Interest Rates and Gross Fixed Capital Formation in Nigeria: A Multi-Dimensional Analysis

Sampson Ikenna Ogoke
Department of Banking and Finance
Kingsley Ozumba Mbadiwe University, Ideato, Imo State
ogokesampson01@gmail.com

Gabriel Queen Ibim
Department of Banking and Finance, Faculty of Administration and Management,
Ignatius Ajuru University of Education, Port Harcourt, Rivers State
queen.gabriel@iaue.edu.ng

Akujuobi Ngozi Edith
Department of Banking and Finance
Kingsley Ozumba Mbadiwe University, Ideato, Imo State
Email: akujuobingozi8@gmail.com
DOI: 10.56201/ijbfr.vol.11.no8.2025.pg148.164

Abstract
The purpose of this study was to examine the effect of interest rates on gross fixed capital formation in Nigeria. The study adopted time series data from Central Bank of Nigeria Statistical Bulletin from 1990-2023. The study made use of the Augmented Dicker-Fuller (ADF) unit root tests and it was discovered that the variables were not in the same order at level, hence, the use of Autoregressive Distribution Lag (ARDL). Gross fixed capital formation was modeled as the function of savings rate, money market, rate, monetary policy rate; prime lending rate and maximum lending rate. The estimated ARDL model found that interest rates explained 66.3 per cent variation in gross fixed capital formation in Nigeria. At lag 1, the study found that prime lending rate has positive but no significant effect and added 0.54 per cent to gross fixed capital formation, maximum lending rate have negative and no significant effect on gross fixed capital formation and reduced it by 0.11 per cent. Money market rates have negative and no significant effect on gross fixed capital formation, the variable reduced capital formation by 0.04 per cent within the time periods. The study concludes that interest rates determine the changes in gross fixed capital formation in Nigeria. It recommends that there should be effective and implementable monetary policies to back the interest rate interest rate and there should be policies to deepen the operational efficiency of the financial market enhance Nigeria gross fixed capital formation. Interest rate should be deepened and the policies revisited to meet the financial development needs of the economy. Nigerian Interest rate structure such as lending, and prime lending rate should be harmonized with the objective of enhancing to enhance Nigeria gross fixed capital formation. Nigeria monetary authorities should increase savings rates to enable deposit institutions to mobilize fund for investment as this has great extent to effect to enhance Nigeria gross fixed capital formation.

Keywords: *Interest Rates, Gross Fixed Capital Formation, Multi-Dimensional Analysis*

INTRODUCTION

Capital accumulation is the system of increasing the stock of real capital of a country. Simply put, it is a situation in which the net investment in the form of fixed assets is drastically increased. In order for a country to have the capacity to accumulate more capital, there has to be an increase in savings and a great reduction in the rate of consumption of the consumer goods made available in the country. The rate of economic development of any country directly has to do with the rate of the formation of capital. In countries like Britain, Japan, and the United States of America which have been more advanced, stocks of capital are high because of the high rate of capital formation meanwhile in many other countries of the world which are still yet to be developed especially African countries, there is a low rate of capital accumulation as a result of low per capita income and low savings, which ultimately results in what is usually called the vicious circle of poverty. Capital formation is a critical success factor of economic growth. Gross Fixed capital formation as a determinant of economic growth is divided into Gross private investment and Gross public investment. Capital formation is influenced by the development of the financial market, the fiscal and monetary policy of the country and the extent of external influence such as foreign aids, external debt and the level of foreign trade. Gross fixed capital formation leads to technical progress which help to realize the economics of large-scale production, increase specializat6ion in terms of providing machine, tools and equipment for growing labour force (Ainabor et al, 2014). In Nigeria like other developing and capital formation is challenged by high level of consumption, capital flight and huge importation such currency laws. This means that inadequate capital formation is a major constraint to economic growth. Therefore, capital formation should be considered priority if the monetary policy goal of economic growth is to be achieved

Various micro and macro factors determine capital formation such as public expenditure, monetary policy, private sector investment, cost of capital, international capital inflow among other factors (Lucky & Uzah, 2017). 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.
Interest rate in every economy is a major monetary policy tool 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. Interest rate changes in response to a variety of economic events 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, economic events such as these tend to be irregular (Acha & Acha, 2019). There is a more regular variability of interest rates associated with the business cycle, the expansion and contraction that the economy experiences over time. For instance, short term interest rates rise during business expansion and fall in economic recession. Long term interest rates do not appear to vary much with the level of economic activities especially investment which is the main drivers of economic growth. The term cyclical volatility of interest rate refers to the variability of interest rate over periods that correspond to the length of the typical business cycle. Interest rate variations affect decisions on investment and savings pattern. Investment behaviour 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. 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. For example, before retirement, people receive a steady stream of income that helps to buffer the changes in wealth associated with changes in the returns on their investment portfolios. This steady return from working helps them maintain a relatively steady level of consumption. After the retirement, steady stream of income from working ceases to exist, hence, a less volatile investment portfolio is called for. The lower volatility of investment returns allows retirees to maintain relatively less consumption over time. There different factors that determine capital formation. Lucky and Uzah (2016) examined factors that determinants of capital formation in Nigeria, testing the Jhingan's Preposition. This study examined the effect of interest rates on gross fixed capital formation in Nigeria.

