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Interest Rates and Private Investment: Estimated Model from Nigeria

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Abstract
This study examined the effect of interest rate on private investment in Nigeria. The objective was to determine the extent to which various interest rates affect real sector investment. Time series data were sourced from Central Bank of Nigeria Statistical bulletin and publications of Nigeria Bureau of Statistics from 1990-2023. Private investment was modeled as the function of savings rate, real interest rate, monetary policy rate, maximum lending rate and prime lending rate. The study used Ordinary least square methods. The study found that 60.2 percent of the variations in dependent variables the long run is accounted for by variations in the study's explanatory variables. The results further indicates that savings rate have positive but no significant effect, real interest rate have positive and no significant effect, monetary policy rate have positive and significant effect, prime lending rate have positive and significant effect while maximum lending rate have positive and no significant effect on private investment in Nigeria. The variables were stationary at first differencing and it is integrated of 1(1). There were the 4 co-integrating equation at the 5% level of significance while the vector error correction model (VECM) result found 69 percent variation which indicates a good fit with an F- statistic value of 3.901566 and a probability value of 0.044452 which judged the model significant. We conclude that there is significant relationship between interest rate and real sector investment in Nigeria. From the findings, we recommend that government should set a sound and fertile environment such as further reforms in the banking sector and deregulations of savings and lending rates in order to foster private investment.

Keywords: *Interest Rates, Private Investment, Prime Lending Rate, Maximum Lending Rate, Savings Rate*

INTRODUCTION

Conventional economic theory has it that higher interest rates reduce investment levels because interest rates represent the cost of capital (Mehrara & Rezazadeh, 2011). Once the level of interest rate is high, it requires investment projects to post higher rates of return for them to be profitable. Therefore, ceteris paribus, the relationship between investment and the interest rate is inverse, which implies that a fall in interest rate is favorable for investment (Keynes, 1978). Numerous contemporary empirical studies, for instance among others, provide substantial evidence of the negative effects of interest rates on private investment. Interest rate in every economy is an important monetary policy instrument aimed at promoting economic growth and development

especially through investment process. The short and long- term variability in interest rates is a prominent feature in any economy (Osuji 2020). Interest rate changes in response to a different of economic conditions such as changes in federal policy, crises in domestic and international financial markets and changes in the prospects for long term economic growth, inflation rate, business environment and investment. However, macroeconomic developments such as these tend to be irregular (Acha & Acha, 2011; Lucky & Uzah, 2017). There is a more regular variability of interest rates associated with the business cycle, the expansion and contraction that the economy experiences over time. Interest rate policy in Nigeria is a major instrument of monetary policy with regards to the role it play in the mobilization of financial resources aimed at promoting economic growth and development. Some examples of interest rate include the saving rate, lending rates, treasury bill rate and the discount rate.

Interest rate and savings are inextricably linked (Adenuga, 2020). They are among the economic variables that are of great importance to a broad spectrum of people, the government, business firms, entrepreneurs, foreign investors, the financial sector and the household. They are so important that they determine to a large extent the level of investment and the economic growth in an economy. Interest rate variations affect decisions on investment and savings pattern. Investment behavior is mainly affected by the level of interest rate obtainable in an economy. Investors differ in their willingness to hold risky assets such as bonds and stocks (Inimino, Abuo, & Bosco, 2018). When the returns to holding stocks and bonds are highly volatile, investors who rely on these assets to finance their consumption profile face relatively large chance of having low consumption.

Several theories of interest rate have been discussed in the literature. Starting from the classical economist, the rate of interest is determined by the demand for and supply of capital. It follows that the rate of interest, under the classical school, is determined through the interaction of the demand curve and supply curve of savings. The points at which the two curves meet determine the equilibrium level of interest. If the rate of interest is above the equilibrium level, the demand for investment funds will fall and the supply of savings will rise. This creates an excess of savings leading to a fall in interest rate. Conversely, if the rate of interest is below the equilibrium level, the demand for savings will rise while the supply of savings will contract; creating an excess demand. This excess demand is what drives the interest rate upwards to return to the equilibrium rate. In the neoclassical perspective, the rate of interest is determined by the demand for and supply of loanable funds. To them, the demand for loanable funds comes from the government, businessmen, and the consumers who demand for them for the purpose of investment, hoarding, and consumption.

The modern theory of interest rate defines interest rate as being determined under the IS-LM framework. Thus, the interaction of the IS and LM curves determine the equilibrium level of income and interest rate. This theory captures the divergence in interest rate between the real market and the money market. An interest rate below the equilibrium level implies that the interest rate in the money market is less than that on the real sector. Thus, businessmen borrow at a lower rate from the money market and invest the borrowed funds at a higher rate in the capital market (Akani & Lucky, 2018). The resultant effect will be an increase in the level of income through the investment multiplier and the equilibrium level of interest will be restored. However, if the rate of

interest is above the equilibrium rate, the rate of interest in the real market is less than the interest rate in the money market. It follows that businessmen will try to discharge debt s in the money market rather than invest in the capital market. Hence, investment will fall and reduce income by the multiplier and the equilibrium rate of interest will be restored. There are many studies on the effect of interest rate; most of the studies focused on interest rate and economic growth while there few studies of citable significant on interest rate and private investment in Nigeria.

LITERATURE REVIEW

Interest Rate

Jhingan (2005) defined interest rates as the rental payment for the use of credit by borrowers and return for parting with liquidity by lenders. Like other prices, interest rates perform a rationing function by allocating limited supply of credit among the many competing demands. Interest rate may also be seen as the price of credit which might be subject to distortions due to inflation. According to Wikipedia (2005) an interest rate is the rate at which interest is paid by a borrower for the use of money that they borrow from a lender. It can also be seen as a rate which is charged or paid for the use of money and is usually expressed on an annual basis Mckinnon and Shaw (1973) argued in favour of financial liberalization as medium of promoting saving, investment, and growth. Their argument was based on the fact that real interest rates are frequently negative in developing countries due to administrative controls on the nominal interest rates and heavy regulation in the financial market.

