary policy actions and other forms of shocks affect economic activity. Specifically, such an understanding should provide an informed assessment of the channels through which monetary policy affects prices and economic activity. Abraduotoo, Amoah, & Bawumia, (2013) Most Centrals

Banks that have been successful at controlling inflation and stabilising output within their domestic economies have done so largely through an understanding of these mechanisms. The forward-looking aspect of monetary policy requires that monetary authorities have knowledge of where macroeconomic variables, such as inflation and output, are heading in the future so that policies can be engineered to attain desired objectives. Since the future is unknown, policy makers rely on forecasting models to gauge the future paths of economic variables. Bernanke and Mihov (1998) and Leeper, Sims, Zha, Hall, & Bernanke (1996) prefer to make the case for the choice of the monetary instrument used for intervention as the major determinant of the degree of impact. They both submit that the traditional approach of using changes in the money stock to stimulate or depress economic activity is inferior to the use of interest rates.

Central bank of Nigeria uses various instruments to achieve its stated objective and these include: open market operation (OMO), required reserve ratio (RRR), bank rate, liquidity ratio, selective credit control and moral suasion. There have been various regimes of monetary policy in Nigeria. Sometimes, monetary policy is tight and at other times it is loose, mostly used to stabilize prices. The economy has also witnessed times of expansion and contraction but evidently, the reported growth has not been a sustainable one as there is evidence of growing poverty among the populace. Therefore, the main thrust of this study is to evaluate the impact of monetary policy instruments on economic growth in Nigeria. Therefore, this study is divided into five sections. Following the introduction is section two which presents the literature review, section three involves the methodology, section four include the analysis, presentation and interpretation of regression result, while section five conclude the work.

From the previous works reviewed, Hayo, and Neuenkirch, (2014), Hayo, Kutan and Neuenkirch. (2015), Howells, .and Sellin, (2016), and Smales (2017) employed ECM to determine the long time effects of monetary policy on the economic. This technique performs better in measuring the relationship. One short-coming of the previous methodological approaches is that they only measure the contemporaneous effects of monetary policy instruments on the economic growth. The long-lasting effect is often ignored. To this end, this study will investigate both the short and long impact with variation in the methodology and data explored. Data for the study would be sourced from Central Bank of Nigeria statistical Bulletin of various years. Augmented Dickey-Fuller test (ADF) was used to ascertain the time series property. The nature of the order of integration of the dependent variable and the independent variables would us to the application of cointegration test. A long-run relationship between the variables would be established from the test. Bound test model would be employed.

The broad aim of this research is to empirically assess impact of monetary policy instruments on economic growth in Nigeria (1986-2018). Other, specific objectives of the study include; To investigate the impact of money supply policy instruments on economic growth in Nigeria, access the impact of exchange rate on economic growth and to examine the impact of interest rate on economic growth in Nigeria

2. Literature Search:

Einsig (1954), "monetary policy includes all monetary decisions and measures irrespective of whether the aims are monetary or non-monetary, and all monetary decisions that aim at affecting the monetary system." (Einsig, 1954). Patat (1987) sees monetary policy as work which is used to control the money supply by the central bank as a tool to achieve the objectives of economic policy. The importance of monetary policy that aims to achieve the important objective of the economies is to maintain monetary and economic stability by maintaining stability of the general price level and the stability of the exchange rate of the local currency, monetary policy enhances the economic growth thus the economic development as well. In addition, monetary policy maintains the soundness of banks and contributes to achieving the desired balance of payments.

Glahe (1977), monetary policy relationship with economic growth and price level has been discussed with great interest by various schools of economic thought. The Keynesian school assumed that monetary policy affects income via interest rate tool and investment only, but a number of economists considered that it is a limited vision, for example, the pioneers of the New-Keynesian theory think that the changes in interest rates caused by changes in money supply in the market are the basis for monetary policy. According to this theory, the initial impact of monetary policy would be on the capital goods industry, and these changes result in changes in consumption and income through investment multiplier (Glahe, 1977).

Uchendu (1995) viewed monetary policy as the adjustment of money stock through various means (interest rates and exchange rates) as well as expectations to influence the levels of economic activities and inflations in a desired direction. By implication, this means that there are transmission channels and mechanisms by which monetary influence the desired targets. CBN (1996) defined monetary policy as the combination of measures designed to regulate the value, supply and cost of money in an economy, in consonance with the expected level of economic activities. While Sanusi (2000) simply put monetary policy as being about money, how much of it is issued, how to maintain its value, and the health of the financial system. Recent definitions of the concept include the following:- Blanchard O. (2009) explained monetary policy as "the use of money stock by the Central Bank to affect the interest rates, and by implication economic

activity and inflation". Dewitt K. et al (2010) view monetary policy "as conscious policy of Central Bank with the sole objective of achieving certain desirable effects on the economy and to avoid

2.1. Credibility of Monetary Policy:

The issue of credibility in policy is said to centre on the perception of economic agents as regard to the commitment of policy makers to declared policy goals and objectives. It is considered relevant in a world where expectation formation is vital to policy effectiveness. The importance of credibility in government policy can be found in the concept of credibility effect which holds that anti-inflation policy will be more effective and necessitate less severe recession if economic agents believe policy makers to be committed to tight money and fiscal restraint (Anyawu and Oiakhenan, 1995).

The extent to which markets perceive a monetary authority to be credible, determines greatly whether its communication signals are capable of influencing private agents' expectations. For instance, the communication signal of a central bank which the market believe to be less credible can exert only little or no influence on private agents' expectations.