LITERATURE REVIEW

Interest Rates

The interest rate is the cost of borrowing money, hence the cost for the borrower to borrow from a lender which is usually expressed as an annual percentage of the total sum (Prisvault, 2012). Therefore, as the interest rate changes, so does the cost of borrowing. Like any other expense, it can become cheaper to borrow or it can become more expensive to borrow. If the interest rate is low, then the cost of borrowing is lower and generally will result in higher capital, because less money is paid back to the bank in the form of interest. When the interest rate is high, generally it will cause less capital as the cost of borrowing is higher and thus the amount of capital retained by a firm is less. In this study we are examining the interest rate from 2010 to 2020, specifically to see if there is significance in the timeline. This timeline is quite extraordinary in the sense that in 2010 the world was starting to recover from the financial crises and in 2020 the world was yet again going into crisis this time a global health crisis.

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 (Jibrin, et. al., 2015). 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

Consequently, the CBN excluded overhead costs from subsequent modifications to the frameworks for computing the bank's cost of funds (Jibrin, *et. al.,* 2015). The 2014/2015 CBN Monetary, Credit, Foreign Trade and Exchange Policy Guidelines excluded overhead costs from the framework in determining banks' cost of funds and computed the cost of funds by employing the weighted average cost of funds computation framework. According to the guidelines, banks should include banks' interest cost on the different types of deposit liabilities, borrowings from the inter-bank funds market, payments in respect of deposit insurance premium and costs due to reserve requirements.

Savings Rate

Keynes (1936) 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 (Umoh, 2003 and Uremadu, 2005). 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.

Keynes maintains that on the aggregate, the excess of income over consumption (otherwise called savings) cannot differ from the addition to capital equipment (i.e. Gross Fixed Capital Formation or Gross Domestic Investment). Savings is therefore a mere residual and the decision to consume and the decision to invest between them determine volume of national income accumulated in a period. In the Keynesian view therefore secularly rising income would result in higher savings rates. As a matter of fact, savings is regarded as being complementary to the consumption function. In its simplest form, the savings function is derived from the linear consumption function when the autonomous consumption expenditure is separated off (Omoh, 2003). Keynes (1936), however, brought in the opportunity cost variable, the rate of interest; which the classical economists now regard as the major determinant of savings (Olusoji, 2003; Chete, 1999; McKinnon, 1973 and Shaw, 1973).

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.

In a bid to ensure price and financial stability, the Central Bank of Nigeria (CBN) Monetary Policy Committee (MPC) adopted the Monetary Policy Rate (MPR) in place of Minimum Rediscount Rate (MRR) to controls the movement of market interest rate by benchmarking it against the MPR. Generally, a tight monetary policy tends to increase interest rate which impacts the economy by increasing the cost of borrowing and by so doing cut back on investment and the general price level. The reverse situation applies to an easy monetary policy but this may not be the actual behaviour of interest rate in practices. In the wake of the 2007-2008 global financial crises, the CBN reduced the MPR in an attempt to avert the global uncertainty of recession. The puzzle in the response of market interest rate to monetary policy actions has left economic analyst with the profound question of the effectiveness of monetary policy in tracking other rates and target variables in Nigeria.

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. Most anticipatory interest rates are reported as ranges instead of single point estimates. As the true rate of inflation may not be known until the time period corresponding with the holding time of the investment has passed, the associated real interest rates must be considered predictive, or anticipatory, in nature, when the rates apply to time periods that have yet to pass. In cases where inflation is positive, the real interest rate is lower than the advertised nominal interest rate. For example, if funds used to purchase a certificate of deposit (CD) are set to earn 4% in interest per year and the rate of inflation for the same time period is 3% per year, the real interest rate received on the investment is 4% - 3% = 1%. The real value of the funds deposited in the CD will only increase by 1% per year, when purchasing power is taken into consideration. If those funds were instead placed in a savings account with an interest rate of 1%, and the rate of inflation remained at 3%, the real value, or purchasing power, of the funds in savings will have actually decreased, as the real interest rate would be -2%, after accounting for inflation.