Lending Rate

In Nigeria, over the years, lending rates have remained persistently high and have continued to raise concerns among policy makers, investors and other economic agents. The high lending rates have been attributed largely to the high cost of raising funds by DMBs. In a bid to influence the availability and cost of credit in the economy, the CBN stipulated the composition of cost of funds for commercial banks to include the following; i) interest expense; ii) insurance Premium; iii) cash and clearing; iv) cost of liquidity; v) overheads recovery rate; vi) cost of risk; and vii) minimum profit margin. The cost of funds includes cost items (i) to (iv), while the remaining are termed other costs.Interest expense was identified as a direct cost, while the indirect cost of funds includes overhead (salaries, other costs), statutory cost such as NDIC premium and Cash Reserve Ratio (CRR), opportunity cost of holding liquid assets in ex-cess of the minimum requirement, cost of holding non-earning assets and tar-get return on equity. Overhead costs previously included were advertising

Savings Rate

In a narrow sense, saving generally means putting money aside, for example, by investing in a pension plan or putting money at the bank. In a broader sense, saving is typically used to refer to economizing, cutting costs, rescuing someone or something. Savings, on the other hand, may be defined as accumulated money put aside by saving. Saving is a mechanism by which economic agents make deliberate choice to allocate a portion of their current income for the purpose of making investment and increasing their future earning capacity. Saving is income not spent, or deferred consumption. Methods of saving include putting money aside in, for example, a deposit account, a pension account, an investment fund, or as cash. Saving also involves reducing

expenditures, such as recurring costs. In terms of personal finance, saving generally specifies low-risk preservation of money, as in a deposit account, versus investment, wherein risk is a lot higher; in economics more broadly, it refers to any income not used for immediate consumption. Saving does not automatically include interest rate. defined savings as the excess of income over expenditure on consumption. Meaning that savings is that part of the disposable income of the period which has not passed into consumption). Given that income is equal to the value of current output; and that current investment (Gross Capital Formation) is equal to the value of that part of current output, which is not consumed, savings is equal to the excess of income over consumption.

Monetary Policy Rate

This is just a fancy word for the interest rate at which banks can borrow from the central bank. And it is how the CBN influences the rate at which banks can lend to companies and customers. The higher the rate the less favourable terms you will get for loans from banks. Currently, in Nigeria, it is 12%. In 2011, it was 8% and has steadily risen since then to 13% towards the end of last year, then briefly dropped to 11% and for a while now has been 12%. in Nigeria, the Central Bank (CBN) Monetary Policy Council (MPC) which derives its legal backing from the various statutes of the bank (CBN Act 1958; Decree No. 3 1997; CBN Act 2007), adopted a new anchor for monetary policy action on December 11, 2006 with the ultimate goal of achieving stability in the domestic currency, prices and ultimate economic stability through interest rates stability around a benchmark called MPR. The transmission of monetary policy action is often effected through interest change. Being a cost for borrowing and a reward for lending, the interest rate is an important economic variable which need to be guided so as to achieve economic stability.

Nominal Interest Rate

Nominal interest rate refers to the interest rate before taking inflation into account. Nominal can also refer to the advertised or stated interest rate on a loan, without taking into account any fees or compounding of interest. Finally, the monetary policy rate, the interest rate set by the Central Bank of Nigeria referred to as a nominal rate. Nominal interest rates exist in contrast to real interest rates and effective interest rates. Real interest rates tend to be important to investors and lenders, while effective rates are significant for borrowers as well as investors and lenders. To avoid purchasing power erosion through inflation, investors consider the real interest rate, rather than the nominal rate. One way to estimate the real rate of return in the Nigeria is to observe the interest rates on Treasury inflation –protected securities (TIPS).

Real Interest Rate

A real interest rate is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower and the real yield to the lender or to an investor. The real interest rate of an investment is calculated as the amount by which the nominal interest rate is higher than the inflation rate. While the nominal interest rate is the interest rate officially assigned to the product or investment, the real interest rate is a reflection of the change in purchasing power derived from an investment based on shifts in the rate of inflation. The nominal interest rate is generally the one advertised by the institution backing the loan or investment. By adjusting the nominal interest rate to compensate for the effects of inflation, you are identifying the shift in purchasing power of a given level of capital constant over time. The anticipated rate of inflation is

reported by the Central Bank of Nigeria on a regular basis and includes estimates for a minimum three-year period.

Investment

Investment can be broadly defined as the acquisitions of an asset with the aim of receiving a return. It could also mean the production of capital goods; goods which are not consumed but instead used in future production. Examples include building a rail road, or a factory, clearing land, or putting oneself through college. There are several motives for investment. The basic motive is profit/return. According to Keynes' theory, this motive depends on the under-utilization of capital described investment as generally conceptualized in terms of "physical" capital formation. The explanation derives from the neoclassical production function with separable input factors – mainly capital and labour, and with investment adding to the stock of capital. Real domestic investment is an expenditure made to increase the total capital stock in the economy. This is done by acquiring further capital-producing assets and assets that can generate income within the domestic economy. Physical assets particularly add to the total capital stock. defined investment as the production of new capital goods, plants and equipment. He also refers investment as real investment and not financial investment. Investment is a conscious act of an individual or any entity that involves deployment of money (cash) in securities or assets issued by any financial institution with a view to obtain the target returns over a specified period of time opined that Keynesian theory helps investment to play a critical role both as a component of aggregate demand as well as a vehicle of creation of productive capacity on the supply side and in determining medium run growth rates.

Domestic investment can generally be referred to as the investment in the companies and products of one's own country rather than in those of foreign countries. Domestic investment comprises of private and public investment. Private investment can be defined as investment by private businesses for the motive of generating profit whiles public investment refers to investment by the government sector primarily, but not exclusively, on social and core economic infrastructure. Domestic investment is one of the most important components of economic growth that countries consider as the main engine of the economic cycle. Recent theories on the nee-classical growth model as well as theories of endogenous growth has emphasized the role of domestic investment in economic growth such as capital spending on new projects in the sectors of public utilities and infrastructure like roads projects, housing, electricity extensions, as well as social development in the areas of health, education, and communication projects among others.

Keynes Theory

This theory assumes equilibrium with less than full employment where both employment and income are fluctuating. The theory views interest as reward for parting with liquidity. It provides that interest rate is determined by the demand and supply of money. The theory opined that supply of money is usually determined by monetary authorities while the demand for money is a function of income and interest rate. The theory further explained that transactionary and precautionary motive of liquidity is dependent on income while speculative motive is dependent on interest rate, it is interest elastic.

Rigid Accelerator Theory

The simplest theory of investment demand is the rigid accelerator model formulated by Clark (1917). In its simplest form, the rigid accelerator theory of investment states that investment is proportional to the increase in output which is proxy by changes i n demand in the coming period. Thus, the accelerator model relates investment to changes in demand and proposes that an increase in a firm's output will require a proportionate increase in its stock of capital. The theory basically assumes that firms‟ desired capital-output ratio is roughly constant and net investment takes place when output is expected to increase. In effect, the theory implies that the level of output or the changes in aggregate demand determines investment or the change in capital stock. Mathematically, this proposition of the theory is expressed as $Kt^* = \sigma Y$, where σ is the desired capital-output ratio which is assumed to be constant, Kt^* is the desired capital stock in period t, and Yt is the level of output in the same period.

McKinnon-Shaw Hypothesis

The neoliberal view by emphasizes the importance of financial deepening and high interest rates in stimulating growth through investment. According the work of, which offered a theoretical and empirical foundation for the relationship between financial factors and investment in developing countries, developing countries suffer from financial repression and that their liberation from these repressive conditions, investment, savings and growth would be induced to increase (Mackinnon, 1973; Lucky, 2018). . The important assumption of the model is that saving is responsive to interest rates, thus a higher saving rates would finance a higher level of investment, leading to higher growth. According to their argument, a repressed financial sector discourages both saving and investment because the rates of return are lower than what could be obtained in a competitive market. As a result, financial intermediaries do not function at their full capacity and fail to channel saving into investment efficiently, thereby hampering the development of the whole economic system.

