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HOW INTEREST RATES AFFECT INVESTMENT BEHAVIOR IN NIGERIA'S FINANCIAL MARKETS

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Abstract: The study examined the impacts of interest rate on investment decision in Nigeria. The study specifically found out the impact of deposit interest rate, exchange and inflation rate on investment decision in Nigeria. The study had 3 research questions and 3 hypotheses. The study adopted the descriptive research design. Data used covered a period of 32 years (1990-2022). Data for the study were collected from the World Development Indicators website for Nigeria. The study adopted method of maximum likelihood in our estimations. Evaluations of results are based on two criteria, namely, economic criterion – a priori behavior of the parameters and their economic implications and statistical criterion – use of R2, F, and t- statistics to test the explanatory power of the estimated parameters. While Eviews version 7.0 was the software package used for the estimations. The results of the study showed that interest rate is a significant determinant of investment decision in Nigeria. This should be expected as the cost on capital plays major role in investment decisions and the prospects of investment in most economies. The finding shows that there exists a comparison between interest rate behavior and investment decision in Nigeria as we have in China. Hence, there is no difference in the impact of interest rate on investment decisions during the period in both countries. Finally, the result of the cointegration shows that there's a long run relationship which makes investment responds negatively to shocks arising from interest rate and positively in the short run as seen in the study. Hence, any change in these variables exerts positive influence on investment. It was concluded that deposit interest rate, exchange rate as well as inflation rate and investment have a significant and positive relationship. Therefore, it was recommended that monetary authorities should promote policy that will improve deposits and also make available loanable funds to encourage investment. 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 interest rate and eventually rise in investment.

Keywords: Interest rate, Investment behaviour, Nigeria, financial market

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INTRODUCTION Background of the Study

The term interest rate can simply be defined as the cost of using someone else's money or reviewed from the lenders point of view, as the price for allowing one use someone's money. It can also be said to represent the price of money (Oluba, 2018). Consequently, by keeping interest rate how and reasonably stable, entrepreneurial activities that ill crystallize in improved macroeconomic activities will be enhanced. Interest rate can also exert short-term influence on commercial banks operations and performance.

Changes in interest rates can reflect the basic situation of the operation of macro economy; it also affects all the macroeconomic variables such as GDP, price level, the level of employment, international balance of payments, the rate of economic growth, etc. Obviously, the interest rate is an important economic variable that plays an important role in both macro and micro economy activity.

A change in interest rates is one of the main factors to judge the macroeconomic situation and the interest rate trend analysis is the main method to predict the macroscopic level of economic situation. Western economists believe that the market rate of interest, the total social savings and investment are closely linked. Therefore, the current interest rates affect the investment activities. At the same time, current interest rates also affect the scale of investment in the future by adjusting the savings. If the interest rate rises, bond prices fall, if the interest rate falls, bond prices rise. (Wuhan, 2015).

A number of studies have been conducted on the impact of interest rate volatility on investment decision in Nigeria. Among these studies is the work done by Ekwenem (2015), who studied interest rate and investment behavior in Nigeria from the period 1976- 2016 using time series data, he found out that the behavior of investment has significant influence on interest rate and inflation rate.

Ojo (2018) & Ani (2018) are both of the opinion that interest rate deregulation would mar the Nigerian economy. In their separate studies, they noted that the deregulation exercise is faulty, claiming it would discourage investment and hence economic growth, by pushing up interest rates. They believe that since domestic financial markets are to some extent structurally oligopolistic, if interest rate is left uncontrolled, it might lead to a sharp increase in lending rate which will translate to increase in cost of capital and discourages investment. This position is supported by Soyibo & Olayiwola (2020) and Akpan (2014) whose work observe the existence of low positive impact of deposit rate on investment after interest rate liberalization in Nigeria. This change of interest rate policy is a problem because of two main reasons, first, investment contraction in Nigeria may not have any connection with the increase in lending rate that accompanied interest rate liberalization. Just as it was in 2017 when interest rate is 17.5% and investment was 19.835%, an increase in interest rate in 2019 (i.e. from 17.5% to 26.8%) was also accompanied by increase in investment (i.e. from 19.835% to 19.879%). Secondly, low-interest rate policy, which the regulation of interest rate implies could discourage saving mobilization. However, it is impossible to achieve economic growth without adequate investment, saving generates investment. (Chuba, 2015).