Gross Fixed Capital Formation

The fixed capital formation index is of great importance in the economic development process. It defines the level and rate of economic growth, characterized by high scalability through the start

and continuation of investment and savings operations. The increase in capital will be reflected in the increase in the productivity of other elements of production such as land and labor, and thus a catalyst for the increase in productivity and economic growth. Nurkse (1962) defines capital formation as a reluctance to use current productive activity in real-time consumption and to direct part of it to the formation of capital goods such as equipment which in turn increases the productive efficiency of the country and raises growth. In other words, directing part of the current resources towards achieving balance for capital goods used in the future to develop and expand consumer products, and to raise economic growth (Nurkse, 1962). Gross fixed capital formation represents the value of the durable goods (tangible and intangible assets) for non-military purposes, purchased by the resident producing units to be used at least one year in the production process, as well as the value of services incorporated in fixed capital goods (Gibescu, 2010). Gross fixed capital formation used within national accounts, which measures expenditure on non-financial assets from both the public and private sectors, and measures the acquisitions less disposals of assets such as land, buildings, equipment and transport used in the production process for more than a year. Gross fixed capital formation consists of resident producers' acquisitions, less disposals, of fixed Assets during a given period plus certain additions to the value of non -produced assets realized by the productive activity of producer or institutional units, fixed assets are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly, or continuously, in processes of production for more than one year.

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. The Keynesian theory implies that low interest rate as a component of cost administered is detrimental to increase savings and hence investment demand. Proponents of this theory argue that increase in the real interest rate will have strong positive effects on savings which can be utilized in investment, because those with excess liquidity will be encouraged to save because of the high interest rate, thus banks will have excess money to lend to investors for investment purpose thereby raising the volume of productive investment. Keynes also emphasized that the rate of interest is purely a monetary phenomenon. This theory introduced the concept of liquidity trap, a situation where low interest rates discourage savings and consequently reduces investments due to lack of investable fund.

Classical Theory

This theory states that the rate of interest is determined by the supply and demand of capital. While the supply of capital is governed by time preference, the demand for capital is governed by the expected productivity of capital. Interest rate is determined at the intersection of the demand curve and the supply curve at a given level of income (Yunana, 2010). The theory is a real theory of interest because it is based on real forces of demand and supply side. It regards productivity on the demand side and thrift on the side of supply and completely neglects monetary influences on interest rate. The weakness of this theory flows from its assertion that

money is merely a veil, a passive factor influencing the rate of interest. This theory also completely ignores the effect of investment on income as it is based on the unrealistic assumption of full employment of resources. Opponents of the theory also opine that the classical confuse the amount saved with the propensity to save. The rate of interest according to the classical is determined by the supply and demand for capital. The supply of capital is governed by the time preference while the demand for capital is determined by the expected productivity of capital. Time preference and productivity of capital depend upon waiting or saving. The demand for capital is determined by the investors because it is productive while the productivity of capital is subject to the law of variable proportions. Additional units of capital are not as productive as the earlier units. That is, the rate of interest is just equal to the marginal productivity of capital and it means that at a higher rate of interest, the demand for capital is low and it is high at a lower rate of interest. Thus, the demand for capital is inversely related to the rate of interest and the demand schedule for capital or investment curve slope downward from left to right. The supply of capital depends on saving, rather than the will to save and the power to save of the individual or community. Some individuals save irrespective of the rate of interest. Classical economists are of the view that, the higher the rate of interest, the larger will be the individual saving and the supply of funds.

Empirical Review

Chauke and Choga (2025) used the autoregressive distributed lag (ARDL) method to investigate the impact of interest rates on gross fixed capital formation. The main findings of the study reveal a negative relationship between real interest rate and gross fixed capital formation in South Africa. Furthermore, savings reveal a positive relationship with gross capital formation. In conclusion, real interest rates affect changes in gross fixed capital creation, with higher interest rates causing decreased investment activity. This study recommends to policymakers that the SARB must lower interest rates to improve investment activity.

Leshoro and Wabiga (2023) investigated the asymmetric effects of interest rates on private investment in South Africa. The study utilised annual time series data from 1971 to 2019. The study used the nonlinear autoregressive distributed lag (NARDL) technique to analyse data. Findings from this study revealed that interest rates and private investment have short-run and long-run asymmetric relationships. This study is among the first to use the asymmetric effects of interest rates on investment.

Lucky and Uzah (2016) examined factors that determine Nigerian capital formation. The objective was to test Jhingan's propositions for sources of capital formation in Nigeria. Time series data were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. Nigerian Gross Fixed Capital Formation (GFCG/GDP) was modeled as the function of Broad Supply (M2/GDP), Credit to Private Sector (CPS/GDP), Gross National Savings (GNS/GDP), Commercial Banks Lending Rate, Exchange Rate (EXR), Inflation Rate (INFR), External Debt (EXTD/GDP), Public Expenditure (PEX/GDP), Government Revenue (GR/GDP), Terms of trade (TT/GDP) and Operating Surplus (OPS/GDP). Cointegration Test, Augmented Dickey Fuller Unit Root Test, Granger Causality Test and Vector Error Correction Model were used to test the dynamic relationship between the variables. Findings proved that M2/GDP, GNS/GDP, EXR, EXTD/GDP, TT/GDP have negative and insignificant effect on capital formation while CPS/GDP, LR, INFR, PEX/GDP, GR/GDP and OPS/GDP have positive and insignificant effect. The model summary revealed 86.0% explained variation and f-statistics 12.38458 probability of

0.000004. The study concludes that the variables have significant impact on Nigerian Gross Fixed Capital Formation and confirm the Jhingan's proposition.