Empirical Review

Adelakun (2015) examined the relationship between savings, investment and economic growth. A corollary of the work is the determination of which of the inputs of production contributes more to economic growth in Nigeria. The study makes use of time series data spanning twenty-nine years using error correction model. The result shows a positive relationship between savings, investment and economic growth in Nigeria. Of the determinants of savings considered in the study, inflation rate contributes negatively to saving, while interest rate positively affect saving. All these confirm economic theory. The striking feature of the study however is the confirmation of the impact of labour on economic growth, which according to the study far outweighs the contribution of capital. Olaniyi (2019) established whether there is a threshold above which the effect of the interest rate on economic and investment growth changes. (2000) threshold estimation approach is used for Nigeria over the period 2006 2017. The findings show that that there are two thresholds that are well-identified by the data. The estimated values of the interest rate thresholds are 21.1% for GDP growth and 22.6% for investment growth. That is, the interest rate contributes positively to economic growth when it is below 21.1%, but becomes a major concern beyond the 21.1% level. Similarly, the interest rate contributes positively to investment growth when it is

below 22.6%, but becomes a major concern beyond the 22.6% level. The logical conclusion is that Nigeria, and other developing countries as well, should aim to achieve interest rate levels that do not inhibit growth and investment by adopting polices that put interest rates on the right trajectory below the estimated thresholds.

Ojima, 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 reveals that high interest rate negatively affects investment. In line with the findings, the study made the following suggestions; that relevant monetary authority should evolve policies that will encourage savings and reduce prime lending rate to genuine investors, among others. It further recommend that since there is a direct relationship between income and savings, relevant authority should consider economic policies that will increase income level of the people in order to mobilize investment. Oriavwote, and Oyovwi, (2014) investigated the influence of interest rate on investment decisions in Nigeria. The co-integration technique with its implied ECM was applied to estimate the data which covered the period between 1980 and 2012. The result shows that while high minimum rediscount rate and high prime lending rates have detrimental impact on aggregate investment, high Treasury bill rates and high government stock rates have positive and significant impact of the level of aggregate investment in Nigeria. The ECM result shows a satisfactory speed of adjustment and a long run relationship also exists among the variables. The study shows that interest rates have differential impact on aggregate investment. The result recommends amongst others that to increase aggregate investment, the minimum rediscount rate and the prime lending rate should be lowered.

Muntanga (2020) investigated the impact of interest rate on savings and investment in Zambia for the period 1980 to 2018. To achieve these objectives, the study tested for the relationship between interest rate and savings and the relationship between interest rate and investments using simple linear regression estimation techniques in the analysis. The study findings show that interest rates impact net savings in Zambia significantly. This was verified by a positive interest rate coefficient. There was also a strong link between interest rate and aggregate savings, which would result in an increase in aggregate savings in the economy. The result can be seen in the literature review which showed that interest rates have a positive response to savings and economic growth and, therefore, the correlation between interest rate sensitivity and savings is positive. Interest rates have a negative significant impact on aggregate investment in Zambia. It was verified by a negative coefficient of interest and a t-value above the thumb-benchmark law of two. Also, there was a negative correlation between interest rate and aggregate investment in Zambia, thus an increase in interest rate will lead to decrease in Aggregate investment in Zambia and vice versa. The overall savings have a significant positive impact on Zambia's aggregate investment. This was verified by a positive coefficient of aggregate savings and a t-value higher than the thumb bench mark value. Also there was a positive correlation between Aggregate savings and aggregate investment thus an increase in Aggregate savings will lead to an increase in Aggregate investment in Zambia. Thus, the study makes the following recommendations: Government should ensure that the interest rate payable on savings is such as to stimulate savings rather than consumption, as it has been shown from this research that interest rates have a positive effect on savings, which in turn stimulate investment. Government should ensure that interest rates on loans and advances are such as to

stimulate investment leading to an increase in gross domestic product and citizens' living standards. Zambians should cultivate a savings culture as the link between savings and investment is direct, which means an increase in savings leads to increased investment.

Gini and Akokaike (2021) explored the effect of interest rate on portfolio investment in Nigeria from 1984 to 2018, using time series data from CBN and WDI. The study was motivated by the fact that portfolio investment has not yield the needed returns in Nigeria despites government's effort at different times to improve the capital market where portfolios are traded, the capital market is still grossly under developed. Also, before and after the deregulation of interest rate which is perceived to be a major determinate of portfolio investment, portfolio investment has not reached its peak in Nigeria. The broad objective of the study therefore was to examine the effect of interest rate on portfolio investment in Nigeria, while the specific objectives included to determine the effect of interest rate on portfolio investment, to investigate the speed of response of portfolio investment to changes in interest rate and exchange rate, and to determine the nature of causal relationship between interest rate and portfolio investment. The study employed the technique of Autoregressive Distributed Lag (ARDL). The Findings showed that interest rate has a positive and significant effect on portfolio investment in the short run but no effect in the long run. It was concluded that apart from interest rate, factors affecting portfolio investment in Nigeria is multidimensional. It was recommended that the CBN should consider an interest rate threshold that applies to both lenders and borrowers so that none get worse off, so as to promote positive portfolio investment and growth

Inimino, Abuo, and Bosco (2018) 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. Osuji, (2021) examined the impact of interest rate liberalization on investment in Nigeria from 1961 to 2017 using error correction model and variance decomposition of vector autoregressive model. The

empirical findings of the study showed that interest rate liberalization has no significant impact on investment in Nigeria. The result further showed that prime lending rate had a negative insignificant impact on investment in Nigeria both in the pre and post liberalization period. Private sector credit and nominal exchange rate were also observed to be insignificant factors explaining variations in investment in Nigeria. However, national income and government expenditure exerted a positive and negative significant impact on investment respectively. The study therefore recommended that government through the Central Bank of Nigeria should use her monetary policies to influence interest rate in such a way as to stimulate investment growth in the country instead of allowing it to be freely determined by the market forces as the theory on liberalization suggests.

Dahunsi (2020) examined the effect of interest rate liberalization on domestic savings in Nigeria between 1986 and 2018. The data collected by the study from the Central Bank of Nigeria statistical bulletin were analyzed using the autoregressive distributed lag technique. The result showed that interest rate and gross domestic savings are cointegrated in the long-run while capital formation had a positive effect on domestic savings. Osuji (2020) investigated the impact of interest rate deregulation on investment growth in Nigeria using data that were collected from the Central Bank of Nigeria (CBN) from 1961 to 2017. The study adopted the error correction model and variance decomposition of the vector autoregression model. Variables such as prime lending rate, private sector credit, nominal exchange rate and interest rate were employed in the study. It was discovered from the analysis of the study that interest rate liberalization had no significant impact on investment in Nigeria.

