Interest Rate and Domestic Private Investment in Nigeria

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Abstract- **The study examined interest rate and domestic private investment in Nigeria from 1980 to 2015. The Augmented Dickey-Fuller test and Autoregressive Distributed Lag model were used as the main analytical tools. The ADF unit test result revealed stationarity of the variables at order zero and one, which satisfied the requirement to employ the ARDL Bounds testing approach. The ARDL Bounds test revealed the existence of a long run relationship among the variables. Moreover, the result revealed that monetary policy rate has negative and significant effects on domestic private investment both in the short and long run. Maximum lending rate has a positive effect on domestic private investment both in the short and long run and was significant in the short run. Prime lending rate has negative and insignificant effects on domestic private investment both in the short and long run. However, the gross domestic product has a negative and insignificant effect on domestic private investment in both the long run and the short run. Based on these findings, the study recommended amongst others that: The monetary authorities should ensure that the relevant macroeconomic fundamentals including growth, lending rates, inflation, etc. move in the right direction. This would enable potential and domestic investors to plan and weigh costs and benefits of investing in the country. Government must play an active role to ensure peace and stability. If there is instability in the country then it becomes rather difficult to attract investors. Thus, peace and stability must be guaranteed in order to attract investment. Government should invest in hard infrastructure particularly power, roads, railways and housing to help the various sectors of the economy to function very well thereby making the business environment friendly which will in turn enhance the growth and development of the country.**

Key Words: **Interest Rate, Investment, MPR, ARDL and Nigeria.**

I. INTRODUCTION

Interest rate is the cost of borrowing. Specifically, it is a demand management tool in macroeconomic analysis. Thus, it is generally regarded as the major determinant of investment. According to Gbosi (2005), interest rates are regarded as the rental payments for the use of credit by borrowers and return for parting with liquidity by lenders. In a way interest rates are like other prices. This is because they perform a rationing function which serves to collect a limited supply of credit among the competing demands for it. The view by economists is that investment and interest rate have a negative relationship. The higher the rate of interest the more costly it is to borrow, and as borrowing becomes more costly firms are likely to reduce their borrowing. In this way, investment falls as the rate of interest rises. On the other hand, the lower the rate of interest the cheaper it is to borrow, and the more investment spending firms are likely to make.

In an economy, the primary role of interest rates is to help in the mobilization of financial resources. This will subsequently lead to efficient allocation of resources in the promotion of economic growth and development. Interest rates affect the level of consumption on the one hand, and the level and pattern of investment on the other hand. Consequently, interest rates serve an economic function in the financial intermediation process. That is, interest rate serves as a vehicle for financial intermediation in the economy. Specifically, financial intermediation involves the process of transferring funds from surplus economic units to deficit economic units. This means that, interest rate guides the flow of funds from savers to borrowers. These funds flow via financial intermediaries like deposit money banks (DMBs), money and capital markets, insurance companies, mutual funds, government securities, etc. Furthermore, interest rates are useful in gauging financial market conditions. It influences savings and investment decisions of economic agents. Therefore, interest rates are usually regarded as a major tool for monetary policy. Whenever the structure of interest rates is changed, the resulting relative rates of interest will lead to shifts in market portfolio of both the public and banks. The critical role interest rate plays in an economy could be highlighted in the spending and savings behaviour of consumers and businesses. Variation in interest rate would affect consumer spending and the level of savings of households, and also the production and investment decisions of firms (Central Bank of Nigeria (CBN, 1997).

Over the years, monetary authorities have articulated and executed a myriad of monetary policy options in an attempt to make interest rates stimulate or boost investment in Nigeria. For instance, before financial liberalization in 1986, interest rates were fixed by the monetary authorities and in August 1987 regime, the general framework of deregulating the economy under Structural Adjustment Program (SAP), the CBN launched a market-based interest rate policy. In addition, in December 2006, the CBN introduced a new monetary policy implementation framework with the monetary policy rate (MPR) as the anchor rate (CBN, 2016).Yet, investment in the country has not accelerated at the speed needed to make feasible impact in raising the real gross domestic product (RGDP), reduce unemployment, reduce poverty, etc. Put differently, despite several policy measures put forward by the monetary authorities to stimulate investment in the country,

the country has not been able to achieve adequate level of investment for sustainable growth and development. For instance, the economy recorded the GDP growth of 2.29 percent in 2015 though positive but was less than that of 2011 which stood at 4.21 percent reflecting signs of declining productivity in the economy (Ekpo, 2017). Ekpo (2017) added that the inability of policies to address declining investment, infrastructure deficit and under-consumption resulted in two consecutive quarters of negative GDP growth in 2016. The -2.24 per cent growth of GDP in the 3rd quarter and -1.30 per cent in the 4th quarter of 2016 confirmed that the economy was deeply in a recession. The GDP growth rate for the second quarter of 2018 recorded a decline in performance from 1.95 per cent in the first quarter to 1.5 per cent (Punch Newspaper August 27, 2018). This outcome is worrisome and has raised an important question. What is the relationship between interest rate and domestic private investment in Nigeria? Based on this question, it is therefore necessary to investigate the impact of interest rate on domestic private investment in Nigeria from 1980 to 2015. The remaining parts of this paper were structured into literature review, methodology, results and discussion as well as conclusion.