Investment is the current commitment of specific amount of cash (in any currency/legal tender) into an income yielding asset with the sole aim of deriving future inflow of cash which will compensate the investor for the following:

i. The time of releasing the fund for the use of another ii. The changes in interest rate and the purchasing power of money

iii. The uncertainty of future payment. (Oluwatusin 2017)

Original Article

Unlike capital, investment is a flow term and not a stock term. This means that capital is measured at a point in time, while investment can only be measure over a period of time. Investment plays a very important and positive role for progress and prosperity of any country. Many countries rely on investment to solve their economic problem such as poverty, unemployment etc (Muhammad Haron and Mohammed Nasr 2014).

Interest rate on the other hand is the price paid for the use of money. It is the opportunity cost of borrowing money from a lender. Interest is the reward that accrues to people who provide the fund with which capital goods are bought (Soyibo & Adekanye, 2021). Interest can also be defined as the payment made to a lender by a borrower for the use of a sum of money for certain period of time.

Interest can also be said to be the charge assessed for the use of money. It can also be seen as "the payment made to owners of capital fund which they are ready to put at the disposal of others; thus, interest rate is like a price which bring into equilibrium the demand for resources to invest with the readiness to establish from present consumption. Interest rate is determined by the force of demand and supply of capital and for the condition that demand and supply of fund are equal. Hence, interest level is arrived at by the intersection between savings and investment (Luckett, cited in Adekanye, 2016). The volatile nature of interest is determined by many factors, which include taxes, risk of investment, inflationary expectations, liquidity preference, market imperfections in an economy etc.

The high interest rate observed in Nigeria during the era of interest rates deregulation has been frequently blamed for the country‟s slow growth and pointed out as a major failing of the Adjustment Program initiated in August, 2016. The believe is premised on the assumption that the demand for funds is for the purpose of investment and that investment demand will be larger at a lower lending rate. This study gawks that such blame is largely for obvious reasons. First interest rate deregulation led to an increase in saving mobilization in Nigeria (Chuba, 2017). While it is impossible to achieve economic growth without adequate investment, saving generates investment.

Secondly, investment does not depend upon interest rate alone, for instance investors may be prepared to borrow more and invest more, even if interest rate is high provided, they anticipate a higher margin of profits. On the other hand, investors are not tempted to borrow even if interest rate are very low, or even zero if they are afraid that they may lose even their capital. In other words, investment depends upon risk and the prospects of profits in a particular industry-or what Keynes (1936) calls the marginal efficiency of capital rather than upon interest rates.

Thirdly, interest rate is just one among many factors that have negative effects on investment. For example, the deregulation of Nigerian economy went beyond interest rates reform policies rather than interest rate deregulation to be the major obstacle to investment expansion in Nigeria.

The policy on interest rate introduced in 2014 was retained in 2015 with a minor modification to allow for flexibility. The policy stayed in place until it was lifted in October 2016. This remained in force till date, thus enabling the pursuit of a flexible interest rate regime in which bank deposit and lending rate were largely determined by the forces of demand and supply for funds (Omole & Falokun, 2019).

LITERATURE REVIEW

The chapter reviewed related literature under the following headings: Theoretical Review,
Conceptual Review, Review of Related Empirical Studies and Summary of literature Review

Original Article

Theoretical Framework

The following theories guided the study, via: classical theory of interest rate and Jorgenson's Neoclassical Theory of Investment.

2.1.1. The classical theory of interest rate

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 (Chioma, 2017). 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.

(b) Jorgenson's Neoclassical Theory of Investment

This theory of investment behavior is based on the determination of the optimal capital stock. His investment equation has been derived from the profit maximization theory of the firm.

Jorgenson's theory is based on the following assumptions: the firm operates under perfect competition; there is no uncertainty; there are no adjustment costs; there is full employment in the economy where prices of labor and capital are perfectly flexible; there is perfect financial market which means the firm can borrow or lend at a given rate of interest; the production function relates output to the inputs of labor and capital; labour and capital are homogenous inputs producing a homogenous output.

Conceptual Framework

Two major concepts are considered in the study, viz: concept of interest and concept of investment decision.