The concept of credibility of policy in economics was first identified by Fallner (1976, 1979) as noted in McCallum (I984). Ever since, the concept has come to be used and applied differently at different times. In particular, the concept of credibility of policy has come to be misunderstood with the credibility of announcement (McCallum, 1984). According to Howells and Mariscal (2013), credibility of monetary policy refers to the extent to which private agents believe in central bank's future pronouncement and consequent policy actions. On the basis of this definition, a monetary authority lacks credibility when it is unable to carry out it pronouncements when due. This suggests that credibility of monetary policy was misunderstood lore credibility of announcement (see McCallum 1984).

2.2. Empirical Review:

Martins (2018) carried out research on potency of monetary policy instruments on economic growth of Nigeria. The incapability of the monetary policies to efficiently and effectively exploit its policy objective could be a function of pitfall of policy instruments adopted which restricts its contributions to economic progress in Nigeria. It is on this premise we explore the potency of monetary policy instruments on economic growth in Nigeria between year 2000 and 2015 with time series data. The study engages Johansen multivariate co-integration approach and Vector Error Correction Model (VECM) after all the variables were confirmed stationary at first difference and integrated at similar order I(1) using ADF, PP test and confirmatory technique of KPSS test .The Co-integration measure establishes existence of long-term relationship between monetary policy instruments and economic growth. Also reveal was a low monthly speed of adjustment of the variables towards their long-run equilibrium path to the tune of 27% approximately .The major discovery of this work discloses that Consumer Price Index (CPI) , Real Exchange Rate, Money Supply (M2) and Interest Rate are significant monetary policy instruments that propelled economic growth in Nigeria during the year under review. Based on the outcomes, we therefore recommend inflation targeting which will not only assist in proper monitoring of money supply but will also boost the overall growth in the economy. Also Domestic production of exportable commodities should be promoted via deliberate policy measure by the Nigerian government so as to ensure stability in real exchange rate and positively contribute to the Nigerian economic growth and create steady path for development.

Rami and Bassam (2017) measured the effect of monetary policy instruments on the performance of Jordanian economy. Using quarterly data covering the period (2005-2015), an econometric model was examined using Vector Error Correction Model to assess the impact of monetary policy instruments on economic growth. The foremost advantage of VECM is that it has a nice interpretation of long-term and short-term equations. The results showed the existence of positive long-term and short-term effects of monetary policy instruments on the growth of real GDP. The model included three monetary policy instruments besides money supply. They are required reserve ratio, rediscount rate and overnight interbank loan rates as dependent variables, and the real GDP growth as a dependent variable. The stationarity of the model time series was addressed. In addition, the stability of the model was tested using stability diagnostics tools. The results showed also an existence of inverse relationship between rediscount rate and economic growth in Jordan over both long and short terms.

Frederick, (2017) seeks to establish the possible effect of monetary policy on prices in Ghana, examining the role of other intervening variables such as interest rate, exchange rate and household consumption expenditure. It uses annual time series data in Ghana from 1975 to 2016 and adopts the Vector Autoregressive Frameworks with VECM and Granger causality techniques. The study found an evidence for the existence of cointegrating relationship among the variables used in the study. The estimated model revealed that monetary policy rate, exchange rate, money supply, output and government expenditure is significant in explaining inflation in the long-run but in the short-run monetary policy rate influences inflation positively and significantly. Granger causality test confirm that monetary policy rate have no reverse causality with any variable in the study even though it has a uni-directional causality running itself to consumer prices and exchange rate. From the above, the study recommends that policy variables such as monetary policy rate have significant impact on price

hence much attention should be given to the MPR such that its fixing will have the desired results that is expected to meet its final goal to ensure price stability. Also, the Government of Ghana could focus on investment and infrastructural development to help boost economic activity which will promote output and decline in price growth since it was evident that the magnitude of the contribution of government expenditure to price changes was very huge in the long run.

3. Theoretical Framework:

The study adopted various combinations of theories on demand and supply of money as expressed by the classical school (Sir. Irving fisher), the monetarist (Milton Friedman) Keynesian monetary theory (John Maynard Keynes), and the Cambridge school (Pigou & Alfred Marshall).

3.1. The Classical Monetary:

Viewed that change in the money supply does not affect the real variables like output, employment and income instead, they believed that money is neutral in its effects on the economy. The quantity theory of money, which was developed by the classical theorist to justify the existence of a relationship between money supply and price level, it was first proposed by 5classical economists of 18 century such as Adam smith and David Hume. In 1911, the quantity theory was modified by the great American economist by name Irvin fisher (1867- 1947) and by great economist Alfred Marshal (1882 – 1924). The analysis is based on the direct relationship between money supply and prices. The quantity of money states that the price level is strictly proportional to the money supply. That is according to them if the quantity of money is raised, the price level will equally rise in the same proportion using the Irvin Fisher`s version through his popular equation approach to the theory. It can be explains in terms of the following equation;

MV = PT

Where: M = total amount of money supply
V = velocity of money in circulation
P = General Price level
T = Real output or volume of all market transaction during a period.

The term velocity of money in circulation refers to the average number of times a unit of money is spent during the year on a final goods and services. Therefore, `V` can be defined as the ratio of nominal GNP to money supply. The theory concluded that doubling the money stock will lead to doubling of price level. It is broadly observing that money moves prices rather than output in the economy in the long term is widely accepted. The controversies in monetary theory and policy have centered on what has come to call the transmission mechanism, the channel by which money supply influences economic activities.