II. LITERATURE REVIEW

Interest Rate and Investment Framework

Private domestic investment refers to the production or purchase of investment goods such as industrial plants (i.e., factories and other industrial structures), production equipment (e.g., machinery and tools), and changes in inventories (i.e., goods produced but not jet sold). Furthermore, interest rates are regarded as the rental payments for the use of credit by borrowers and return for parting with liquidity by lenders (Gbosi, 2005). According to CBN (2016) interest rate is the amount charged on borrowed money, expressed as a percentage of the principal, by a lender to a borrower for the use of money. It is often expressed as a percentage of the amount borrowed (principal) for one year or any other time period – month, week , day etc. – as agreed by the lender and borrower at the time of contracting the loan. Specifically, interest rate is the percentage of the principal that is paid as a fee over a specified period of time. It can as well be described as the rental payments for the use of credit by borrowers and return for parting with liquidity by lenders over time. Interest rates play vital roles in the day to day transaction within the economy. These roles are spelt out as follows: (a) Interest rates dictate the consumer's borrowing behaviour. In most countries, purchasing a home, a new car or even university education could be financed through loans. Therefore, the lower the interest rate, the more of such loans since monthly or yearly payments will be small. This means that, lower payments will allow consumers to spend more on goods and services since less of their monthly or yearly income is tied to debt service. The opposite will be the case if interest rates are persistently high. (b) Regarding capital inflows and outflows, high domestic interest rate relative to other countries, to a large extent attracts foreign capital inflows into a country because of the prospects for high returns on investments. Conversely, if the domestic interest rate is low relative to other countries, the return on investment would equally be low with possible outflow of foreign capital. (c) Governments sometimes finance their activities through the issuance of debt securities such as treasury bills and bonds. As interest rates rise, the government has to issue bonds at those higher rates. Debt service becomes a larger component of government expenditure and ultimate government deficit since they have to spend more of the budget on interest costs.

In addition, there are various types of interest rates categorized into policy, deposit, and lending rates. Policy rate is the rate used by the central banks to determine the cost, availability and quantity of money in the economy so as to achieve desired macroeconomic objectives. Deposit rates are paid on savings and time deposits of different maturities such as one-month and fixed deposits in financial institutions. Lending rates, on the other hand are interests charged by money lenders, banks, etc. for meeting the short and medium-term financing needs of borrowers. This rate is usually differentiated according to credit worthiness of borrowers and objectives of financing. This study examined monetary policy rate, lending rate-prime and maximum lending rates; and treasury bills rate. Monetary Policy Rate (MPR): By monetary policy rate economists mean the rate at which central banks lend to deposit money banks (DMBs) in performing their duties as lender of last resort. That is, interest rate paid by deposit money banks when they borrow from the central bank. A high MPR will discourage commercial banks from borrowing from the Central Bank. On the contrary, a low MPR will encourage borrowing. The MPR is expected to communicate the stance of monetary policy and acts as a guide for all other market interest rates. Lending Rate: By lending rate economists mean the rate which deposit money banks (DMBs) charge their customers on loans extended to them. Specifically, two of these rates have been most prevalent in Nigeria. These rates are the Prime and Maximum Lending Rates. Prime Lending rate is simply defined as the interest rate which deposit money banks charge their most credit-worthy customers; which are usually large organizations. For most banks, this rate also represents the minimum rate. It could also form the basis for other lending rates on mortgages, personal loans, and loans to small businesses. The maximum Lending Rate, on the other hand, is the rate charged by deposit money banks for lending to customers with low credit rating.

Whenever the structure of interest rates is changed, the resulting relative rates of interest will lead to shifts in market portfolio of both the public and banks. To this effect, the direction and magnitude of changes in interest rates are of primary importance to economic agents and policy-makers (CBN, 1997). The level of national income is determined by consumption and investment. Specifically, consumption itself

depends on income while investment is a function of the marginal efficiency of capital schedule and the rate of interest.

Furthermore, high interest rate makes the cost of borrowing funds expensive thereby impacting negatively on the level of investment. This is because households, firms, and governments often borrow money from banks and other lending institutions to finance investment. Similarly, high level of interest rate serves as signal for economic agents to save more money in return for better rewards. Also, low interest rates means funds would be cheaper to borrow and signals increasing investment. Firms usually source for funds to venture into investments in new factories, more efficient machines, raw materials, etc. expecting to earn more income from their investments. However, if the interest rate (cost of the loan) is greater than the expected return on investment, then it would not be economically plausible to undertake such investment decision and vice versa. Thus, when interest rates are lower, firms are likely to make investment (CBN, 2016).