Concept of Interest Rate

According to Onwumere (2019), interest rates are defined as the rental payments for the use of credit by borrowers or the return for parting with liquidity by lenders. An interest rate is a price and like other prices, it performs a rationing function by allocating the limited supply of financial resources among the numerous competing demands for such resources. In recent years, many developing and transition countries have allowed market forces to play a greater role in their economies. In the financial sector, this means liberalizing interest rates so that they are allowed to be set by the market, and developing financial markets so that credit can be allocated more efficiently.

According to Keynes (1936), interest rate is the reward for not hoarding but for parting with liquidity for a specific period of time. Keynes' definition of interest rate focuses more on the lending rate. Adebiyi (2021) defines interest rate as the return or yield on equity or opportunity cost of deferring current consumption into future. Some examples of interest rate include the Saving rate, Lending rates, Treasury bill rate and the Discount rate.

The seminar works of McKinnon cited in Shaw (2017) attributed financial repression as the cause of the unsatisfactory growth performance of developing countries. They argued that countries characterized by financial repression; raising nominal interest rates relative to inflation would increase saving and the supply of investible resources in the economy. The productivity of investment also rises as these resources are channeled to projects

that have higher rates of return. They argued further that financial repression arises mostly when a country imposes ceilings on nominal deposit and lending interest rates at a low level relative to inflation. The resulting low or negative real interest rates discourage savings mobilization and the channeling of the mobilized savings through the financial system. This has a negative impact on the quantity and quality of investment and hence on economic growth. Both McKinnon and Shaw advocated that financial liberalization was needed to remedy the problems caused by the financial repressive policies of developing countries.

Since the introduction of the interest rate liberalization concept in the 2010s, many countries such as Angola, Burundi, Congo, Ivory Coast, Ghana, Malawi, Nigeria, China, India etc. have made attempts at liberalizing their financial sectors by deregulating interest rate, eliminating or reducing credit controls, allowing free entry into the banking sector, giving autonomy to commercial banks, permitting private ownership of banks and liberalizing international capital flows financial repression has retarded the development process as envisaged by Shaw and cited in Fabio and Andrew, (2017). Undoubtedly, government past efforts to promote economic development by controlling interest rate and securing inexpensive funding for their own activities have undermined financial development. (Arturo, Fabio, & Andrew, 2017).

Prof. Learner, in Jhingan (2013), defines interest rate as the price which equates the supply of credit or saving plus the net increase in the amount of money in the period, to the demand for credit or investment plus net hoarding in the period. This definition implies that interest rate is the price of credit which like other prices is determined by the forces of demand and supply of loanable funds. Apart from this, interest rate can also be categorized as nominal or real (Uchendu, 2013). This categorization credited to Irvin Fisher accommodates the influence of inflation on interest rate. Nominal interest rate in the observed rate of interest incorporating monetary effects while real interest rate is arrived at by considering the implication of inflation on nominal interest rate (Essian, 2015).

Concept of Investment Decision

According to Nupur (2023), an investment decision refers to the decisions that involve the investment of various resources of the firm to gain the highest possible return on investment for their investors. An investment decision is categorized as a long-term and short-term investment decision. A firm has to also keep in mind the scarcity of resources. It involves carrying out financial decisions on a long-term basis. This type of investment is known as a Capital Budgeting Decision. Anjali (2022) saw investment decision as a part of Financial Management which deals with the allocation of the company's valuable funds into investment projects or potential assets. It involves identifying such projects or assets to invest in and generate returns from them. Besides, these decisions significantly affect the profitability and stability of the firm. Dheeraj (2023) defined investment decision as Investment decision refers to financial resource allocation. Investors opt for the most suitable assets or investment opportunities based on risk profiles, investment objectives, and return expectations. Dheeraj (2023) observed that businesses have limited financial resources; therefore, the top-level management undertakes capital budgeting and fund allocation into long-term assets. Managers overseeing business operations opt for short-term investments to ensure liquidity and working capital. Investment decisions are also influenced by the frequency of returns, associated risks, maturity periods, tax benefits, volatility, and inflation rates.

Nupur (2023) opined that financial Management is concerned with the management of the flow of funds and involves decisions related to the acquisition and application of funds in long-term and short-term assets. It is

concerned with two aspects; they are procurement of funds as well as usage of finance. There are three major decisions that every financial management takes Investment Decision, Financial Decision, and Dividend Decision.