Meyer and Mothibi (2021) applied the ARDL technique to examine the impact of risk-rating agencies' choices on economic growth and investment in South Africa from 1994Q1 to 2020Q2. The study discovered a statistically negative relationship between the loan interest rate and investment, as well as a statistically significant positive relationship between the risk-rating index, economic growth, and investment. As previously noted, the OLS approach was used in the research of Xaba (2019) and Tabibu (2020) in South Africa, which has been strongly criticised in the econometric area. It is also worth mentioning that the studies of Kasongo (2019), Mongale and Baloyi (2019), and Meyer and Mothibi (2021) followed the researcher's method, but the authors did not use the supplemental econometric methodologies to examine the robustness of the results. Consequently, the ARDL-predicted findings will be verified for robustness using alternative cointegration methods such as FMOLS and CCR.

Modestus and Princess (2021) empirical examined of Variation in Interest Rates and Investment behaviour in Nigeria for the period 1981 and 2019. Time series data on interest rate, inflation rate, exchange rate and gross fixed capital formation obtained from the Central Bank of Nigeria, National Bureau of Statistic, World Bank Development Indicators and others were estimated using the error correction mechanism of autoregressive distributed lag (ARDL). The findings of the study show that a negative and significant relationship exist between interest rate and gross fixed capital formation in Nigeria in the period of study. The implication of this is that a unit increase in prime lending rate will lead to a decrease in investment by 0.02 units. Based on these findings the following recommendations were made; the issue of high interest rate with hidden transaction costs by banks must be vigorously addressed by the monetary authorities. The regulatory body should put in place policies that will stabilize the monetary policy rate (MPR) so as to keep the lending rate low in order to stimulate investment. The Central Bank should mandate banks to channel mobilized savings to investors in the form of loans. Monetary authorities should make policies which would help to boost the saving culture of the people. This could be done by increasing the deposit rate which would lure the people to deposit their money in banks thereby increasing the supply of loanable funds. This would lead to a fall in lending interest rate and eventually rise in investment.

Mongale and Baloyi (2019) examined the determinants influencing international investment decisions in South Africa from 2007 to 2017. In the study, household disposable income, labour productivity, investment infrastructure (measured by gross fixed capital formation), interest rate, labour unrest, and FDI were discovered to have a positive and statistically significant relationship. Using the Johansen cointegration method, Bader and Malawi (2010) assessed the impact of interest rates on investment in Jordan from 1990 to 2005. Variables included gross fixed capital formation, real interest rate, and income (GDP). According to the findings, there is a statistically significant inverse relationship between the real interest rate and gross fixed capital formation (investment).

Osuka, Otiwu and Nwabeke (2024) examined the effect of interest rates on capital formation in Nigeria. Time series data were sourced from Central Bank of Nigeria Statistical Bulletin from 1990-2021. Gross fixed capital formation was modeled as the function of Savings Rate, Real interest rate, Prime lending rate and Maximum Lending rate. Multiple regressions with econometrics view statistical package were used as data analysis techniques. Co-integration, Granger Causality Test and Augmented Unit Root Test were used to determine the long and the short run relationship that exist among the variables. The study found that there was variation of

73 percent on Nigeria gross fixed capital formation of the country due to changes in interest rates. The study further revealed that there was a strong positive relationship between the study variables. the study found that that savings rate and prime lending rate have positive and significant effect of Nigeria fixed capital formation, real interest rate have positive but no significant effect while maximum lending rate have negative and no significant effect on Nigeria gross fixed capital formation. The study concluded that there is statistically significant relationship between Savings rates, and gross fixed Capital formation in Nigeria. There is statistically significant relationship between prime lending rate and gross fixed Capital formation in Nigeria. There is statistically significant relationship between maximum lending rate and gross fixed Capital formation in Nigeria.

Shama and Alhakimi (2020) examined the causal relationship between interest rate and investment in Egypt using the ARDL approach. The study used time series annual data for the period 1980 to 2018. The results indicated the presence of a long-run cointegration relationship between investment and interest rates. In addition, the findings also revealed that interest rate Granger causes investment. Dotsis (2020) examined investment under uncertainty with a zero lower bound on interest rates. The study used the shadow rate model of Black (1995). The results showed that the presence of a lower bound on interest rates can produce a positive relationship between interest rate volatility and investment.

Xaba (2019) investigated the influence of interest rates on savings and investments in South Africa from 2007 to 2017 using the OLS technique. In the study, variables such as interest rate (repurchase rate), savings, and investment were employed. The study found a statistically significant positive relationship between the interest rate and savings and a statistically significant negative relationship between the interest rate and investment, demonstrating the compatibility of classical and neo-classical interest rate theories. Tabibu (2020) obtained the same results in the case study of South Africa using the same method. The study by Kasongo (2019) employed ARDL technique to establish a positive and statistically significant relationship between the real interest rate (the rate of investment returns) and investment. The research advocated for foreign direct investment (FDI) as an alternative for local investment and flexibility of investment policy to attract more investors.