Interest Rate and Investment Theories

According to the classical theory of interest rate as postulated by the classical economists, the interest rates are determined by the supply of and demand for capital (savings) where the supply of savings or investment is assumed to be inversely related to the interest rate. The classical economists called this a real theory of interest. This is because; the interest rate does not depend in any way on monetary conditions. The classical economists argued that, the supply of capital is the same thing as saving. To make capital available, people do so by reducing their consumption expenditures. Thus, both savings and investment were said to depend on the rate of interest rate (i.e., the price of capital), and was considered the factor which made savings and investment equal. They submitted that investment schedule slopes downward. This means that at lower interest rate, investors (business firm) will decide to invest more. However, the interaction of savings and Investment determine the interest rate. That is, equilibrium interest rate exists where savings and investment are at the same level; the level of income having nothing to do with this equilibrating mechanism as full employment is assumed. The classical theory of interest rate does have some short comings and has been criticized. For instance, Gbosi (2005) criticized the classical theory of interest rate on the ground that there is actually no such market for savings. More importantly, the rate of interest is not the price for savings. Furthermore, an improvement in the classical theory of interest rate (i.e., real theory of interest rate) determination is the loanable fund theory.

The loanable fund theory is an extension of the classical theory. Specifically, the loanable fund theory shows that the rate of interest is the price of credit which is determined by the demand for and supply of loanable funds. That is, interest rates are largely dependent on the demand for and supply of loanable funds. Loanable funds are monies that are made available by the surplus economic units to be borrowed by the deficit economic units. The higher the demand for loanable funds relative to the supply, the higher should be the rates of interest and vice versa. In line with this theorizing, equilibrium interest rate is where demand for and supply of loanable funds are at par (Ezirim, 2005). Furthermore, the supply and demand are made up of several sources. The demand for loanable funds is for business investment and household use. In addition, funds are also demanded for hoarding. This depends on interest on income, which is obtained by acquiring income yielding claims. Thus, the lower the rate of interest the greater the demand for money for hoarding. But, the supply side is made up of personal savings, business and government savings that are offered on the loan market. The loanable fund theory is usually called the real theory of interest rate. This is because the model assumes that interest rates are determined by real factors. This makes sense because the decision whether to lend or borrow is a rational one. As stated above, the rate of interest is in equilibrium where the demand for loanable fund is equal to the supply of loanable funds. It is important to know that an increase in savings or in supply of money would cause the interest rate to decrease. On the other hand, an increase in the demand for funds for investment or hoarding will cause the rate of interest to rise (Gbosi, 2005).

However, Keynes took a complete different approach to interest rate determination. This theory argued that it is not the rate of interest, but the level of income that is the mechanism bringing savings and investment into balance ---- an attack on the position of the real interest rate theorists; that the rate of interest is just the price which equilibrates the desire to hold wealth in the form of money and the quantity of money supplied. Strictly speaking, Keynes in his analysis did not consider interest either as the price of savings or for loanable funds. However, Keynes considered interest rate as payment for the use of money. He argued that the consideration considered by some economists that saving and investment were the main determinants of interest rate was not only empirically unjustified but also a logical error. In his liquidity preference theory, he argued that the interest rate was determined by two factors. The two factors are the supply of money and the demand for money. In his model, the stock of money is considered to be determined by the Central bank. This is the supply side of the Keynesian analysis. The demand for money, however, needs a more detailed explanation. The demand for money seems easy to explain on one level. After all, everyone would like to hold more money.

Apart from the desire to hold money for transaction purposes, money is a valuable asset to hold at any given period. If a person prefers to hold government bonds, he will earn interest on it but money has no interest (Gbosi, 2005). Therefore, whenever interest rates are high, the holder of cash will forgo additional interest income in order to maintain his cash position. It then means that whenever interest rates are high, the demand for money for speculative purposes will fall. The operation becomes more attractive whenever interest rates

are low. As earlier mentioned, the determination of interest rate occurs in the Keynesian model when the demand for and supply of money is equal (Gbosi, 2005). Gbosi (2005) further submitted that, at very low rate of interest, people would prefer to hold money than securities. This is because the risk of capital loss (through increases in interest rates) would outweigh the small amount of interest to be obtained from securities. Keynes called this section of the money demand curve "liquidity trap" (Gbosi, 2005). In another development, the price expectation theory posited that interest rates are expected to be charged to compensate lenders for expected inflation in the economy.