3.2. The Monetarist Theory:

The monetarist hold that transmission by which changes in the money supply cause changes in aggregate demand or expenditure and prices, interest rates and other economic variables is essentially a portfolio adjustment process. The economy comprises of individuals, households and firms who hold their wealth in the form of portfolios of assets. These assets are financial and non-financial which include money, securities, durable and semi- durable goods and services. According to the Monetarists, any change in the money supply causes disequilibrium between the public`s actual and desirable real cash balances of assets in their portfolios. That is if money supply is raised, this increases the cash balances with the public. This in turn will make people to reduce their excess cash balances in the acquisition or purchases of bonds, shares, goods and services. The relative prices of assets are always changing in response to shifts in the spending patterns of the people caused by changes in the money supply Liquidity effect. Finally, there is the price expectation effect, which occurs due to the expectation of inflation will continue. The short run liquidity effect brings a reduction in interest rates and both the output and price expectation effects increase the interest rates. In addition, this will discourage investment and reduce output and employment.

3.3. Keynesian Theory:

The Keynesian theory is based on the presence of unemployment equilibrium in the economy and the issue of short run assumption. The Keynesian analysis believed that there are three motives for holding money; precautionary, transactions, and speculative. The demand for precautionary and transactions motives are determined by the level of income and that of speculative motives is determined by the interest rate. The demand for money is a decreasing function the interest rate given the level of national income. The higher the interest rate the lower the demand for money and vice – versa. This shows that there is a negative relationship between the interest rate and the demand for money, which provides link between changes in the money supply and the aggregate variables of the economy.

The Keynesians are also on the opinion that money financial assets (bonds) are good substitutes. A small change in the interest rate will result to an increase in the price of bonds or securities, which will induce people to sell bonds and hold more money for speculative purposes.

According to Cambridge version, posits that the amount of money that a society holds is “identical” to a fraction, K, of value of total transactions planned. This yields the famous Cambridge equation M = KPT. The main propelling developing the cash balances or Cambridge equation approach was to integrate the theory of money with the theory of value, the Cambridge version approach , representing the neo-classical quantity theory of money,

and its cash balance version associated primarily with the names of Warals, Marshal, Wicksell, and pigou – neo classical theory assumed that for their convenience, individuals wish to hold a certain proportion, k, of the real volume of their planned transaction, T, in the form of real money balances.

The demand for these balances thus equals KT. Correspondingly; the demand for nominal money balances is KPT where P is the price level of the commodities transacted. The equation of this demand to the supply of money, M, then produced the famous Cambridge equation M = KPT.

Keynes in contradiction to the classical economists emphasized that because wages and prices are rigid, the economy will not always be at the full employment level, thereby creating a role for monetary policy. According to Cambridge version when money supply increases it has a positive effect on the price level (Pigou 1947). This what the monetarists refer to as inflation. Monetarists stress that there is a positive correlation between money supply and price levels (inflation) Friedman & Schwartz (1963).

Modifying the classical quantity theory of money, the Keynesian believes that money supply through its transmission mechanism affects the real GDP indirectly. Monetarists while agreeing to Keynes that in the short run economy does not operate at full employment therefore expansionary monetary policy may work positively in the long run they support classist that rising money supply will increase inflation only. Therefore, they suggest that the policy must accommodate increase in real GDP without changing price level. (Lan, 2008). Most of the modern economists are of the view that long run growth depends upon enhancement of productivity, if an appropriate monetary policy is supplemented by external environment of suitable liquidity, interest rate, robust demand, soft assistance from world Bank of the financial institutions and debt rescheduling would lead to sustainable economic growth in the long run (Laurence, 2001; Bernanke, 2003).

Monetarists such as Friedman (1968) believed that the monetary authority should avoid major monetary shocks to the economy, suggesting a rule in which the quantity of money growth at constant rate sufficient to accommodate trend productivity growth. Keynesian economists

Believed that a monetary expansionary stimulates economic development and employment, even if it leads to a higher inflation. The research seeks to adopt these theories as normally used by other research works.

4. Methodology:

Traditionally, for a time series, study secondary data is normally employs to establish the necessary link or otherwise among the variables of interest; hence, this study followed the same step. The data is going to be sources from the National Bureau of Statistics (NBS) publications, Central Bank of Nigeria (CBN) Annual Report and Statistical Bulletin, World Bank and International Financial Statistics (IFS) of the IMF. Therefore, the research aims to empirically examine the monetary policy instruments on their impact on economic in Nigeria from 1986 to 2018.The study chooses ordinary least square method of analysis (OLS) tentatively. However, diagnostic checks of the time series properties of the data, like unit root test, was carried out with a view to determining the order of integration of the data used. If the variables of interest are found to be co-integrated, an error correction (ECM) test was also employed to supplement the long-run relationship, otherwise, vector autoregressive model (VAR) will be adopted to analyze the short run dynamics among the variables. Post estimation like serial correlation and heteroscesdascity test was also adopted in order to ensure the robustness of the model

4.1. Model Specification:

$$GDP = f(MS, EXR, \&INT) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

GDP is Gross Domestic Product, MS is Money Supply, EXR is Exchange Rate, INT is Interest Rate.

Equation 3.1 can be put in its econometrics form as given below;

$$GDP = \beta_0 + \beta_1 MS + \beta_2 EXR + \beta_3 INT + \mu \ldots\ldots\ldots\ldots (2)$$

Where μ is the error term.

β_0 is the constant term;

β_1 - β_6 are coefficient of the variables.

4.2. ARDL Co integration Approach:

$$\begin{aligned}\Delta GDP_t = {} & \beta_0 + \beta_1 GDP_{t-1} + \beta_2 MS_{t-1} + \beta_3 EXR_{t-1} \\ & + \beta_4 INT_{t-1} + \beta_5 \Delta GDP_{t-i} + \beta_6 \Delta MS_{t-i} \\ & + \beta_9 \Delta EXR_{t-i} + \beta_{10} \Delta INT_{t-i} \\ & + \mu_t \ldots\ldots\ldots\ldots (3)\end{aligned}$$

Where; Δ is the first-difference operator, and β's shows the long run coefficients and short run coefficients. Hence, the null hypothesis (H_0) of no cointegration states that, H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$ and the alternative hypothesis of existence of cointegration state that; $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10} \neq 0$.