The size of assets, profitability, and competitiveness are all influenced by investment decisions. These decisions generally involve vast amounts of investment and are mostly irreversible except when there is a huge cost. Therefore, once the decisions are made, it is almost impossible for a business to avoid such decisions, and they need to be managed with extreme caution. Such decisions should be taken by some who is thorough with the organization and its work. A poor capital budgeting decision has the power to seriously damage the financial fortune of any business. The everyday working of a business is affected by such decisions. They also influence the liquidity and the probability of a business. The necessary elements of sound working capital management include Efficient cash management, inventory management, and receivables management. A long-term decision is very important as they affect the earning capacity of the business in the long run and usually involves a large outflow of the fund (Nupur, 2023), In the view of Nupur (2023), a short-term investment decision is known as a Working Capital Decision. Such decisions involve decisions regarding the levels of cash, inventory, and receivables. Short-term decisions are required in the everyday working of a business and also influence the liquidity as well as the profitability of a business. The essential elements of sound working capital management are efficient cash management, inventory management, and receivables management. There are several projects available for the firm to invest in. The projects have to be analyzed cautiously and are selected or rejected based on the volume of return.

According to Nupur (2023), the following are factors affecting Capital Budgeting Decisions

i. Cash Flows of the Project: Whenever an investment decision involving a huge amount is taken, the firm looks forward to generating some cash flows over a period. The form in which such cash flows are presented is usually in the form of a series of cash receipts and payments over the life of an investment. Before taking any capital budgeting decision, these cash flows should be properly measured and evaluated.

ii. The Rate of Return: In any project undertaken by the firm, the most important part of it is the rate of return received from them. The evaluation of such projects is done based on the returns expected from them. Also, the estimation of risk is done depending on the returns. For example, if there are two projects, X and Y (with the same risk involved), with a rate of return of 10 percent and 15 percent, respectively, under any normal circumstance, project Y should be opted for. This is because project Y has a higher rate of return and therefore, more profit.

iii. The Investment Criteria Involved: The decision of investment in any of the projects is concerned with the calculation and evaluation of several elements, such as the amount of investment, interest rate, cash flows, and rate of return. The selection of any particular project is based on different evaluation techniques known as capital budgeting techniques. Such techniques are applied to the projects before choosing a certain one.

Empirical Literature

Several empirical studies have proved that increased real interest rates raise the quantity and quality of investment. Challier and Oguie (2021) found the real interest rate to have a significant and positive relationship with economic growth. Obute, C. et al (2021) assess the impact of interest rate deregulation on economic growth of Nigeria, their findings reveal that real deposit rate has no significant impact on saving before and after deregulation

(liberalization); and also, real lending rate has no significant impact on investment before and after liberalization but that investment has a positive and significant impact on economic growth.

Soyibo and Adekanye (2021), in their investigation of the relationship between aggregate savings and real interest rates in Nigeria use OLS regression model but in a log form and find aggregate savings to be positively and significantly correlated with real interest rates. Thornton (2020), found a positive and significant coefficient for the savings rate in a demand for money function and a positive and significant coefficient for the real money balances in a savings function, and concluded that the complementarily hypothesis was relevant for the poorest developing countries.

Olubanjo, Atobatele and Akinwumi (2020) simulated the inter-relationships among interest rates, savings and investment decision in Nigeria between 2013 and 2020 using two stages least square method. Their result suggested that a marked decrease in the real lending rate would not result automatically into increased domestic investment.

McKinnon (1973) and Shaw (1973) who argued that, in countries characterized by financial repression, raising nominal interest rates relative to inflation would increase saving and the supply of investable resources in an economy. According to the McKinnon and Shaw doctrine, financial repression arises mostly when a country imposes ceilings on nominal deposit and lending interest rates at a low level relative to inflation the resulting low or negative real interest rates discourage saving mobilization and the channelling of the mobilized saving through the financial system.

Country and cross-country studies for OECD (Organisation for Economic Cooperation and Development) countries tend to show that saving is not much influenced by interest rates (Deaton 2021).