Akpansung and Waziri (2018) examined financial liberalization policies and its impact on the economic growth process of Nigeria between 1986 and 2014. The study employed three different measures of financial liberalization and it was discovered that the different financial liberalization measures had a significant effect on economic growth both in the short run and long run. Okwuchukwu and Ariwa (2017) looked at the influence the financial system, savings and investment have on the Nigerian economy. The scope of the study was between 1970 and 2014 with variables like the gross domestic product, interest rate, savings rate, gross savings, and gross fixed capital formation. It was discovered in the study that the real interest rates had a negative and significant influence on the Nigerian economy. Agbaeze and Onwuka (2016) investigated the effect of financial liberalization on the investments of the private sector in Nigeria using a temporal scope that ranged between 1991 and 2011. The study found that financial liberalization has not contributed significantly to the improvement of private sector investment in Nigeria. It was believed that a situation like an unfavorable economic environment contributed to the reduction experienced in the benefits of financial liberalization.

Karimo and Ogbonna (2017) examined the direction of causality between financial deepening and economic growth in Nigeria for the period 1970-2013. The study adopted the Toda-Yamamoto augmented Granger causality test. The results showed that the growth-financial deepening nexus in Nigeria follows the supply-leading hypothesis. According to the study, this means that it is financial deepening that leads to growth and not growth that leads to financial deepening. The study recommended among others that policy effort should be geared towards removing obstacles

that undermine the growth of credit to the private sector, and must restore investors' confidence in the stock market operations. Olawumi, Lateef and Oladeji (2017) examined the effect of financial deepening on the profitability of selected commercial banks in Nigeria using secondary data. Findings revealed that each component of financial deepening indicators has a strong relationship and are statistically significant. This provides empirical evidence that financial deepening made positive contributions to the level of profitability of the selected commercial banks in Nigeria. This paper concluded that contributions of each component of financial deepening to selected commercial banks performance is strong and are statistically significance.

Wairagu (2016) studied the effects of financial deepening on entrepreneurial growth in Kenya. The financial deepening indicators comprised of credit received by entrepreneurs/SMEs, the affordable nature of interest rates, savings culture coupled with the financial sector regulation. This research study employed a descriptive survey design and data were derived from both primary and secondary sources. Primary data were collected with the aid of a questionnaire while secondary data were gathered from expressive documentary analysis. The collected data were afterwards coded before the actual analysis with the useful aid of the Statistical Package for Social Sciences (SPSS). The results of the study were then presented in tabular form by particular use of line graphs and bar graphs. Major study findings indicated that the growth rate of the loans accessed by entrepreneurs/SMEs was on an unchanging progress in the period between 2006 and 2016. The four notable determinants (credit access, interest rates affordability, savings culture together with financial sector regulation) also had a confirmatory correlation with the expanded (growth) rate of entrepreneurs/SMEs. The researcher recommended effective enhancement of the distribution and apportionment policies to keep guard against bad debts and untoward wastage of funds. According to the study, there is also the necessity to initiate a proper and workable policy to make certain that the loans advanced to clients are equitably dispersed across the SMEs country wide to make sure that the rewards of economic and financial development are secured by a much wider population among other notable recommendations. The study further recommended the realignment of the interest rates in tandem with the existing parliamentary laws to prevent the exploitation of entrepreneurs/SMEs by the financial lending institutions. The researcher suggested that a study be carried out to give a model to guide the establishment of the appropriate lending rate that can ensure a steady positive entrepreneurial growth in the country.

Nwanna and Chinwudu (2016) examined financial deepening and economic growth in Nigeria from 1985 to 2014. The paper focused on the impact of stock market and bank deepening variables such as money supply, market capitalization, private sector credit and financial savings have on economic growth of Nigeria. The study used annual time series data from 1985 to 2014 obtained from the Central Bank of Nigeria statistical bulletin. Ordinary least square (OLS) econometric technique was employed in the study. The result of the analysis revealed that both bank based and stock market financial deepening proxies have significant and positive effect on economic growth. The study recommended that there should be improvement by encouraging more participation in the stock market, easing restrictions on international capital and entry into stock market to ensure more companies are listed. Obafemi, Oburota and Amoke (2016) assessed the relationship between financial deepening and investmentin Nigeria. Secondary data spanning from 1970 to 2013 was used for the empirical analysis. It adopted the Gregor-Hansen Endogenous structural break

methodology and the supply-leading hypothesis in building the model. The study also employed the Unit Root Test, Co Integration Test and Granger Causality Test. It discovered a unidirectional causality, running from financial deepening to investment. It also found that the financial deepening has a statistically significant impact on domestic investment. Based on these empirical findings, the study recommended increased integration of the credit and thrift societies, cooperatives, rural saving organization etc into the mainstream formal financial sector in order to shore up the mobilization of savings for investment. It also recommended subsidizing the operational cost of financial intermediation so as to narrow the gap in interest rate spread. According to the studies, these steps when judiciously executed will ultimately promote financial deepening by easing the rigidities involved in mobilizing and accessing of credit for investment purpose.

Alrabadi and Kharabsheh (2016) investigated the dynamic relationship between financial deepening and economic growth in Jordan over the period (1992-2014). Vector auto regressive regressions, Granger causality and Johansen-Juselius conitegration tests were employed to achieve the objectives of the study. Using quarterly data, the results indicated no statistically significant effect of financial deepening on economic growth on the short run. However, the cointegration tests showed a statistically significant long run equilibrium relationship between the two variables regardless of the proxy used for financial deepening. Moreover, the Granger causality test showed a bi-directional causality between economic growth and financial deepening when the latter is measured by the amount of credit granted to private sector. However, a one way causal relationship from the economic growth to financial deepening was found when the amount of deposits and money supply (M2) were used as proxies of financial deepening. Dabwor and Abimiku (2016) assessed empirically whether or not financial deepening has played a significant role in poverty alleviation effort in Nigeria for the period 1990 to 2013 using both quantitative and descriptive analyses. The paper estimated three models in which poverty rates for the rural areas, urban areas as well as national poverty rates were regressed on financial development indicators. The paper found that the coefficient of ratio of broad money supply to GDP reduces poverty rate in Nigeria. The study also found that the ratio of market capitalization to GDP and ratio of foreign direct investment in equities to GDP have positive impact on rural and urban poverty reduction respectively. However, the ratio of credit to the private sector and the ratio of total stock traded to GDP revealed opposite impact on poverty alleviation at all levels. The descriptive analysis indicated that poverty rate in Nigeria has been unacceptably high in spite of abundant natural and human resources. The paper therefore, recommended the need for urgent reforms in the financial sector that would facilitate development in both the money and capital markets to improve liquidity; reduce interest rate spread to attract deposits and broaden financial access to the poor.