We test the formulated hypothesis by relating the computed F-statistic with critical values as given in (Narayan, 2005) specifically designed for small sample sizes of between 30 and 80 observations on the assumption that all variables in the model are I(0) on one side and that all the variables are I(1) on the other side. Following the norms of hypothesis testing, if the

calculated F-statistic exceeds the upper critical bounds value, then the H_0 is rejected and we accept H_1, while if the F-statistic falls within the bounds then the test is inconclusive and lastly if the F-statistic falls below the lower critical bounds value, it implies that there is no co-integration.

With cointegrated variables, causal relations among variables can be examined within the framework of ECM (Granger, C.W.J., , 1988). This presents both the short run and long run relationship among the variables. The individual coefficients of the lagged terms explain the short-run dynamics in the model, while the error correction term (ECT) present the information of long-run relationship. In the same vein, the significance of lagged explanatory variable depicts short-run causality while a negative and statistical significant ECT is assumed to signify long-run causality. The short-run causality model from the ARDL model is presented in equation .4;

$$\Delta GDP_t = \beta_0 + \beta_1 GDP_{t-1} + \beta_2 MS_{t-1} + \beta_3 EXR_{t-1} + \beta_4 INT_{t-1} + \rho ECM_{t-1} \dots\dots\dots\dots (4)$$

Where, Δ is the difference operator, ECM represent the Error Correction Term (ECT) derived from the long-run cointegrating relation from specified ARDL models equation .3. In equation .4, ρ should exhibit a negative and significant sign for causality to exist in the long run.

Lastly, the stability of the model is tested using the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests. This is based on the assertion of Narayan (2005) who maintained that, after the error correction models have been estimated, (Pesaran, M.H. and Pesaran, B. , 1997) suggest applying the cumulative sum of recursive

4.3. Granger Causality Test:

$Y_t = \alpha_o + \alpha_{1\Sigma} y_t + \dots + \alpha_{2\Sigma} y_{it} + \beta_{1,\Sigma} x_{i,t} + \dots \beta_{2,\Sigma} x_t + \varepsilon_{i,t} \dots\dots\dots (5)$

4.4. Error Correction Model:

Error correction model is specified as

$$\Delta y_t = \alpha_o + \beta_1 \Delta X_1 - \pi \hat{U}_{t-1} + \varepsilon_t (6)$$

Where β_1 is the impact multiplier (short run effect) that measure the immediate effect on change in X_1 will have on achange in y_t on the other hand π is the feedback effect or adjustment effect, and how much of the disequilibrium being corrected.

4.5. Measurement of the Variables:

Exchange Rate (EXRATE): This is the official nominal exchange rate. It is defined as the value of one country`s currency in terms of another (foreign) currency. This variable is included in the model to express the strength of the current on monetary policy among some selected West African states. For this study, the exchange rate of the country understudy to the US dollar (yearly rate) will be used to represent the exchange rate.

Interest Rate (INTRATE): Interest rate is the amount changed, expressed as a percentage of per capita, by a lender to a borrower for the use of assets. The asset borrowed includes cash, consumer goods and large assets, such as vehicles or buildings. Interest rate is essentially a rental or leasing charge to borrowers for the asset`s use. In the case of substantial assets, like a vehicle or building, the interest rate is sometimes, known as the lease rate. When borrowers are a low risk party, they usually charged a low interest rate; if the borrower is, considered high risk, the interest rate that they charged will be higher.

GDP; gross domestic products, this is the value of goods and services produce in an economy within a period of one year (annually)residuals (CUSUM) and the CUSUM of the square (CUSUMSQ) tests to assess the parameter constancy.

5. Analysis and presentation of Result:

We present, analyze and interpret the results and findings of our study. We present and interpret the results of the line graphs on the different series. Summary statistics on the series, unit root test, ARDL Co-integration and the ECM model results are also presented, interpreted and analysed. The Post-estimation test was also carried out to ensure that our model does not suffer from serial correlation, heteroscedasticity and others.

5.1 Descriptive Statistics:

Table 5.1: Summary Statistics

	GDP	MS	EXR	INTR
Mean	31721.53	5931.465	101.8545	18.97636
Median	11332.25	1505.964	118.6000	17.98000
Maximum	127762.5	25079.72	306.1000	29.80000
Minimum	202.4362	23.80640	1.800000	13.54000
Std. Dev.	38875.29	7805.683	85.97888	3.428598
Skewness	1.085134	1.135610	0.662236	1.503045
Kurtosis	2.843531	2.910403	2.903149	5.112065
Jarque-Bera	6.509998	7.103897	2.424959	18.55892
Probability	0.038581	0.028669	0.297459	0.000093
Sum	1046811.	195738.4	3361.200	626.2200
Sum Sq. Dev.	4.84E+10	1.95E+09	236555.8	376.1692
Observations	33	33	33	33

Table 5.1 shows the descriptive statistics of the GDP, Money supply, Exchange rate and Interest rate data in Nigeria from 1986 to 2018, and the total number of observations for each variable is 33. The variable with the highest mean value is GDP, and Money supply follows, then Exchange rate and Interest rate respectively. GDP, Money supply and exchange rate appear to be mesokurtic

– their Kurtosis values are less than three (3), while only Interest rate is platykurtic given that its Kurtosis value is greater than three (3). The Jarque-Bera test shows that GDP, Money supply and Interest rate are not normally distributed given that their probability values are significant at 5% level, while exchange rate only shows normality in its distribution over the 33 periods of observation as its JB probability is not significant at 5% and even at 10%.

overestimate the number of lags to be included, which is not favorable in small samples as by increasing the lag the number of observations decrease. But from our observation, it is apparent that we are not dealing with small samples as our number of observations is above 30. Thus, in order to establish a coherent model based on our sample size, the AIC criterion will be used to govern the lag length for the ARDL model.