Mahmudul and Gazi (2019) in their study in Jordan on stock investment (based on the monthly data from January 2018 to March 2013) found that interest rate exerts significant negative relationship with share price for markets of Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain, and Venezuela. For six countries from this sample, they argued on the availability of significant negative relationship between changes of interest rate and changes of share price.

Fry (2019) have shown that credit availability mechanism has been reported for 12 Asian developing countries which showed that the ratio of domestic credit to nominal gross national product (GNP) is positively and significantly related to real interest rates. Fry (2019b) gives similar results for seven pacific basin developing countries.

Akintoye and Olowlaju (2018) examine optimum macroeconomic investment decision in Nigeria. The study employed OLS and VAR framework to stimulate and project intertemporarily private investment response to its principal shock namely public investment, domestic credit and output shock. The study found low interest rate to have constrained investment growth. The study resolves that only government policies produce sustainable output, steady public investment and encourage domestic credit to the private sector will promote private investment.

Drees and Parabasioglu (2018) on the impact of interest deregulation on economic growth of Norway, Finland and Sweden revealed that with interest rates deregulation, interest rates surged in these countries leading to and increased economic growth.

Original Article

Omar et al (2017) on the impact of interest rate liberalization on the economy of Bangladesh revealed that long-run economic growth in Bangladesh is largely explained by physical capital and real interest rate. They went on to state that financial liberalization has had significant negative impacts on economic growth implying that financial reforms failed to attract new investment. This they believe is due to the adverse investment climate existing in that country Akiri and Adofu (2017); investigate the effect of interest rate deregulation on investment decision in Nigeria between 2016-2021 and uses OLS regression model to authenticate the proficiency of interest rate deregulation on gross domestic investment decision in Nigeria. The study also identified other factors which impede investment decision in Nigeria namely, political instability, exchange rate inflation rate, unawareness of investment opportunities and corruption in other to bring out the level of influence of exchange rate and inflation rate into investment.

Nwanyanwu (2016) studied the interest rate policy and the performance of the Nigerian Manufacturing Sector using both linear and log-linear specification and found that linear specification appeared better in terms of the regression result during the (2010-2014) period of study. The result showed that investment in the manufacturing sector is negatively related to interest rates and exchange rates and positively related to foreign capital.

Summary

From the above theories of interest rate and investment, this research work is based on the Keynesian theory of interest rate and investment. This is because the Keynesian explain the behaviour of investment toward interest rate, which is in relation to the situation of Nigeria, when the interest rate is regulated, investment is negative because the rate of interest is very high but when deregulated, the rate of interest is left into the hands of demand and supply to decide. Finally**,** this research work therefore in examining the impact of interest rates on investment decisions in Nigeria follows the Keynesian view to see if same holds for Nigeria.

METHODOLOGY

This study used quasi-experimental research design approach adopted from the work of Hanan N (2015) and Vector Error Correction Model (VECM) technique for the data analysis. Data for this study were the annual panel ranging from 1990 through 2021. The variables include Gross Fixed Capital Formation (GFCF), Exchange Rate (EXC), Deposit Interest rate (INT) and Inflation rate (INF). This was because the data required mainly secondary data on variables were all sourced from the World development indicators (WDI).

Specification of the Model

Keynes posited that investment is affected by interest rates and income. We would extend the Keynes model specification to incorporate some other determinants of investment decision in Nigeria. We would include Gross Fixed Capital Formation (GFCF), and Exchange Rate. The variables highlighted above are considered to be the core determinant of investment decisions in Nigeria. The use of Gross Fixed capital Formation (GFCF) is prompted as this same is used in the study of Wuhan (2015) which this study attempts to make a comparison.

Econometricians assures a stochastic model that accounts for a random variable (μ) that cannot be explained on the dependent variable. The random variable introduces take into account or captures other factors which affect investment model specification in its stochastic form yield:

$$GFCF = \beta_0 + \beta_1 DINT + \beta_2 EXR + \beta_3 INF + \mu$$

Where μ is the stochastic error term introduced of our variables, we take composition of some convenience of analysis.

Original Article

The specification of the functional form the model gives:

GFCF=f (DINT, EXR) (1)

Econometrically, this can be restated as;

GFCF= β_0+ β_1 DINT + β_2 EXR + μ (2)

Where:

GFCF = Gross Fixed Capital Formation

INT = Deposit Interest rate

EXR = Exchange rate INF = Inflation rate μ = stochastic or error term Where β_0=intercept term indicating a change in investment when the explanatory variables increase by one unit. β_1 and β_2 are coefficients attached to the explanatory variables explaining their effects on the dependent variables.