Okafor, Onwumere, and Chijindu (2016) conducted a causality and impact analysis on financial deepening indicators and economic growth in Nigeria for a-33-year period covering 1981 – 2013. The study used the Phillips-Peron test for unit root to ascertain whether the variables are stationary or not. The VEC residual normality test and the Histogram-Normality test were utilized in other to determine if the data set were normally distributed. Test for a long run relationship was conducted with the aid of the Johansen cointegration test. The Error Correction Model as well as the Granger causality test was also employed. The findings revealed that there is a long run

relationship between economic growth, broad money supply and private sector credit, with high speed of adjustment towards long run equilibrium. The results also revealed that while broad money has positive and non-significant impact on economic growth, private sector credit has negative and non-significant impact on growth. The Granger causality test results showed that neither broad money supply nor private sector credit is granger causal for economic growth and vice versa. The study therefore recommended that private sector friendly policies should be implemented to ensure that investors do not only have access to credit but such credit should be at affordable cost, i.e. at a relatively low interest rate. Monetary and fiscal policies should be harmonized in other to achieve the economic goal of sustained growth and stability. Agyei (2015) examined the causal relationship between financial development and economic growth in Ghana. This was done using modern time series econometric procedures by employing four proxies of financial development and applying Granger causality test, Cointegration and Vector Error Correction Model (VECM) .The empirical results showed a uni-directional relationship between financial development and economic growth and that the direction of causality is sensitive to the choice of proxy of financial development. It was discovered that, the issue as to whether finance follows in the direction of economic growth or lead to economic growth depends on the proxy of financial development. According to the study when Credit to the private sector (CPSY) was used to proxy financial development, finance leads economic growth. On the other hand, when the ratio of broad money to GDP (M2+Y) was used as a proxy for financial development, finance follows growth. The empirical Cointegration results supported a positive long run relationship between financial development and economic growth.

Aye (2015) investigated the role of financial development on economic growth in Nigeria using a bootstrap rolling window estimation approach. The study covered the period 1961-2012. The tests revealed the periods where financial deepening had predictive power for economic growth, as well as the periods where economic growth had predictive power for financial deepening. The results highlighted the risk of misleading conclusions based on the standard Granger causality tests which neither accounted for structural breaks nor time variation in the relationship between financial deepening and economic growth. Alenoghena (2014) examined the contributions of capital market and financial deepening to economic growth in Nigeria over the period of 1981 to 2012. The analysis involved examining the stochastic characteristics of each time series variable by testing their stationarity using Augmented Dickey Fuller (ADF) test and estimating the error correction mechanism model. Several variables were adopted as proxies for capital market and financial deepening. The study revealed that Stock Market Capitalisation (MCAP), Narrow Money Diversification (NMD; involving credit to private sector) and Interest Rate (INT) significantly impacted the promotion of economic growth of the country during the period of study. Though, other measures of liquidity represented by Financial Development (FID) and Monetisation Ratio (MTR) were not significant in explaining the trend in economic growth, they exhibited very strong coefficients in the process. It was recommended that government and other stake holders in the economy should take measures to further improve the liquidity of the financial market to enhance overall economic efficiency in the country. The study added that policy targets should be specific on the expansion of credit to the producing sectors of the economy and further monetization of the economy by extending financial services to deficient locations.

Madichie, Maduka, Oguanobi and Ekesiobi (2014) used Ordinary Least Squares (OLS) techniques, Augmented DickeyFuller unit root test, Johansen cointegration test, error correction technique, and the Granger causality test to investigate the impact of financial development on economic growth in Nigeria covering the period 1986-2012. The empirical results revealed that all the variables used are integrated of the same order, I(1); there is evidence of the existence of a long run relationship among the variables used; the normalized cointegration coefficients revealed that financial development affects economic growth negatively in the long run. However, the short run impact of financial development on economic growth is positive. This, according to the study, means that the finance-led growth hypothesis is valid in Nigeria only in the short run. The study also found evidence of stability of both long run and short run relationship between the real GDP and financial development in Nigeria and the adjustment process to restore equilibrium after disturbance is effectively slow (6.50 percent of discrepancies is corrected in each period). Also, the paper found that causality runs from economic growth to financial development and there is no bi-directional causality between growth and finance which lends support to the demand-leading hypothesis. Based on these findings, the study recommended among other things that: the government should device a means to energies the micro finance sector so as to make credits available and accessible to micro entrepreneurs who are often deprived of credits by the conventional credit markets.

Bakang (2014) investigated the effects of financial deepening on economic growth in the Kenyan banking sector. The study achieves this objective using quarterly time series data from 2000 to 2013. Financial deepening, the independent variable was captured by four indicators which include Liquid Liabilities (LL) as ratio to nominal Gross Domestic Product (GDP); Credit to the Private Sector (CPS) as ratio to nominal GDP; Commercial Bank Assets as ratio to commercial bank assets plus Central Bank Assets (CCBA); and Commercial Bank Deposits (CBD) as ratio to nominal GDP. The dependent variable, economic growth, was measured by real GDP. The study found that banking sector in Kenya has an important role to play in the process of economic growth. Specifically, the empirical results revealed that liquid liabilities, credit to the private sector, central bank assets and commercial bank deposits have positive and statistically significant effects on GDP. The study recommended the reinforcement of existing policies that will encourage the public to save more money with commercial banks. This, as explained by the study should be in the area of increasing the interest rate paid to depositors on their deposits in order to incite them to save more. The study also recommended the intensification of financial inclusion policies through increased access and usage of formal banking services while reducing banks transaction costs. Ohwofasa and Aiyedogbon (2013) studied the impact of financial deepening on economic growth in Nigeria for the period 1986 to 2011. Vector autoregressive (VAR) methodology and its derivatives, impulse response function and variance decomposition, were employed to scrutinize the relationship between financial deepening and economic growth. The findings showed that the series are co-integrated and that long run relationship existed between the variables. The results of the VAR estimates revealed among other things that a one year lag of economic growth, gross national saving as a ratio of GDP (lag 1) and exchange rate (lag 1) have significant positive impact on current economic growth while the impact of GCF (lag 1) on the current level of economic growth was negative and statistically significant. It was also empirically discovered that PSC/GDP (lag 2) and GNS/GDP (lag 2) happened to be key determinants of M2/GDP. Similarly, the key

determinants of PSC/GDP include its year 1 and 2 lagged values and GNS/GDP (lag 2) with GNS/GDP (lag 2) and PSC/GDP (lag 2) exhibiting negative impact. Finally, on the current level of GNS/GDP, it is observed that M2/GDP (lag 1) and PSC/GDP (lag 2) exhibit significantly negative determining influence while PSC/GDP (lag 1) and the past value of GNS/GDP (lag 2) were also seen as its key determinant. These findings were further corroborated by the results of the impulse response function and variance decomposition. Among the recommendations of the study was that savings should be stimulated in order to place more funds in the hands of banks to intermediate to investors seeking funds. The study added that lending rate should be reasonable so as not to deter investors to borrow to embark on viable investment projects.