METHODOLOGY

This study combined the theoretical expectations and empirical observations that enable to extract the expected controlled variable that influences domestic private investment. Statistical and econometric analyses of the given data were applied and e-view software was used to examine the statistical findings. Data were sourced from Nigerian Exchange Group and annual reports of the 32 quoted manufacturing firms within 2014-2023.

Methods of Specification

The main variables under consideration are taken from theoretically setups and empirical evidences in different countries. The study and econometric output depend upon the data from the aforementioned sources.

$$GFCF = \beta_0 + \beta 1PLR + \beta_2 MLR + \beta_3 MMR + \beta_4 SR + \beta_5 MPR + \mu \quad (1)$$

Where

GFCF= Gross fixed capital formation

SR = savings rate

MMR = money market 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

The mathematical implication is stated as follows: $\beta_1, \beta_1, \beta_1, \beta_1 > 0$ (2)

ARDL Bounds Test to Cointegration

To investigate if there is a long-run relationship interest rates and capital formation in Nigeria, the ARDL-bounds test to cointegration technique (Pesaran & Shin, 1999; Pesaran, Shin & Smith, 2001) was used. The method can be applied if the series are I(1) or a combination of I(1) and I(0). The advantages of this technique over the conventional cointegration approaches including those of Engle and Granger (1987), Johansen (1988, 1991), and Johansen and Juselius (1990) have been explained in details in the literature (Abu, 2017, 2019; Abu et al., 2019; Abu & Staniewski, 2019). Some of these advantages include its flexibility for variables to have different optimal lags; using a single reduced form equation to estimate the long-run and the short-run parameters of the model at the same time; and its adequacy in estimating relationships even with finite sample. The ARDL model (p, $k1$, $k2$, $k3$, $k4$) is specified as:

$$\text{GFCF}t = \delta 0 + \sum \delta 1i \; p \; i{=}1 \; \text{GFCF}t{-}i + \sum \delta 2i \; k1 \; i{=}0 \text{PLR}t{-}i + \sum \delta 3i \; k2 \; i{=}\text{MLR}t{-}i * \text{MMR}t{-}i + \sum \delta 4i \; k3 \; i{=}0 \; \text{MPR}t{-}i + \sum \delta 5i \; k4 \; i{=}0 \; \text{SR}t{-}i + \sum \delta 6i \; k5 \; i{=}0 \quad (3)$$

The bounds test is conducted by testing the null hypothesis of no co-integration (H0) against the alternative hypothesis (H1) using the following equations: H0: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = 0$, and H1: $\beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq 0$. The computed F-statistic (i.e. Wald test) was used to test the joint significance of the coefficients, and its value compared with the lower and upper critical bounds values. If the F-statistic is higher than the upper critical bound, the H0 is not accepted. However, if the F-statistic is less than the lower bound, the H0 is not rejected. But if the F-statistic falls between the upper and lower bounds, then the decision will be inconclusive. If co-integration is found among the variables, both the long-run and the short-run coefficients would be estimated using the following models.

RESULTS AND DISCUSSION

Table 1: Unit Root test

Variable	ADF	MacKinnon 1%	5%	10%	Order integration
GFCF	-4.054001	-3.646342	-2.954021	-2.615817	1(1)
PLR	-1.795908	-3.646342	-2.954021	-2.615817	1(0)
MLR	-0.642560	-3.646342	-2.954021	-2.615817	1(0)
MMR	-1.462393	-3.646342	-2.954021	-2.615817	1(0)
MPR	-1.638233	-3.646342	-2.954021	-2.615817	1(0)

Source: Extract from E-view, 12.0

Stationarity test or unit root test is one of the conditions to be satisfied in time series data analysis to ensure accuracy and to avoid spurious regression. A time series is said to be stationary when it's mean and variance do not vary systematically over time (Gujarati 2004). A Unit root test was carried out to check for stationarity. In order to avoid problems of autocorrelation as may arise from using Dickey-Fuller test, the researcher used Augmented Dickey- Fuller Unit root test.

The Null hypothesis is that, Unit root is present in the variable under test. Alternative hypothesis is that there is No unit root. The critical value at 5 percent is the base for guideline on unit root test. When the absolute value (not considering the sign) of the Test statistics is higher than the absolute value (ignoring the sign) of the critical value at 5 percent, we reject null hypothesis, we instead accept alternative hypothesis that there is no unit root. The results performed using E-view version 9.0, as shown above. The first Unit root test conducted was Augmented Dickey-Fuller Test at Level for each variable. And the results as shown in the table above indicate that the variables are stationary, because all the absolute values of the Test statistics, regardless of their signs were above than the values of the 5% critical value. Therefore, the variables are stationary at first difference and at level, 1(I) and 1(0), this mix in stationarity enable us to used bond test. We reject the null hypothesis of non stationarity and conclude that there is stationary at first difference.