Table 5.2 Unit Root Test

Variables	**Augmented Dickey-Fuller (ADF) Test**			**Phillip-Perron (PP) Test**		
	At Level	At First Difference	Order	At Level	At First Difference	Order
LGDP	-3.720387***	-2.994700***	I(0)	-3.305926***	-2.967059***	I(0)
LMS	-2.490854	-3.579066**	I(1)	-2.490854	-3.576145***	I(1)
EXR	1.307002	-3.977775**	I(1)	1.059238	-3.928085***	I(1)
INTR	-4.179252***	-4.826944***	I(0)	-4.384002***	-10.33843***	I(0)
Asymptotic Critical Values						
1%	-3.484198	-3.484198		-3.484198	-3.484198	
5%	-2.885051	-2.885051		-2.885051	-2.885051	
10%	-2.579386	-2.579386		-2.579386	-2.579386	

* represents significance @10% level and

** represents significance @5% level, while

*** represents significance @1%. Source: Author's computation, 2020.

Table 5.2 reveals the stationarity properties of each variables under study using Augmented Dickey-Fuller and Phillip-Perron methods. The output show the suitability of Autoregressive Distributed Lag Model (ARDL) as the appropriate long-run cum short-run regression method of analysis for this study as their stationarity properties reveal mixture of I(0) and I(1) i.e they are either integrated of order zero(0) or integrated of order one(1). Contrary to the orthodox methods of Johansen's test (Johansen 1991), and Vector Autoregression, in this case, ARDL technique of regression analysis can be employed to explore the long-run and short-run relationship in the dynamic model, having explored and satisfied the stationarity requirement of the explicative and dependent variables. We can therefore proceed to exploring if long-run relationship is established among the variables by conducting the F-Bounds Test for cointegration. The result of ARDL Long run Bounds Test is also presented in table 5.3.

5.2. Lag Selection

Similar to the unit root test in 4.3, the lag selection is important as it determines the results of the model. Several methods can be used to obtain the optimal lag for each variable. However, it is worthy of note that the SIC criterion provides slightly better estimates than the AIC criterion in small samples in the ARDL framework (Pesaran & Shin 1998). The AIC criterion also tends to

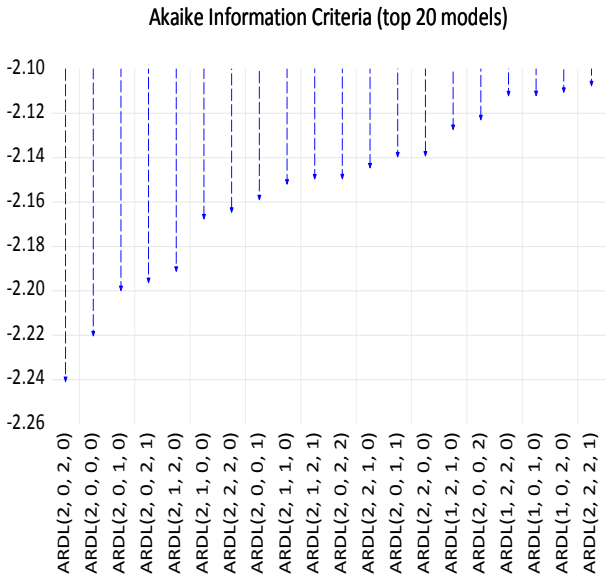


Figure 5.2. Lag selection criteria.

The AIC information criterion presented in Figure 5.2 reveals that the optimal lag for our ARDL model is (2, 0, 2, 0). However as noted by Pesaran et al. (2001) serial correlation as well as heteroskedasticity, misspecification and non-normality should not be present, hence the lag length may be adjusted for the possible biases in order to

capture the effects of the explanatory variables on the target variable.

5.3 ARDL F-Bounds Test for Co-Integration Analysis:

When one cointegrating vector exists, Johansen and Juselius(1990) cointegration procedure cannot be applied. Hence, it become imperative to explore Pesaran and Shin (1995) and Pesaran et al (1996b) proposed Autoregressive Distributed Lag (ARDL) approach to cointegration or bound procedure for a longrun relationship, irrespective of whether the underlying variables are I(0), I(1) or a combination of both. In such situation, the application of ARDL approach to cointegration will give realistic and efficient estimates. Unlike the Johansen and Juselius (1990) cointegration procedure, Autoregressive Distributed Lag (ARDL) approach to cointegration helps in identifying the cointegrating vector(s).

A hypothesis test for each long-run coefficient will also be conducted to evaluate which of the indicators that have a significant relationship. As done in previous research, to reject or fail to reject the null hypothesis, the critical values, as used in Pesaran et al. (2001) will be followed. If the F-statistic falls above the critical values, we assume that there is a long-run relationship between the variables. If it falls below, we reject the notion of a long-run relationship and if it is in between we assume the result is inconclusive using the F-bounds test, therefore for further confirmation, we can result to using t-ratio.

Table 5.3: ARDL F-Bounds Test for Co-Integration Analysis

F = 6.323272	K= 3	Null-Hypothesis: No long-run relationships exist.
Critical Value	Lower Bound	Upper Bound
1% 5% 10%	2.37 2.79 3.65	3.2 3.67 4.66

Source: Author's Computation Using Eviews software, version 11, 2020.