Torruam, Chiawa and Abur (2013) examined the causal relationship between financial deepening and Economic Growth in Nigeria for the period 1990-2011. The stationarity properties of the data and the order of integration of the data were tested using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test. The variables tested stationary at first differences. The Johansen approach of cointegration was applied to test for the long-run relationship among the variables. The result indicated four (4) cointegrating relationships between the variables; the Granger-causality suggests that there is unidirectional causality running from economic growth to financial deepening in Nigeria. The study concluded that financial deepening has an impact on economic growth in Nigeria. According to the study, it implies that developing the financial sector in Nigeria, improves financial structures and ensures efficient delivery of financial services to the private sector to invest to attract more private sector participation for increase output.

Aye (2013) assessed the dynamic causal relationship between financial deepening, economic growth and poverty in Nigeria using annual time series covering 1960 to 2011 periods. The Johansen co-integration test was used to examine the long-run relationship between finance, growth and poverty. The short and long run causality between these variables was tested using a modified Hsaio-Granger causality within a Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) framework. The results indicated no evidence of long run equilibrium relationship between finance, economic growth and poverty. Therefore, the study focused on short-run causality. Also, the results showed a short-run unidirectional causality from growth to poverty conditional on finance. The study also found evidence of causality from poverty to financial deepening conditional on growth. The study suggested that a more balanced policy approach that also takes into account other fundamental growth factors such as institutions, investment in physical and human capital may help strengthen the finance–growth-poverty dynamics. Chukwuka (2012) examined the causal relationship between financial deepening and economic growth in the Nigeria for the period 1986 to 2010 using Vector Auto Regressive model. The study found that financial deepening does not impact economic growth in short run but in the long run. The study also found that GDP have a positive and significant impact on Deposit Money Banks' Assets, money supply and private sector credit. It recommended that monetary authorities should continue with the policy reforms to consolidate the emerging confidence in the financial system.

METHODOLOGY

The study adopted the quasi-experimental research design. This is because the variable under study cannot be manipulated or is not under the control of researcher. The study is designed after correlation or regression research methodology. Here we try to see how two or more variables can relate or influence each other. The study used annual data sourced from Central Bank of Nigeria.

Model Specification

PI = f (SSR, RIR, MPR, PLR, MLR) 1

To have the estimable version of above models 1 can be rewritten to have

$$PI = \beta_0 + \beta 1SR + \beta_2 RIR + \beta_3 MPR + \beta_4 PLR + \beta_5 MLR + \mu \quad 2$$

Where

PI = Private investment

SR = savings rate

RIR = Real interest rate

MPR = monetary policy rate

PLR = prime lending rate

MLR = maximum lending rate

$\phi_0 \alpha_0$ = Constant

β_1 - β_5 = Coefficients of independent variables

μ_{it} = Error Term

A-Priori Expectation

Base on theories such as financial intermediation theory and empirical results examined in this study, the variables are expected to have a positive effect on the dependent variables. The mathematical implication is stated as follows: β_1, β_1, β_1, β_1 >0

Data Analysis Techniques

Econometric Analysis

Appropriate levels of analysis will be conducted, in each case ranging from the global analysis (that reveals the overall utility of the models) to analysis of relative statistics that test the hypotheses. This study applies unit root test first so as to uncover the true nature of stationary-properties of all the variables under consideration. This is necessary in order not to run into the problem of spurious regression since unit root problems are common features encountered in most time series studies. However, the simple regression model will be employed as the estimation

technique for this study. Johansen and Jusellius Co-integration Test would be applied to determine the long run equilibrium of the variables in the model, while the Granger Causality Test would also be applied in checking the underlying structure of the dynamics relationship between the variables.

Ordinary least squares (OLS) are a method for estimating the unknown parameters in a linear regression model. Hutcheson (2011) defined ordinary least square (OLS) regression as a generalized linear modeling technique that may be used to model a single response variable which has been recorded on at least an interval scale. This method minimizes the sum of squared vertical distances between the observed responses in the dataset and the responses predicted by the linear approximation.

OLS technique may be applied to single or multiple explanatory variables and also categorical explanatory variables that have been appropriately coded. In single explanatory variables, the relationship between a continuous response variable (Y) and a continuous explanatory variable (X) may be represented using a line of best-fit, where Y is predicted, at least to some extent, by X. If this relationship is linear, it may be appropriately represented mathematically using the straight line equation 'Y = a + ßx

For the multiple explanatory variables additional variables are added to the equation. The form of the model is the same as in a single response variable (Y), but this time Y is predicted by multiple explanatory variables (X_1 to X_5).

$$Y= \beta_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 \quad 3$$

The interpretation of the parameters (a and ß) from the above model is basically the same asfor the simple regression model , but the relationship cannot be graphed on a single scatter plot. a indicates the value of Y when all variables of the explanatory variables are zero. Each ß parameter indicates the average change in Y that is associated with a unit change in X, whilst controlling for the other explanatory variables in the model. Model-fit can be accessed through comparing deviance measures of nested models. For example, the effect of variable X_3 on Y in the model can be calculated by comparing the nested models

$$Y= \beta_0+ ß_1X_1 + ß_2X_2+ ß_3X_3 \quad 4$$

$$Y= \beta_0+ ß_1X_1 + ß_2X_2 \quad 5$$

The change in deviance between these models indicates the effect that X3 has on the prediction of Y when the effects of X_1 and X_2 have been accounted for (it is, therefore, the unique effect that X_3 has on Y after taking into account X_1 and X_2). The overall effect of all three explanatory variables on Y can be assessed by comparing the models

$$Y= \beta_0+ ß_1X_1 + ß_2X_2+ ß_3X_3 \quad 6$$

$$Y= a. \quad 7$$

The significance of the change in the deviance scores can be accessed through the calculation of the F-statistic using the equation provided above (these are, however, provided as a matter of course by most software packages). As with the simple OLS regression, it is a simple matter to compute the R-square statistics.

Stationarity (Unit Root) Tests

The study investigates the stationarity properties of the time series data using the Augmented Dickey Fuller (ADF) test. According to Nelson and Plosser (1982), Chowdhury (1994) there exist a unit root in most macroeconomic time series. While dealing with time series, it is necessary to analyze whether the series are stationary or not. Since regression of non-stationary series on other non-stationary series leads to what is known as spurious or nonsense regression causing inconsistency of parameter estimate. The Null hypothesis of a unit root is rejected against the one sided alternative if the t-statistics is less than the critical value.. Thus, test for stationarity is also called test for integration. It is also called unit root test. Stationarity denotes the non-existence of unit root. We shall therefore subject all the variables to unit root test using the augmented Dickey Fuller (ADF) test specified in Gujarati (2004) as follows.

$$\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + \alpha i \sum_{i-1}^{m} \Delta y_{t-1} + Et \qquad 8$$

Where:

Δy_t = change time t

Δy_{t-1} = the lagged value of the dependent variables

Σ_t = White noise error term

If in the above δ =0, then we conclude that there is a unit root. Otherwise there is no unit root, meaning that it is stationary. The choice of lag will be determined by Akaike information criteria.