Decision to invest in a new capital asset depends on whether the expected rate of return on the new investment is equal to or greater less than the rate of interest to be paid on the funds needed to purchase the asset. It is only when the expected rate of return is higher than the interest rate that investment will be made in acquiring new capital assets. In reality, the factors often taken into consideration while making any investment decision include the cost of the capital asset, the expected rate of return from it during its lifetime and the market rate of interest (Jhingan, 2007). Keynes sums up these factors in his concept of the marginal efficiency of capital (MEC) - the highest rate of return expected from an additional unit of a capital asset over its cost. According to Gbanador (2007), "the MEC can be defined as the rate of discount that equates the current cash outlay with the present value of future cash receipts". The MEC involves comparing the yield on an investment with the current interest rate which is regarded as the opportunity cost of capital. If the MEC is greater than or equal to the interest rate, it would be profitable for the firms concerned. Put differently, according to this approach, the decision to invest in a given asset depends on the Internal Rate of Return from investing in the asset and the current rate of interest. Keynes (1936) defined the MEC or the Internal Rate as being equal to the Rate of Discount which would make the Present Value of the series of annuities given by the returns expected from the Capital Asset during its life just equal its supply price. It is an Internal Rate because it is determined solely and subjectively by the firm. The optimum or equilibrium amount of investment will be determined when the Internal Rate equals the current Rate of Interest (Ekine, 2011). In other words, profit from investment is measured by the return on investment which is known as Marginal Efficiency of Investment (MEI), which depends on market rate of interest. MEI relates the amount invested to changes in the rate of interest, ceteris paribus. MEI shows the relationship between investment and interest rate. That is, it shows the amount of investment at various rates of interest. Given this idea, an investment function can be written as: $I = I_o + I(r)$….(i)

Moreover, income is also an important variable that affect investment. The acceleration principle or theory of investment states that investment in the current period depends on changes in the level of national income or output. Momentously, the accelerator theory of investment suggests a positive relationship between investment and the rate of growth of aggregate demand, income or output. According to Ekine (2011) the theory "assumes that there is a desired capital stock for a given level of output and interest rates. A rise in output or a fall in interest rates may prompt increased levels of investment as firms adjust to reach the new optimal capital stock level". The accelerator works on the basis of a fixed capital to output ratio which implies that in order to produce extra units of goods and services, firms need to adjust its investments to meet changes in demand. This theory of Clark (1917) opined that the level of current net investment in fixed capital depends on the change in income or output in the previous year. A typical acceleration equation can be written as: $I = \beta(\Delta Y)$…….(1). By assumption of autonomous investment we have, $I = I_o + \beta(\Delta Y)$….(2). Where; I=Investment, Io = autonomous investment; β = acceleration coefficient; ΔY = change in income. By examining changes in income or output between period, time t and t-1, we have $\Delta Y = Y_t - Y_{t-1}$....(3) substituting equation (3) into (2) we have $I_t = Io + \beta(Y_t - Y_{t-1})$….(3); Where; Y_t is current national income and Y_{t-1} is national income last year.

In macroeconomics, investment plays an important role over the business cycle. A typical Keynesian investment function is: $I_t = a_o + a_1 Y_t - a_2 R_t$. Where I_t is investment, Y_t is GDP and R_t is the real interest rate. So: Investment should be higher when the interest rate is low, and vice versa. Also, a fast growth in national income (GDP) will exert pressure on aggregate demand, which in turn will encourage investment. Meaning that, the Keynesian investment function favours the acceleration theory of investment.

In addition, James Tobin (1969) also developed investment model. Tobin's q ratio theory of investment holds that investment decision is dependent upon the ratio of the market value of a firm's financial assets to their replacement cost. Put differently, Tobin's q states that a firm's decision to invest depends on the ratio of the market value of installed capital (physical asset) to its replacement cost. i.e., q = market value of installed capital/replacement cost of installed capital (physical asset). Therefore, the ratio of the market value to the replacement cost of capital is known as Tobin's q (Tobin, 1969). According to this theory, in the long-run the ratio of market price to replacement cost will tend towards one, but the evidence is that this ratio can differ significantly from one for every long periods of time. The ratio of market price to replacement cost is known as the q-ratio or simply q. That is, q represents the ratio of the market value of a firm's present capital (shares) to the replacement cost of the firm's physical assets (the cost of capital replacement). It (i.e., q) shows how an additional naira of capital affects the present value of profits. Therefore, if we denote the market value of existing assets as MVEA and we denote the replacement cost as RC , expressing this in terms of q will yield: q = MVEA/RC. When the value of q exceeds one, the decision to invest becomes a rational one (i.e., when q > 1, additional investment in the

firm would make sense because the profits generated would exceed the cost of the firm's assets). Meaning that, If q>1, then firms have an incentive to increase their capital stock because capital once installed and producing goods and services is priced more highly than its cost. But when the value of q is less than one it would be irrational to invest (i.e., when q< 1, the firm would be better off selling its assets instead of trying to put them to use). Meaning that, If q<1, then firms should scrap capital, close plants etc. A firm would want to increase its capital stock if q is high and reduce it if q is low. The firm will be equilibrium when q is equal to one. This state is known as the perfect state of the firm. Measuring q (which is what the theory implies is relevant for investment) is extremely difficult (Romer, 2012). For an investor, it is the marginal Q, the ratio between marginal value of capital and its marginal replacement cost that is of main interest rather than average Q, the ratio between the market value of existing capital and its replacement cost. In empirical research, however, the marginal Q is difficult, or even impossible, to observe (Kaijser, 2014).