Table 5.3 shows the computed F-statistic: 6.323272 (Significant at 0.01 marginal values with 3.2 as upper bound value). Following the position of Pesaran *et al.* (2001), the F-test is greater than the upper bound values at 1%, 5% and 10% respectively. The result therefore neglects the null hypothesis that there exists no long-run relationship among the variables under consideration. The result also validates the output of estimated ARDL long-run model in this study.

5.4. Estimation of Long-run and Short-run ARDL Model

5.4.1: Estimated ARDL Long-run Model

Table 5.4.1 Estimated Long-Run ARDL Model

Estimated Long-Run Outputs of ARDL (2, 0, 2, 0) Based on AIC suggestion				
The regress and is ***LGDP***				
Regresor	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$LGDP_{t-1}$	1.163592	0.176187	6.604310	0.0000***
$LGDP_{t-2}$	0.355480	0.159816	2.224308	0.0362**
LMS	0.190477	0.080926	2.353714	0.0275**
EXR	-0.002211	0.000822	-2.689220	0.0132**
EXR_{t-1}	0.002324	0.001221	1.903405	0.0696*
EXR_{t-2}	-0.001605	0.001004	-1.599541	0.1233**
$INTR$	0.012253	0.004965	2.468178	0.0214**
C	0.302140	0.295999	1.020748	0.3180
R^2 = 0.998910 F- stat. (Prob.) = 3012.091(0.000000)				
Adjusted R^2 = 0.998579				
S.E. of regression = 0.070820				
Diagnostic Tests				
Test Statistics				**LM Result**
A. Serial Correlation		X^2_{auto}		= 0.037162(0.9636)
B. Functional Form (Ramsey Reset)		X^2_{RESET}		= 4.671079 (0.0918)
C. Normality		X^2_{Norm}		= 10.70351 (0.004740)
D. Heteroscedasticity		X^2_{Het}		= 0.557598 (0.7820)

Source: Author's computation Obtained from E-views software, version 11, 2020)

Note: ** and * indicate significance at 1% and 5% level of significances. Figures in parenthesis are probability values. A is Breusch-Godfrey Serial Correlation LM Test, B is Ramsey's RESET test, C is Normality Test, D is Heteroscedasticity test.

Table 5.4.1. reveals the results of the estimated long-run coefficients of the of ARDL (2,0,2,0) on the impact of monetary policy instruments on economic growth in Nigeria. The explicative variables are; LMS (log of money supply), Exchange rate, Interest rate and the lag values of the dependent variable. A percentage increase in one period lag and two-period lag of LGDP leads 1.163592% and 0.355480% change in the current value of LGDP at 5%

level of significance. Also, a percentage increase in log of money supply (LMS) brings about 0.190477% increase in LGDP, while a unit increase in EXR and EXR(-1) bring about -0.002211%, 0.002324% change in LGDP at 5% and 10% level of significance respectively. Lastly, a unit increase in INTR leads to 0.012253% increase in LGDP at 5% level of significance.

However, the value of R^2 which is 0.998910 implies that 99% of variation in the LGDP is explained by the explicative variables, and after taking the degree of freedom into consideration, the value of adjusted version of R^2 is also 0.998579 which also implies that 99% of variation in the target variable is jointly explained by the independent variables. This reveals a good model specification and shows the relevance of these features in determining the behaviour of the explained variable. Furthermore, the value of F-statistic and its probability is 3012.091 and 0.000000 respectively, this result indicates that the model exhibit a good fit given that the F-stat value is high and the probability value statistically significant at 1% level, therefore, the model is jointly significant in determining the target variable, and also, it is reliable for economic analysis prediction for policy purpose.

The post estimation results of the diagnostic checks also reveal a good status of model specification, absence of serial correlation, and heteroschedasticity, but the variables are not normally distributed. Breusch-Godfrey Serial correlation test is 0.037162(0.9636), Ramsey reset test is 4.671079(0.0918), Heteroschedasticity test is 0.557598(0.7820), while Jarque-Bera Normality test is 10.70351(0.7820).

Table 5.4.2 Estimated Short-Run ARDL Model

Estimated Sort-Run Outputs of ARDL (2, 0, 2, 0) Based on AIC suggestion				
The regressand is *LGDP*				
Regressor	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$D(LGDP_{t-1})$	1.163592	0.176187	6.604310	0.0000***
D(*EXR*)	-0.002211	0.000822	-2.689220	0.0132**
$D(EXR_{t-1})$	0.002324	0.001221	1.903405	0.0696*
ECT(-1)	-0.191888	0.031497	-6.092197	0.0000***

Source: Author's computation Obtained from E-views software, version 11, 2020)
Note: ** and * indicate significance at 1% and 5% level of significances.

5.4.2: Estimated ARDL Short-run Model:

Table 4.5.2 is divided into two parts which show the short-run dynamic result of the impact of the monetary policy instruments on economic growth in Nigeria, and the error correction mechanism that reports the speed of adjustment to equilibrium. In the first part, the specified regressors are $D(LGDP_{t-1})$, D(EXR), $D(EXR_{t-1})$. A percentage increase in one period lag of the dependent variable in the short run leads to 1.163592% percentage rise in the dependent variable at 1% level of significance. Also, a unit rise in the value of Exchange rate and its one period lag leads to -0.002211% and 0.002324% change in