Table 2: Summary of the bound test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	16.681541	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	31		Finite Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: Extract from E-view, 12.0

From the ARDL bounds test result, it is clear that there is a long run relationship amongst the variables. This is because the computed F-statistic of about 16.681541 is higher than the upper critical bounds at 1%, 2.5%, 5% and 10% critical values. This provided evidence to reject the null hypothesis of no cointegration at 5% and 10% significance level for the growth 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 macroeconomic variables interest rates and gross fixed capital formation in Nigeria.

Table 3: ARDL Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GFCF(-1)	0.657525	0.370735	1.773574	0.1015
GFCF(-2)	0.119756	0.372040	0.321890	0.7531
PLR	0.359801	0.747391	0.481409	0.6389
PLR (-1)	0.545185	0.824113	0.661541	0.5208
PLR (-2)	-0.373123	0.842324	-0.442969	0.6657
PLR(-3)	0.315764	0.691792	0.456443	0.6562
MLR	0.248407	0.290027	0.856496	0.4085
MLR(-1)	0.176321	0.225666	0.781336	0.4497
MLR(-2)	-0.126536	0.212730	-0.594820	0.5630
MLR(-3)	-0.195255	0.207561	-0.940711	0.3654
MMR	0.040343	0.037748	1.068759	0.3062
MMR(-1)	-0.004594	0.043446	-0.105747	0.9175
MMR(-2)	-0.009974	0.047620	-0.209454	0.8376
MMR(-3)	-0.050819	0.039939	-1.272410	0.2273
SR	0.069647	0.154668	0.450301	0.6605
SR(-1)	0.005274	0.130756	0.040332	0.9685
SR(-2)	0.036453	0.152730	0.238679	0.8154
SR(-3)	0.047508	0.175105	0.271310	0.7908
MPR	0.655457	2.709282	0.241930	0.8119
MPR(-1)	0.078413	16.88635	2.018103	0.0607
MPR(-2)	0.064216	29.18616	0.413284	0.6849
MPR(-3)	-0.172531	16.18737	-3.223039	0.0053
C	-9.616160	22.27218	-0.431757	0.6736
R-squared	0.705384	Mean dependent var		4.751613
Adjusted R-squared	0.663459	S.D. dependent var		3.952469
S.E. of regression	3.392085	Akaike info criterion		5.557493
Sum squared resid	138.0749	Schwarz criterion		6.436388
Log likelihood	-67.14114	Hannan-Quinn criter.		5.843991
F-statistic	1.596164	Durbin-Watson stat		1.956270
Prob(F-statistic)	0.206090			

Source: Extract from E-view, 12.0

The estimated ARDL model found that interest rates explained 66.3 per cent variation in gross fixed capital formation in Nigeria; this implies that 33.7 per cent was explained by variables not capture in the model. The model is statistically significant with the value of f-statistics and probability. The Durbin Watson statistic proved the absence of serial autocorrelation. At lag 1, the study found that prime lending rate have positive but no significant effect and added 0.54 per cent to gross fixed capital formation, maximum lending rate have negative and no significant effect on gross fixed capital formation and reduced it by 0.11 per cent. Money market rates have negative and no significant effect on gross fixed capital formation, the variable reduced capital formation by 0.04 per cent within the time periods.

Table 4: ARDL Long Run Form and Bounds Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.616160	22.27218	-0.431757	0.6736
GFCF (-1)*	-0.222719	0.237085	-0.939404	0.3660
PLR(-1)	0.847626	2.042521	0.414990	0.6855
MLR(-1)	0.102937	0.224796	0.457912	0.6552
MMR(-1)	-0.025044	0.054008	-0.463708	0.6512
SR(-1)	0.158882	0.195005	0.814758	0.4311
MPR(-1))	-0.119756	0.372040	-0.321890	0.7531
(PLR)	0.359801	0.747391	0.481409	0.6389
D(MLR(-1))	0.057359	1.250259	0.045878	0.9642
D(MLR(-2))	-0.315764	0.691792	-0.456443	0.6562
D(MMR)	0.248407	0.290027	0.856496	0.4085
D(MMR(-1))	0.321791	0.201320	1.598409	0.1359
D(MMR(-2))	0.195255	0.207561	0.940711	0.3654
D(SR)	0.040343	0.037748	1.068759	0.3062
D(SR(-2))	0.060793	0.046143	1.317496	0.2123
D(SR(-3))	0.050819	0.039939	1.272410	0.2273
D(MPR)	0.069647	0.154668	0.450301	0.6605
D(MPR(-1))	-0.083961	0.235790	-0.356084	0.7280
D(MPR(-2))	-0.047508	0.175105	-0.271310	0.7908

Source: Extract from E-view, 12.0

From Table 4, the long run results show that at lag I, prime lending rate affect negatively to gross fixed capital formation, savings rate affect negatively to gross fixed capital formation, the positive effect of the variables confirm the positive effect of money market rate and savings rate. However, monetary policy rate exerts negative influence on gross fixed capital formation over the periods of the study. The results obtained in this study in the long run do not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature.