Decision Rule

t-ADF (absolute value) > t-ADF (critical value) : Reject H_o (otherwise accept H_1)

Note that each variable will have its own ADF test value. If the variables are stationary at level, then they are integrated of order zero i.e 1(0). Note that the appropriate degree of freedom is used. If the variables are stationary at level, it means that even in the short run they move together. The unit root problem earlier mentioned can be explained using the model:

$Y = Y_{t-1} + \mu_I$ 9

Where Yt is the variable in question; μ_i is stochastic error term. Equation (a) is termed first order regression because we regress the value Y at time "t" on its value at time (t- 1). If the coefficient of Y_{t-i} is equal to 1, then we have a unit root problem (non stationary situation). This means that if the regression.

$$Y= Y_{t-1} + \mu_I \quad 10$$

Is run and L is found to be equal to 1 then the variable Yt has a unit root (random work in time series econometrics).

If a time series has a unit root, the first difference of such time series are usually stationary. Therefore to salve the problem, take the first difference of the time series. The first difference operation is shown in the following model:

$$\Delta Y= (L-1)\ Y_{t-1} + \mu_I \quad 11$$

$$\delta Y_{t-1} + \mu_I \quad 12$$

(Note : δ =1-1= 0 ; where L =1 ; $\Delta Yt = Yt - Y_{t-i}$) 13

Integrated Of Order 1 Or I(I)

Given that the original (random walk) series is differenced once and the differenced series becomes stationary, then the original series is said to be integrated of order I or I (1).

Integrated of Order 2 Or I (2)

Given that the original series is differenced twice before it becomes stationary (the first difference of the first difference), then the original series is integrated of order 2 or 1(2).

Therefore, given a time series has to be differenced Q times before becoming stationary it said to be integrated of order Q or I (q). Hence, non-stationary time series are those that are integrated of order 1 or greater.

The null hypothesis for the unit root is: Ho: a = 1;

The alternative hypothesis is Hi: a <1.

We shall test the stationarity of our data using the ADF test.

Co-integration Test (The Johansen' Test)

It has already been warned that the regression of a non-stationary time series on another non stationary time series may lead to a spurious regression. The important contribution of the concept of unit root, co-integration, etc is to force us to find out if the regression residual are stationary. The lag length is one and is based on the Akaike (1969) information criterion (AIC). The lag is taken into account at Mckinnon critical values at 5% level. If the residuals from the regression are 1(1) or 2(2), i.e stationary, then variables are said to be co-integrated and hence interrelated with

each other in the long run. This approach is based on conducting unit root test on residual obtained from the estimated regression equation. If the residual is found to be stationary at level, we conclude that the variables are co-integrated and as such as long-run relation sip exists among them.

$$PI_t = w_O + \sum_{i=1}^{i} \vartheta_t SR_{t-i} + \sum_{i=1}^{j} \varpi_i RIR_{jt-i} + \sum_{i=1}^{j} \varpi_i MPR_{jt-i} + \sum_{i=1}^{j} \varpi_i PLR_{jt-i} + \sum_{i=1}^{j} \varpi_i MLR_{jt-i} + \mu_{1t} \quad 14$$

In the equation above, therefore, in this study, we will carry out a stationarity test between an independent variables interest rates and the dependent variable private investment in Nigeria from 1990-2023.

Vector Error Correction (VEC) Technique

The study investigates the direction of causality for the hypotheses using Vector Error Correction (VEC) model based causality technique. The presence of co-integrating relationship forms the basis of the use of Vector Error Correction Model. E-views econometric software used for data analysis, implement vector Auto-regression (VAR)- based co-integration tests using the methodology developed by Johansen (1991,1995). The non-standard critical values are taken from Osterward Lenun (1992).

RESULTS AND DISCUSSIONS

Table 1: Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SR(-1))	0.341570	0.184547	1.850852	0.0840
D(RIR(-1))	0.144673	0.200450	0.721742	0.4816
D(MPR(-1))	0.423608	0.203289	2.083771	0.0447
D(PLR(-1))	0.260874	0.198126	1.316706	0.2077
D(MLR(-1))	0.666547	0.182147	3.659400	0.0023
ECM(-1)	1.364133	0.274594	4.967811	0.0002
C	-43.29945	8.896126	-4.867225	0.0002
R-squared	0.751276	Mean dependent var		-0.690400
Adjusted R-squared	0.602042	S.D. dependent var		21.86535
S.E. of regression	13.79352	Akaike info criterion		8.375449
Sum squared resid	2853.918	Schwarz criterion		8.862999
Log likelihood	-94.69311	Hannan-Quinn criter.		8.510675
F-statistic	5.034206	Durbin-Watson stat		1.933615
Prob(F-statistic)	0.003032			

Source: Extracts from E-Views 9 Output

To evaluate and correct for the errors existent between the long and short run dynamics in the study, the error correction estimation was executed. The results are shown in table 4.2 above. From the table, the ECM coefficient stands at stands at 1.364133 from with the expected negative sign,

which implies that 136 percent disequilibrium in equity investment is offset within the year. On the other hand, the coefficient of determination (R^2) of 0.602042 indicates that about 60.2 percent of the variations in dependent variables the long run is accounted for by variations in the study's explanatory variables. The profitability of ECM f-statistics of 5.034206 confirms its goodness of fit and its Durbin-Watson value of 1.933615 within acceptable range also. The results further indicates that savings rate have positive but no significant effect, real interest rate have positive and no significant effect, monetary policy rate have positive and significant effect, prime lending rate have positive and significant effect while maximum lending rate have positive and no significant effect on real sector investment in Nigeria.

Table 2: Unit Root Test Summary Results at First Difference

Variable	ADF Statistics	Mackinnon			Prob.	Order Of Intr.
		1%	5%	10%		
PI	-7.710413	-3.661661	-2.960411	-2.619160	0.0000	1(1)
SR	-9.907440	-3.661661	-2.960411	-2.619160	0.0000	1(1)
RIR	-6.594827	-3.653730	-2.957110	-2.617434	0.0000	1(1)
MPR	-7.981873	-3.646342	-2.954021	-2.615817	0.0000	1(1)
PLR	-5.711991	-3.653730	-2.957110	-2.617434	0.0000	1(1)
MLR	-5.923445	-3.646342	-2.954021	-2.615817	0.0000	1(1)

Source: Extracts from E-Views 9 Output

From Table 2 above, the results of the unit root tests show that the null hypotheses of a unit root for time-dependent variables of a non-stationary nature can be made stationary at the first difference, the variables became stationary at first differencing and it is integrated of 1(1). Having established the order of integration for the variables, the next step is to carry out a co-integration test to determine whether a long-run relationship exists between the variables. In this study we adopt co-integration test developed by Johansen (1988). The low R^2 and the adjusted R^2 indicates that the variables are safe for the estimation processes in order to avoid spurious regression estimations that are plagued with the problems of serial correlation.