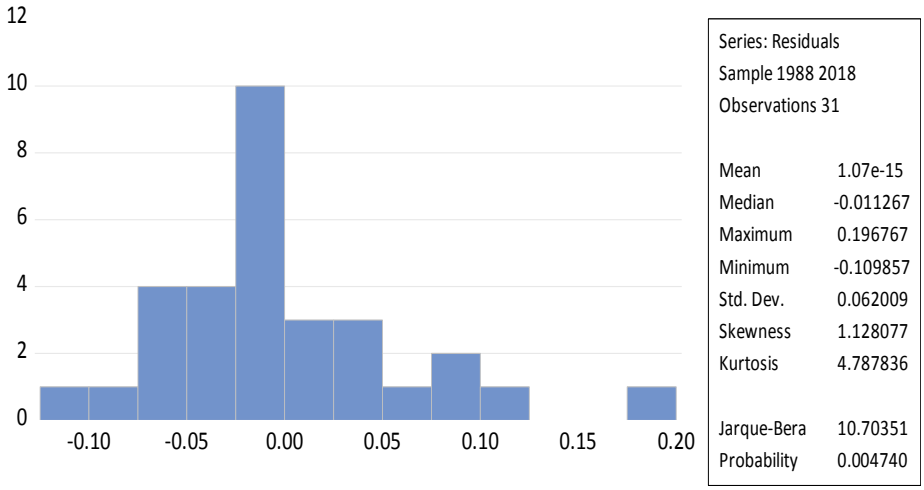


Figure 5.4.1. Normality Test

the target variable, LGDP. It shows that exchange rate in its current period is inversely related to the dependent variable and it's statistically significant at 5% level, while its one period lag is positively related to the economic growth, although its significant at 10% level.

The second part of the results in table 4.5.2 reveals the error correction mechanism. The coefficient of the ECT(-1) is -0.19188, and it implies that the speed of adjustment of the variables of interest in this study back to equilibrium after divergence is 19%. The negative status of the ECT(-1) value approves its validity and reliability for prediction and policy purpose.

5.4.3: Stability Test

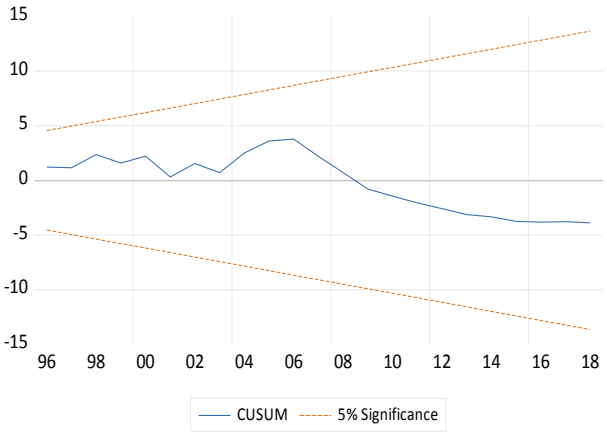
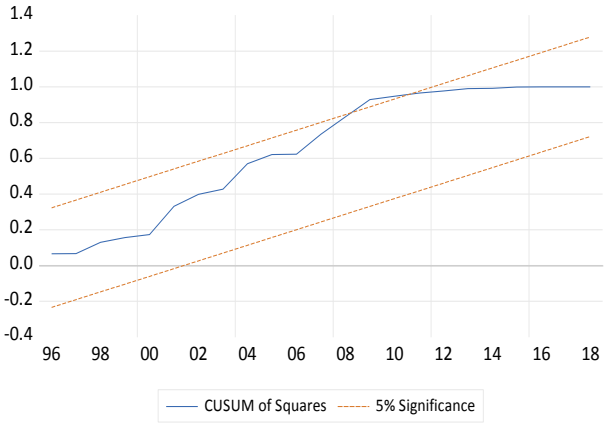


Figure 5.4.3. (A). CUSUM Test



5.4.3 (B). CUSUM of Squares Test

In accordance with Pesaran and Pesaran (2009), who stresses the need to analyze the stability of the long-run coefficients in conjunction with the short-run dynamic model, the cumulative of the recursive residuals (CUSUM) as well as the cumulative sum of squares of recursive residual (CUSUMQ) were investigated empirically. These are graphically represented in Figures 4.5.3 (A) and (B) which portray the plots of CUSUM and CUSUMQ test statistics as resting neatly within the boundaries at 5% significant level. Hence, this confirms the stability of the long-run coefficient of monetary policy instrument with respect economic growth in the ARDL model (Adekoya & Abdul Razak, 2017; Pesaran & Pesaran 2009).

6. Interpretation of Results and Discussion of Findings:

Having estimated the long run and short run dynamic model of the impact of monetary policy instruments on economic growth in Nigeria, the long run estimated results show that the one period lag and two-period lag as the autoregressive features in the model are positively and significantly related to the target variable in its current value. Log form of money supply also shows a positive and significant relationship with the target variable over the years under examination. Exchange rate as part of the explicative variables take the form of two lags, its current value is inversely related to the economic growth, while one period lag is positively related to the economic growth at 10% level of significant. In other words, the contemporaneous value of exchange rate has negative impact on economic growth, while its lag value, specifically, one period lag has positive impact on economic growth in Nigeria. Also, the interest rate as a selected monetary policy instrument exerts positive and significant impact on economic growth in Nigeria. The possible reason for the increase or positive sign in the supply of money could be a ploy by the CBN to deliberately stabilize price within the economy (i.e loose monetary policy). The Negative association recorded between exchange rate and economic growth could possibly be attributed to the treat of currency substitution, fiscal dominance and political influence in Nigeria among others.

In the short run, one period lag of the target variable exerts positive impact on it current value, while the current value of exchange rate is inversely related to the target variable, but one period lag of exchange rate is positively and significantly related to the economic growth, which is in line with the results obtained in the long run dynamic estimation. Also, importantly in the short-run, the error correction mechanism shows that the speed of reversion of the variables under study back to position of agreement is 19%, this is a relatively low percentage but yet, it assures and confirms the long run report of cointegration among the dependent and explicative variables.