Furthermore, organizers of production need money for investment. They can raise money for investment through a number of ways including selling shares and equity. For instance, when a firm sells its shares, the buyers of such shares buy with the intension to earn a capital gain from the increase in the market value of such shares. A buyer will purchase a share or shares when the buyer expects a high capital gain. Thus Tobin's q as a measure of the incentive to invest has one major advantage. Both current and expected future profitability of investment get reflected in it.

Empirical Nexuses between Interest Rate and Investment in Nigeria

George-Anokwuru (2017) investigated the relationship between interest rate and domestic private investment in Nigeria. Specifically, the aim of the study was to examine the impact of interest rates and private domestic investment in Nigeria from 1980 to 2015. Ordinary Least Square regression was employed to examine the relationship among the variables utilized in the study. The findings revealed that prime lending rate has a negative and significant relationship with private domestic investment in Nigeria. However, real interest rate has a negative but insignificant relationship with private domestic investment in Nigeria.

Davis and Emerenini (2015) investigated the impact of interest rate on investment in Nigeria. Multiple regressions were used as the statistical method for the study which revealed that high interest rate negatively affects investment. In line with the findings, the study suggested among others that relevant monetary authority should evolve policies that will encourage savings and reduce prime lending rate to genuine investors, among others.

Duruechi and Ojiegbe (2015) examined the determinants of investments in the Nigerian Economy: An empirical approach, 1990-2013. The data for the study were analyzed using OLS, co-integration and Granger causality test methods of econometrics. The Unit root test conducted with the Augmented Dickey Fuller (ADF) Unit root revealed that the variables were stationary at first difference rate 1(1). The Johansen Co-integration test also revealed the existence of a long-run relationship among the variables in the study. The Pairwaise Granger Causality showed causality running unidirectional from government expenditure to investment. The error correction model (ECM) indicated that short run disequilibrium in investments can be corrected at the speed of 67% per annum. These simply showed that there is a significant relationship between the selected macroeconomic variables and level of investment in Nigeria. Also postulated by the study is the fact that only government expenditure has a significant influence on investment in Nigeria thus leading the study to conclude that investment in Nigeria is still at a very low level and should be encouraged to impact positively on the economy in general.

Hitlar (2015) investigated the impact of interest rate liberalization on investment in Nigeria from 1970-2012. Using the error correction model (ECM), the result indicated that a long run relationship exists among the variables. The result further revealed that all the variables (interest rate, market capitalization rate, public expenditure and trade openness) have significant impact on investment. Also, the impulse responses of these variables to shocks in the extraneous variables were verified; using the Multiple-Equation VAR models. In addition, the variance decomposition result showed that Period 2 showed a standard deviation value of 97.23 in investment resulting from own shock, 2.44 to a response to a shock from interest rate, 0.0186 to a response from market capitalization rate,0.205900 to a response to public expenditure and 0.101933 to response to trade openness. In period 10, investment responds positively with a standard deviation of 18.77 originated from own shock and standard deviation values of 8.05, 7.94, 12.43 and 15.59 arising from a shock from interest rate, market capitalization rate, public expenditure and trade openness respectively.

Agwu (2015) used Autoregressive Distributed Lag Model (ARDL) to examine the determinant of investment in Nigeria. In estimating the long-run and short-run coefficients of variables, in the long run, it showed that past income level, capital investment, government size and interest rate are the major determinants of domestic investment in Nigeria and these variables have a positive effective on private investment in Nigeria. Exchange rate and inflation have an insignificant affect on private investment in Nigeria.

Osundina and Osundina (2014) examined the link between interest rate and investment decision in Nigeria. The study used Multiple Linear Regression model. A modified Mundel – Flemming model was used where interest rate was the dependent variable and other variables such as; Gross domestic product, investment level, Government spending, debt and exchange rate were independent variables. The study found out that there is no strong empirical evidence that there

is a link between interest rate and investment decision in Nigeria.

Ogede (2013) investigated the sensitivity of interest rates and banks investment in Nigeria, using time series analysis and annual data from 1980 - 2011. The Ordinary least square model was used to capture the variables in the model. The empirical results found real lending rates to be significant and highly negatively sensitive to all the incorporated financial indicators in Nigeria during the reviewed periods. This implies that overall financial policy instituted and regulations have been effective in stabilizing the sensitivity of interest rate to changes in banks' investment in Nigeria. There also exists presence of negative serial correlation among the residuals. The results revealed that the behaviour of interest rate is important for banking sector to growth in view of the relationships between interest rates and investment and growth. Thus, the formulation and implementation of financial policies that enhance investment-friendly rate of interest is vital for promoting economic growth in Nigeria.

Onwumere, Okore and Imo (2012) took a careful look at the impact of interest rate liberalization on savings and investment in Nigeria from 1976 to 1999. Simple linear regression technique was adopted using SPSS statistical software. The study revealed that interest rate liberalization had negative non significant impact on savings and negative significant impact on investment in Nigeria. Thus, interest rate liberalization, though a good policy, was counterproductive in Nigeria. This might probably be as a result of improper pace and sequencing. In determining the appropriate sequencing of interest rate liberalization, the study recommended that the authorities need to distinguish not only between loan and deposit transactions but also between wholesale and retail transactions. Interest rates on wholesale transactions between sophisticated entities should be liberalized first, followed by lending rates and then deposit rates. This gradual approach safeguards the profitability of banks while allowing time for people and firms to adjust to liberalization.