Table 5: ARDL Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF(-1))	1.141387	0.247439	4.612808	0.0013
D(GFCF(-2))	0.581902	0.134261	4.334107	0.0019
D(PLR)	1.524466	0.321746	4.738108	0.0011
D(PLR(-1))	-0.007248	0.330071	-0.021959	0.9830
D(PLR(-2))	0.445049	0.284432	1.564696	0.1521
D(MLR)	-0.202645	0.059167	-3.424980	0.0076
D(MLR(-1))	0.123297	0.050163	2.457935	0.0363
D(MLR(-2))	-0.078219	0.053919	-1.450667	0.1808
D(MMR)	-0.495940	0.182138	-2.722878	0.0235
D(MMR(-1))	0.398439	0.152389	2.614614	0.0281
D(SR)	2.657200	0.833123	3.189445	0.0110
D(SR(-1))	-7.946513	1.207136	-6.582947	0.0001
D(SR(-2))	-3.190699	0.875646	-3.643823	0.0054

D(MPR)	0.106321	0.416698	0.255151	0.8043
D(MPR(-1))	-1.643110	0.554701	-2.962154	0.0159
ECM(-1)*	-2.767311	0.345525	-8.009014	0.0000
R-squared	0.933504	Mean dependent var		0.356452
Adjusted R-squared	0.867007	S.D. dependent var		14.85132
S.E. of regression	5.416004	Akaike info criterion		6.522915
Sum squared resid	439.9965	Schwarz criterion		7.263037
Log likelihood	-85.10518	Hannan-Quinn criter.		6.764176
Durbin-Watson stat	1.780993			

Source: Extract from E-view, 12.0

The existence of a long run relationship among interest rates and its exogenous variables allows for the estimation of long run estimates. The long run estimates are as reported in Table 4. The short run estimates also based on the Schwartz Bayesian Criteria (SBC) employed for the estimation of the ARDL model are reported in Table 3. Some descriptive statistics can be obtained from Table 5. From the Table, it can be observed that the adjusted R^2 is approximately 0.867. It can therefore be explained that approximately 86.7 percent of the variations in gross fixed capital formation is explained by the independent variables. Also, a DW-statistics of approximately 1.780993 reveals that there is no autocorrelation in the residuals. The results also showed that the coefficient of the lagged error correction term ECT (-1) exhibits the expected negative sign (-2.767311) and is statistically significant at 1 percent. This indicates that approximately 276 percent of the disequilibrium caused by previous years' shocks converges back to the long run equilibrium in the current year. According to Kremers, Ericsson, and Dolado (1992) and Bahmani-Oskooee (2001) a relatively more efficient way of establishing cointegration is through the error correction term. Thus, the study discerns that the variables in the model show evidence of high response to equilibrium when shocked or disturbed in the short-run. Theoretically, it is debated that an error correction mechanism exists whenever there is a cointegrating relationship among two or more variables. The error correction term is thus obtained from the negative and significant lagged residual of the cointegration regression. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The negative coefficient is an indication that any shock that takes place in the short-run will be corrected in the long-run. The rule of thumb is that, the larger the error correction coefficient (in absolute terms), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007).

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study analyzed the effect of the interest rates on the gross fixed capital formation in Nigeria from 1990 to 2023. The goal was to determine what has been happening with such macroeconomic variables as the interest rates and the gross fixed capital formation, which led to the trend analysis. Following a number of preliminary examinations, the ARDL estimating strategy was selected as the one to use for the inquiry. Pretests, including the unit root tests and others, were carried out to determine how the time series would behave in the future. In order to identify whether the series are mixed with order 0 or order 1, or whether they are I(0) or I, it is necessary to carry out this step (1). The investigation went one step further and included an integration test to determine whether or not the

variables were cointegrating with one another. This is an extremely important factor to consider when determining whether or not the connections that develop over the series are meant to be permanent. The study also calculated the lag time, which was done so that the order in which the series might enter the model could be determined. According to the ARDL computation, the only variables that are not significant at the 5 percent level. At lag 1, the study found that prime lending rate have positive but no significant effect and added 0.54 per cent to gross fixed capital formation, maximum lending rate have negative and no significant effect on gross fixed capital formation and reduced it by 0.11 per cent. Money market rates have negative and no significant effect on gross fixed capital formation, the variable reduced capital formation by 0.04 per cent within the time periods. From the error corrections results, the study conclude that interest rate have significant effect on gross fixed capital formation.