The value of R^2 which is 0.998910 implies that 99% of variation in the target variable is explained by the policy variables, and after taking the degree of freedom into consideration, the value of adjusted version of R^2 is also 0.998579 which also implies that 99% of variation in the target variable is jointly explained by the independent variables. This reveals a good model specification and shows the relevance of these features in determining the behaviour of the explained variable. Furthermore, the value of F-statistic and its probability is 3012.091 and 0.000000 respectively, this result indicates that the model exhibit a

good fit given that the F-stat value is high and the probability value statistically significant at 1% level, therefore, the model is jointly significant in determining the target variable, and also, it is reliable for economic analysis prediction for policy purpose.

7. Summary:

This research work has explored the impact of monetary policy instruments on economic growth in Nigeria between the period of 1986 and 2018. The target variable in the study is Gross domestic product, while the policy variables are; Money supply, Exchange rate and Interest rate. As a requirement, stationarity properties of the variables were examined through the Augumented Dickey-Fuller (ADF) and Phillip-Perron (PP) methods of unit root test, and the result in both cases show that the variables are either stationary at level or first difference i.e, they're mixture of I(0) and I(1). A further examination on cointegration was conducted and the ARDL F-Bounds test reveals that the variables are cointegrated i.e they exhibit a long-run relationship which was also confirmed by the ECT(-1) coefficient.

The long-run ARDL estimation shows that money supply in its current value is positively and significantly related to the target variable, Exchange rate is inversely related to the target variable, while its one period lag shows a positive impact on economic growth, and interest rate, over the years under consideration exerts positive influence on economic growth in Nigeria. Also, in the short run, similar result was obtained as exchange rate in the current period hampers growth, but its one period lag promotes economic growth. The error correction mechanism denoted by ECT (-1) shows that 19% is the speed of adjustment of the variables to the equilibrium. The coefficient is negative and that confirms the suitability of the specified model for prediction and policy application in Nigeria.

The value of R^2 which is 0.998910 implies that 99% of variation in the target variable is explained by the policy variables, and after taking the degree of freedom into consideration, the value of adjusted version of R^2 is also 0.998579 which also implies that 99% of variation in the target variable is jointly explained by the independent variables. This reveals a good model specification and shows the relevance of these variables in determining the explained variable. Also, the value of F-statistic and its probability is 3012.091 and 0.000000 respectively, this result indicates that the model has a good fit given that the F-statistic value is high and the probability value statistically significant at 1% level, therefore, the model is jointly significant in determining the target variable, and also, it is reliable for economic analysis prediction for policy purpose.

8. Conclusion:

The role of the Central bank in regulating the liquidity of the economy which affects some macroeconomic variables such as the output, employment and prices cannot be over-emphasized. The Central Bank of Nigeria over the years has adopted different monetary policy management techniques to keep the economy in a stable state. Before the structural adjustment of 1986 which ushered in a period of financial deregulation, it adopted a system of direct control through the issue of credit guidelines and interest rate fixation but from the later part of the 1980s, it adopted indirect control system of management by resorting to open market operations, adjustment of legal reserves requirement and the rediscount rate.

But in all these, the attainment of the desired objectives of monetary policy has been affected by domestic and external environments which include fiscal dominance, underdeveloped nature of the financial markets, external debt overhang and volatility in oil price. Given the result of the estimated model, it shows that various monetary policies administered through those variables have not probably been adequately applied to help propel growth. However, below are the conclusions drawn from the study:

1). that there exists positive relationship between money supply and growth in Nigeria.
2). That there is an inverse relationship between exchange rate in current period and growth, but one period lag of exchange rate positively impacts growth in Nigeria.
3). that interest rate exerts positive influence on economic growth in Nigeria.

9. Recommendations

Based on the conclusions made, this study recommends the following to cover each objective:

1. Domestic production of exportable commodities should be promoted via deliberate policy by the Nigerian government so as to ensure stability in real exchange rate and positively contribute to the Nigerian economic growth.
2. Policy on massive and expansionary mechanism capable of boosting money supply to the real sector should be pursued in order to boost economic activities and enhance openness in the economy.
3. The Nigerian government should as well strive to limit the volatility of the financial system and make it more viable, efficient and effective as we have in developed economies. This will automatically allow for smooth monetary policy execution by the Central Bank of Nigeria.
4. Partial autonomy should be replaced with full autonomy for the central banks in the developing economies at large which is invariably subjected to government interference and its politics.

5. Monetary policies should be used to create a favorable investment climate by facilitating the emergency of market-based interest rate and exchange rate regimes that attract both domestic and foreign investments.
6. Monetary policies should be used to create a favourable investment climate by facilitating the emergency of market-based interest rate and exchange rate regimes that attract both domestic and foreign investments, create jobs, promote non-oil export and revive industries that are currently operation far below installed capacity. In order to strengthen the financial sector, the Central Bank has to encourage the introduction of more financial instruments that are flexible enough to meet the risk preferences and sophistication of operators in the financial sector.
7. The government should also endeavor to make the financial sector less volatile and more viable as it is in developed countries. This will allow for smooth execution of the Central Bank monetary policies. Law relating to the operation of the financial institutions could be made a bit less stringent and more favorable for the operators to have room to operate more freely.
8. The Central Bank should find a way of reducing the level of deficit financing, improve funding of the informal sector and the SMEs and promote their integration into the formal sector while at the same time working with government to improve the tax regime to make the tax capacity to approach the tax potential so as to reduce tax evasion to barest minimum and ensure that there is proper balancing between capital and recurrent expenditures of government.

Conflict of Interest:
There was no conflict of interest by authors.

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