Eregha (2010) examined variations in interest rate and investment determination in Nigeria. The study employed a simultaneous equation mode of two equations using ordinary least squares method of econometrics to analyze the data and deduced that investment has an indirect relationship with interest rate variation and other variables that he used.

III. METHODOLOGY

This section specifies the econometric model that was employed in this study. Specifically, it specifies an econometric model aimed at capturing the association between interest rate and domestic private investment in Nigeria. To achieve this objective, data on domestic private investment, monetary policy rate, maximum lending rate, prime lending rate and national income-GDP were collected from CBN Statistical Bulletin from 1980 to 2015. Guided by the perceived functional relationship between the matrix of domestic private investment and interest rate, a link was forged between the variables in line with the Keynesian investment function: $I = f(Y, R)$ ….(1) which gives: $I_t = a_o + a_1Y_t - a_2R_t$ …. (2)

Where; I is investment, R is interest rate and *Y* is national income (GDP). Thus, the model for the study was specified as:

$$DPI_t = \alpha_0 + \alpha_1 MPR_t + \alpha_2 PLR_t + \alpha_3 MLR_t + \alpha_4 GDP_t + \mu_t \quad \ldots\ldots(3)$$

Where; DPI_t = Growth Rate of Domestic Private Investment, MPR_t = Monetary Policy Rate, PLR_t = Prime Lending Rate, MLR_t = Maximum Lending Rate, and GDP_t = Growth Rate of Real Gross Domestic Product, α_0 = Constant term, α_1, α_2, α_3, *and* α_4 are Regression Coefficients of independent variables and μt = Stochastic Error Term. **On the apriori,** we expected α_1, α_2, *and* $\alpha_3 < 0$, *while* $\alpha_4 > 0$.

Techniques of Data Analysis

The techniques that were employed to analyze our data are: unit root test via Augmented Dickey Fuller test (ADF) and Autoregressive Distributed Lag (ARDL). The ADF unit root test helps to ascertain stationarity of the variables, and the general form of the ADF is presented thus:

$$\Delta \psi_t = \alpha_0 + \alpha_1 \psi_{t-1} + \Sigma\alpha_1 \Delta\psi_i + \delta_t + U_t \qquad (3)$$

Where: ψ is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the independent variables and U is random error term. In order to examine the short-and long-term relations between the dependent and independent variables in the model, Autoregressive Distributed Lag (ARDL) was used. The reason is that estimates provided by ARDL method avoid problems such as autocorrelation and endogeneity, they are unbiased and efficient. Moreover, Autoregressive Distributed Lag (ARDL) is a long-established method of estimating co-integrating relationships, such as Engle-Granger (1987) or Johansen's (1991, 1995) method, or single equation methods such as Fully Modified OLS, or Dynamic OLS either require all variables to be I(1), or require prior knowledge and specification of which variables are I(0) and which are I(1). To alleviate this problem, Pesaran and Shin (1999) and Smith (2001) showed that co-integrating systems can be estimated as ARDL models, with the advantage that the variables in the co-integrating relationship can be either I(0) or I(1), without the need of pre-specifying as I(0) or I(1). Pesaran and Shin also noted that unlike other methods of estimating co-integrating relationships, the ARDL representation does not require symmetry of lag lengths; each variable can have a different number of lag terms. Therefore, the ARDL model for this study is presented thus:

$$\Delta DPI_{t,j} = b_0 + b_1 DPI_{t-1,j} + b_2 MPR_{t-1,j} + b_3 MLR_{t-1,j} + b_4 PLR_{t-1,j} + b_5 GDP_{t-1,j}$$

$$+\sum_{i=1}^{n1} a_{1i,j}\Delta DPI_{t-1,j} + \sum_{i=0}^{n2} a_{2i,j}\Delta MPR_{t-1,j} + \sum_{i=0}^{n3} a_{3i,j}\Delta MLR_{t-1,j} + \sum_{i=0}^{n4} a_{4i,j}\Delta PLR_{t-1,j} + \sum_{i=0}^{n5} a_{5i,j}\Delta GDP_{t-1,j} + \mu_t \quad ----(4)$$

Where Δ is the first difference operator, b_1, b_2, b_3, b_4, and b_5 denote the long-run association, while α_1, α_2, α_3, α_4 and α_5 indicate the short-run dynamics of the model, and n is the optimal lag lengths.

IV. RSULTS AND DISCUSSION

The empirical analysis focused mainly on descriptive statistics and estimation of the regression model.

Descriptive Statistics for Underlying Series

The essence of the descriptive statistics is to ascertain stability of the time series.