Recommendations

i. There should be effective and implementable monetary policies to back the interest rate interest rate and there should be policies to deepen the operational efficiency of the financial market enhance Nigeria gross fixed capital formation.
ii. Interest rate should be deepened and the policies revisited to meet the financial development needs of the economy. Nigerian Interest rate structure such as lending, and prime lending rate should be harmonized with the objective of enhancing to enhance Nigeria gross fixed capital formation
iii. Nigeria monetary authorities should increase savings rates to enable deposit institutions to mobilize fund for investment as this has great extent to effect to enhance Nigeria gross fixed capital formation.
iv. The government should find a way of making the monetary policy rate more attractive to the investing public, which will improve their subscription towards the government securities and ultimately improve government revenue and, translates to government meeting its public expenditure as at when due.
v. That the Lending rate has some policy implication on economic growth in Nigeria, this is made possible because if there is an increase in Lending rate, it reduces or retards investment as well as economic growth, while a reduction in Lending rate would promote and stimulate capital formation in Nigeria.

REFERENCES

Acha, I. A. & Acha, S. O. (2019). Capital Market Performance and Economic Growth in Nigeria. *Noble International Journal of Economics and Financial Research, 4, 10-18.*

Adenuga, A. O. (2020). Stock market development indicators and economic growth in Nigeria: Empirical investigation. *Central Bank of Nigeria Economic and Financial Review, 48(1), 21–32.*

Ainabor, A.E., Shuaib, I.M. and Kadiri, A.K. (2014). Impact of Capital Formation on the Growth of Nigerian Economy 1960-2010: Vector Error Correction Model (VECM). School of Business Studies, *Readings in Management and Social Studies, 1, 132-154*.

Chauke, M. P., & Choga, I. (2025). The impact of interest rates on gross fixed capital formation: The effects of the COVID-19 pandemic and regulatory responses [Special issue]. *Journal of Governance & Regulation, 14(2), 265–274*

Chete, L.N. (1999). Macroeconomic Determinant of Private Savings in Nigeria. NISER Monograph, series No 7, pp 1-4.

Jibrin, M. A., Okorie, G., Okoro, A. S., Dada, E. A., Chiemeke, C., & Owolabi, O. H. (2015). Strategies for Lowering Banks' Cost of Funds in Nigeria, CBN Working Paper Series(CBN/WPS/01/2015/05).

Keynes, J. M. (1936). The general theory of employment interest and money. Palgrave Macmillan.

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money.* Houghton Mifflin Harcourt.

Leshoro, T. L. A., & Wabiga, P. (2023). The asymmetric effects of interest rates on private investment in South Africa. *Acta Universitatis Danubius. Œconomica, 19(3), 161–182.*

Lucky, A. L., & Uzah, C. K., (2016). Determinants of capital formation in Nigeria: A test of Jhingan's Preposition 1981 – 2014. *IIARD International Journal of Banking and Finance Research, 2 (1), 1 – 19.*

Mackinnon, R. (1973). *Money and Capital in International Development*. The Brokenness Institution Washington. DC.

Meyer, D. F., & Mothibi, L. (2021). The effect of risk rating agencies decisions on economic growth and investment in a developing country: The case of South Africa. *Journal of Risk and Financial Management, 14(7), Article 288. https://doi.org/10.3390/jrfm14070288*

Modestus C. N., & Princess, E. D. (2021). Interest Rates and Investment Behaviour in Nigeria: An Empirical Evidence. *IOSR Journal of Economics and Finance (IOSR-JEF) 12(6), 68-75*

Mongale, I. P., & Baloyi, L. (2019). An analysis of drivers of international investment decisions in South Africa. In R. M. Yonk & V. Bobek (Eds.), Perspectives on economic development-Public policy, culture, and economic development. IntechOpen. https://doi.org/10.5772/intechopen.88592

Olusoji, M.O. (2003). *Determinants of Private Savings in Nigeria*: An Error Correction Approach NDIC Quarterly Publication, 13 September.

Shama, T. R., & Alhakimi, S. S. (2020). The causal relationship between interest rate and investment in Egypt: ARDL Approach for the period 1980–2018. *Al-Tijarah wa Al-Mal, 40(1), 1–28. https://doi.org/10.21608 /caf.2020.125698*

Shaw, E.S. (1973). Financial Deeping in Economic Development. Oxford University Press Oxford.

Umoh, O.J. (2003): An Empirical Investigation of the Determinants of Aggregate National Savings in Nigeria. *Journal of Monetary Economic. Integration, 3(2): 113-132*

Uremadu, S.O. (2005). Determinants of Banking Systems Credit to the Nigerian Economy in a Liberalised Financial System: *An Empirical Analysis for publication in BIJAR, BUK Kano.*

Uremadu, S.O. (2006): The Impact of Real Interest Rate on Savings Mobilization in Nigeria. An unpublished Ph. D thesis submitted to the Department of Banking and Finance, UNN Enugu, Campus.

Xaba, N. (2019). The impact of interest rates on savings investments in South Africa. University of the Witwatersrand. https://wiredspace.wits.ac.za/server/api/core/bitstreams/aa5f9c42-eeff-4885-a319-70535f627af4/content