Table 3: Johansen Co-Integration Test Results: Maximum Eigen

Hypothesized No. of CE(s)	Eigen value	Maximum-Eigen	0.05 Critical Value	Prob.**	Decision
None *	0.769540	48.43333	40.07757	0.0046	Reject H_0
At most 1	0.628354	32.66384	29.87687	0.0092	reject H_0
At most 2	0.475008	31.26430	27.58434	0.0406	reject H_0
At most 3	0.228945	28.57984	21.13162	0.0048	reject H_0
At most 4	0.208898	7.732834	14.26460	0.4065	reject H_0
At most 5	0.087682	3.028286	3.841466	0.0818	Accept H_0

Source: Extracts from E-Views 9 Output

From Table 3 above the results of the Johansen co-integration test shows that we adopt the alternative hypotheses of at most 4 co-integrating equation at the 5% level of significance. This implies that, there are four linear combinations of the variables that are stationary in the long run and also confirms the existence of a long-run relationship between the interest rate and private investment in Nigeria.

Table 4: Over-Parameterized Result

Variable	Coefficient	Std Err.	T-Statistics	Prob.
C	3.705379	8.348647	0.443830	0.6658
D(PI (-1))	0.296947	0.404806	0.733553	0.4786
D(PI(-2))	0.336541	0.358517	0.938701	0.3680
D(PI (-3))	0.500906	0.345830	1.448420	0.1754
D(SR (-1))	-5.770891	4.802849	-1.201556	0.2548
D(SR (-2))	-13.02951	6.123759	-2.127697	0.0568
D(SR (-3))	-4.837588	6.617092	-0.731075	0.4800
D(MLR(-1))	2.533071	2.666899	0.949819	0.3626
D(MLR(-2))	6.249705	4.427341	1.411616	0.1857
D(MLR(-3))	3.168330	4.444825	0.712813	0.4908
D(MPR(-1))	-5.847021	4.806143	-1.216573	0.2492
D(MPR(-2))	-3.383989	4.953588	-0.683139	0.5087
D(MPR(-3))	-0.418109	4.217976	-0.099126	0.9228
D(PLR(-1))	-1.250728	4.898301	-0.255339	0.8032
D(PLR(-2))	-0.030426	4.487182	-0.006781	0.9947
D(PLR(-3))	-0.210090	4.255542	-0.049368	0.9615
D(RIR (-1))	11.47860	7.139423	1.607777	0.1362
D(RIR (-2))	14.44383	7.380309	1.957077	0.0762
D(RIR (-3))	0.689096	8.895722	0.077464	0.9396
ECM(-1)	-1.092006	0.448192	-2.436466	0.0630
R2	0.608955			
ADJ. R2	0.566486			
F-STATISTICS	3.901566			
F-PROB	0.054452			
Durbin-Watson	2.104219			

Source: Extracts from E-Views 9 Output

From the Table 4 above, the vector error correction model (VECM) result shows that R^2 = 60% and adjusted R^2 =59% % which indicates a good fit with an F- statistic value of 3.901566 and a probability value of 0.054452 and the error correction term. This is further analyzed by a Parsimonious. ECM is appropriately signed not statistically significant with a probability value of 0.0630 in the model.

Discussion of Findings

The study found that about 60.2 percent of the variations in dependent variables the long run is accounted for by variations in the study's explanatory variables. The profitability of ECM f-

statistics of 5.034206 confirms its goodness of fit and its Durbin-Watson value of 1.933615 within acceptable range also. The results further indicates that savings rate have positive but no significant effect, real interest rate have positive and no significant effect, monetary policy rate have positive and significant effect, prime lending rate have positive and significant effect while maximum lending rate have positive and no significant effect on real sector investment in Nigeria. The positive effect of the variables confirms the findings of Rahman and Ferdaus (2021) that domestic savings are negatively and domestic investment is positively associated with economic growth in Pakistan, Ismael and Rashid (2013) that there exists a long-run relationship between household saving and the variables used in the study, while the result of the Error Correction Model reveals that about 45% convergence towards equilibrium takes place every year, the findings of Kudaisi (2013) that the dependency ratio, the interest rate is negative and insignificant on domestic savings, Ahmad and Mahmood (2013) that per capita income inversely related to domestic savings rate, both in the long-run and as well in the short-run significantly. The exchange rate and inflation rate harm savings. The findings of Ogbokor (2014) the results of the co-integration tests suggest that there is a long-run relationship between savings and the explanatory variables used in the study, Elias & Worku (2015) that there is a significant relationship between domestic savings and economic growth in the case of Ethiopia and Uganda and the findings Olesia (2015) showed a positive relationship between savings and economic growth in conjunction with the corresponding role of FDI toward growth. The study found that mortgage bank savings and time deposit have negative e but no significant effect on the equity investment in the capital market. The negative effect of the variables contradicts the expectations of the results and in line with the savings investment theory of the economists. The coefficient of the variables proved that increase could negatively reduce equity investment by 0.36 and 0.77 percent. The negative effect of the variables contradicts reforms in the financial market such as the deregulations of the financial market in the last quarter of 1986.

CONCLUSION AND RECOMMENDATIONS

Conclusion

From the results the ECM coefficient stands at stands at 1.364133 from with the expected negative sign, which implies that 136 percent disequilibrium in equity investment is offset within the year. On the other hand, the coefficient of determination (R^2) of 0.602042 indicates that about 60.2 percent of the variations in dependent variables the long run is accounted for by variations in the study's explanatory variables. The profitability of ECM f-statistics of 5.034206 confirms its goodness of fit and its Durbin-Watson value of 1.933615 within acceptable range also. The results further indicates that savings rate have positive but no significant effect, real interest rate have positive and no significant effect, monetary policy rate have positive and significant effect, prime lending rate have positive and significant effect while maximum lending rate have positive and no significant effect on real sector investment in Nigeria.

From the findings, the study concludes that there is no significant relationship between savings rate and real sector investment in Nigeria. From the findings, the study concludes that there is significant relationship between real interest rate and real sector investment in Nigeria. From the findings, the study concludes that there is significant relationship between monetary policy rate

and real sector investment in Nigeria. From the findings, the study concludes that there is no significant relationship between prime lending rate and real sector investment in Nigeria. From the findings, the study conclude that there is significant relationship between maximum lending rate and real sector investment in Nigeria

Recommendations

i. The government should set a sound and fertile environment such as further reforms in the banking sector and deregulations of savings and lending rates in order to foster domestic saving that will help to increase the level of real sector investment. The government should increase the operational efficiency of the development banks such as mortgage banks to increase savings that can be transform to equity investment in the real sector investment.
ii. The government should transform the financial sector of the country and regulatory obstacles should be removed and policies that encourage savings should be put in place in the financial market. Government should create favorable condition in order to mobilize domestic savings from the small depositors.

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