Table 4.1: Descriptive Statistics Result

	DPI%	MPR%	MLR%	PLR%	GDP%
Mean	77.62056	12.51583	20.65750	17.33306	19.02111
Median	22.39000	12.75000	21.17000	17.54500	5.710000
Maximum	1595.200	26.00000	36.09000	29.80000	550.5500
Minimum	-93.23000	6.000000	9.500000	7.500000	-26.49000
Std. Dev.	274.9657	4.304585	5.950353	5.045903	91.41484
Skewness	4.968153	0.786876	0.080582	0.082882	5.687351
Kurtosis	27.46593	3.984352	3.267593	3.218009	33.59265
Observations	36	36	36	36	36

Source: *Authors' Computed Result from (E-views 9.0)*

The descriptive statistics reported in Table 4.1, indicates that growth rate of domestic private investment (DPI), monetary policy rate (MPR), maximum lending rate (MLR), prime lending rate (PLR) and growth rate of gross domestic product (GDP) averaged 77.62056, 12.51583, 20.65750, 17.33306 and 19.02111 respectively. The standard deviation showed that monetary policy rate, maximum lending rate and prime lending rate converged around their mean. While growth rate of domestic private investment and growth rate of gross domestic product did not converge around their respective mean. The Skewness test result showed positive values for all the series, meaning that they have high tails. All the variables are leptokurtic in nature since their values for kurtosis 27.46593, 3.984352, 3.267593, 3.218009 and 33.59265 respectively are more than three. This indicates a flatter than normal distribution. Specifically, the Kurtosis test reveals that the variables have large tails.

Unit Root Test Result

The test for the stationarity status of all variables in the model to establish their order of integration proceeds the ARDL bounds test, the reason for this is to be sure that the variables are stationary at level 1(0) and first difference 1(1) only but not second difference I(2) so as to avoid spurious regression results. Inferences in the bounds testing procedure through the computed F-statistics for bounds testing are based on the assumption that the variables are level 1(0) or first-difference 1(1) stationary. Therefore, the ADF method was used to test for the stationarity of the variables in the model. See Table 4.2 below.

Table 4.2: Augmented Dickey-Fuller Unit Root Test

Variables	ADF Test Values	Critical Values @ 5%	Order of integration
DPI%	-6.573300	-2.948404	1(0)
MPR%	-6.400410	-2.954021	1(1)
MLR%	-6.627267	-2.954021	1(1)
PLR%	-5.810106	-2.954021	1(1)
GDP%	-6.812912	-3.544284	1(0)

Note: PDI, MPR, MLR, PLR and GDP as earlier defined.
Source: *Authors' Computed Result from (E-views 9.0)*

The stationarity test result presented in Table 4.2 showed that at 5% level of significance, the variables were stationary. For instance, DPI and GDP were stationary at level 1(0), i.e., DPI and GDP were stationary in their levels at 5% ADF test. While MPR, MLR and were stationary at first differences 1(1). That is, they became stationary at first difference (integrated of order one). Given that the variables were integrated of order 1(0) and 1(1). The requirement to fit in an ARDL model to test for long run relationship is satisfied.

Model Estimation Results

Table 4.3 ARDL Bounds Test for Co-integration

Model		**F-Statistic** = 7.879004
F(GDP%, MPR%, MLR%, PLR%, DPI%)		K = 4
Critical Values	Lower Bound	Upper Bound
10%	3.03	4.06
5%	3.47	4.57
2.5%	3.89	5.07
1%	4.4	5.72

Source: *Authors' Computed Result from (E-views 9.0)*

Since the variables were integrated of order 1(0) and 1(1), and the sample size is small, Narayan (2004) critical values for small sample sizes ranging from 30 observations to 80 observations was adopted. From the ARDL bounds test result, it is clear that there is a long run relationship amongst the

variables (DPI, MPR, MLR, PLR and GDP). This is because the computed F-statistic of about 7.88 is higher than the upper critical bounds at 1%, 5%, 2.5% and 10% critical values. This provided evidence to reject the null hypothesis of no co-integration for the DPI model. It can therefore be concluded from the ARDL bounds test that there is a long-run relationship among the variables. Therefore, this study illustrates that interest rate variables have a long run relationship with private domestic investment in Nigeria within the period reviewed. Following the establishment of long-run co-integration relationship among the variables, the long-run and short-run dynamic parameters for the variables were obtained.

Estimated ARDL Long Run Coefficients Using ARDL Approach

Table 4.4: Estimated ARDL Long Run Coefficients. Dependent Variable: DPI ARDL (4, 2, 2, 1, 0)

Regressors	Coefficient	t-Statistic	P-Value
MPR%	-54.139095	-3.802070	0.0014
MLR%	22.199126	1.992718	0.0626
PLR%	14.549432	1.301176	0.2106
GDP%	-1.927033	-0.455836	0.6543

Source: *Authors' Computed Result from (E-views 9.0)*

The estimated ARDL long run coefficients revealed that monetary policy rate has negative and significant relationship with domestic private investment. This conforms to a priori expectation. Maximum lending rate and prime lending rate have positive and insignificant relationship with domestic private investment. This does not conform to apriori expectation. While the growth rate of gross domestic product has negative and insignificant relationship with domestic private investment which is contrary to the apriori expectation. In addition, it can be deduced that monetary policy rate has the ability to enhance domestic private investment in the long-run.

Result of the Short Run Error Correction Model Using the ARDL Approach

Table 4.5: Error Correction Representation for the Selected ARDL Model ARDL (4, 2, 2, 1, 0)

Regressors	Coefficients	t-Statistic	P-Value
MPR%	-122.2634	-3.464452	0.0030
MLR%	84.81843	3.524355	0.0026
PLR%	26.52362	1.339346	0.1981
GDP%	-4.892962	-0.442441	0.6637
ECM (-1)	-2.539117	-5.258085	0.0001
R-squared = 0.703544	F-statistic = 2.881724 Prob(F-statistic) = 0.020397	Akaike info criterion = 13.87717 Schwarz criterion = 14.56424	Durbin-Watson stat = 2.144659

Source: *Authors' Computed Result from (E-views 9.0)*

Table 4.5 shows the result of the short-run dynamic coefficients associated with the long-run relationships obtained from the ECM equation. The Error Correction Term in the model has the right sign (i.e., negative) and statistically significant. This indicates adjustment to long-term equilibrium in the dynamic model. Put differently, it indicates it adjustment from short run equilibrium to long-run equilibrium in the dynamic model. This implies that deviations from the short-term growth rate in domestic private investment adjust quickly to long run equilibrium. The Durbin Watson (DW) value of 2.144659 which is approximately 2.1, suggests that the model is free from autocorrelation. As expected, monetary policy rate in the short- run has negative and significant effect on domestic private investment. This means that, a percentage increase in monetary policy rate will decrease domestic private investment by 122.2634%. This outcome is consistent with the results of Ogede (2013) and George-Anokwuru (2017) that real interest rate (i.e., monetary policy rate) is negatively related to private domestic investment and statistically significant. Furthermore, maximum lending rate in the short- run has a wrong sign (i.e., positive) instead of negative. But this does not conform to the apriori expectation. Meanwhile, maximum lending rate is statistically significant. In addition, prime lending rate and national income (GDP) in the short- run have positive and negative effect respectively on domestic private investment. Also, prime lending rate and national income (GDP) are not statistically significant. The negative and insignificant relationship depicted by the national income (GDP) variable reveals that growth in gross domestic product during the period of study was not fast to exert pressure on aggregate demand, which in turn should encourage domestic private investment. Because investment is linked to gross domestic product growth since it depends on aggregate demand. Therefore, a low growth rate will cause investment demand to reduce. The result also depicts that the variables such as monetary policy rate and maximum lending rate have the potentials to adjust to stable long run relationship or equilibrium with domestic private investment.

V. CONCLUSION AND RECOMMENDATIONS

The study on interest rate and domestic private investment in Nigeria from 1980 to 2015 is very important because in any economy, the primary role of interest rate is to help in the mobilization of financial resources. This will subsequently lead to efficient allocation of resources in the promotion of economic growth and development. Interest rates affect the level of consumption on the one hand, and the level and pattern of investment on the other hand. Furthermore, the broad objective of the study was to examine the impact of interest rate on domestic private investment in Nigeria from 1980 to 2015. To achieve this objective, the study utilized data on monetary policy rate (MPR), maximum lending rate (MLR), prime lending rate (PLR) and growth rate of gross domestic product (GGDP) on growth rate of domestic private investment (DPI) from CBN Statistical Bulletin. An Autoregressive Distributed Lag (ARDL) method of

econometrics was used to capture both short and long-run relationship between endogenous and exogenous variables. The regression result revealed that about 70 percent variation in growth rate of private domestic investment (PDI) is explained by monetary policy rate (MPR), maximum lending rate (MLR), prime lending rate (PLR), and growth rate of gross domestic product (GDP). The F-statistic of 2.881724 is also significant. Moreover, the result revealed that monetary policy rate has negative and significant effects on domestic private investment both in the short and long run. Maximum lending rate has a positive effect on domestic private investment both in the short and long run and was significant in the short run. Prime lending rate has negative and insignificant effects on domestic private investment both in the short and long run. Furthermore, the gross domestic product has a negative and insignificant effect on domestic private investment in both the long run and the short run. At the same time, there is a long-run relationship among DPI, MPR, MLR, PLR and GDP. On the basis of the findings, the study put forward recommendations in the midst of others towards enhancing the impact of interest rate on domestic private investment in Nigeria. The monetary authorities should ensure that the relevant macroeconomic fundamentals including growth, lending rates, inflation, etc. move in the right direction. This would enable potential and domestic investors to plan and weigh costs and benefits of investing in the country. Government must play an active role to ensure peace and stability in Nigeria. If there is instability in the country then it becomes rather difficult to attract investors. Thus, peace and stability must be guaranteed in order to attract investment. Government should invest in hard infrastructure particularly power, roads, railways and housing to help the various sectors of the economy to function very well thereby making the business environment friendly which will in turn enhance the growth and development of the country.

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