PRESENTATION AND DATA ANALYSIS OF RESULTS

PRESENTATION OF DATA

The focus of this chapter is in the presentation and analysis of data collected through the method specified in Chapter three. The aim is to analyze the data to enable us to test the hypothesis stated earlier in chapter one and achieve the intended objectives enumerated in the same chapter. This chapter therefore comprises of the data presentation, examine the effect of deposit interest rate on investment decision in Nigeria; examine the effect of exchange rate on investment decision in Nigeria; and examine the effect of inflation rate on investment decision in Nigeria.

Descriptive Statistics

The descriptive statistics in this part of the study describes and analyses the data using the mean, the standard deviation, the minimum and the maximum. The details of the descriptive statistics are presented in table 2 below:

Table 2: Summary of Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
INTR	32	17.03459	5.991203	7.7	29.8
EXR	32	22.2195	20.36291	0.22	76.76
INFR	32	19.89466	25.09117	-3.34	114.8
INVD	32	28.40595	27.35357	-4.06	118.1

Source: Field work 2023

Table two indicates that a total of 32 observations were analysed in this study. The table further shows that INVD which is the dependent variable has a mean of 28.406. This implies that considering the time under investigation using the predictor variables in the study ignoring other factors, the average INVD can be predicted to be 28.406. The study further shows that the deviation of the INVD from the mean is low (27.354), also the minimum and maximum are -4.06 and 118.1 respectively. The result on the Table showed that INTR has 17.03459 as its mean and a deviation of 5.991203. The maximum and minimum values for INTR stood at 29..8 and 7.7 respectively. Table also proves that EXR has a mean of 22.2195 with a little deviation of 20.36291 and a minimum and

Original Article

maximum of 0.22 and 76.76 respectively. INFR has an average of 19.89466 with a deviation of 25.09117 and a minimum of -3.34 and maximum of 114.8.

1. The Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller statistic used in the ADF test is a negative number, and the more negative it is, the stronger the rejection of the hypothesis that there is a unit root.

Of course, this is only at some level of confidence. That is to say that if the ADF test statistic is positive, one can automatically decide not to reject the null hypothesis of unit root. From the findings, the variables of Investment decision and Interest rate are both stationary at 5% level of significance.

Johansen Cointegration Test

Cointegration is a statistical property of a collection (X_1, X_1, ..., X_k) of time series variables. First, all of the series must be integrated of order 1. A cointegrating relationship exists between series, if there is a stationary linear combination between them. The Johansen cointegration test is adopted to assess the long-run linear combination of the cointegrating vectors of interest rate and investment and if there is evidence of cointegration. The result indicates a negative and long run relationship between interest rate and Investment decision in Nigeria during the period under review.

EMPIRICAL ANALYSIS

In this part the Vector Error Correlation Model (VECM) is used to analyze the effect of interest rate on the total investment decision in Nigeria. A logarithmic treatment for the variable of investment to eliminate possible heteroskedasticity and mark it as GFCF. The rate is calculated each year and marked as INTR. All the estimation and tests are conducted by Eviews 7.7.

TEST OF HYPOTHESES

First, it should draw great attention that whether it can pass through the stability test or not. Unit root test (ADF test) is used to determine the stability of the variables. The test results are shown below:

Table 4.1: The ADF test

Variables	ADF test statistic	1% critical value	7% critical value	10% critical value	P- value
INTR	-3.1734	-4.11101	-3.14471	-1.71377	0.0371
INVD	-0.11710	-4.11101	-3.14471	-1.71377	0.7734
D(INTR)	-3.05381	-4.10104	-3.17737	-1.71877	0.0377
D(INVD)	-3.40111	-4.17705	-3.11147	-1.74748	0.0405

Source: Authors' calculations

Decision: We reject Ho if the p value is less than the level of significance.

Hence interest rate has no unit root at 7% and 10% level of significance even at first difference. However, Investment has a unit root at 1%, 7%and 10% level of significance but has no unit root at 7% and 10% level of significance under first difference.

Before establishing the VECM the best lag period test is shown in the table below;

Original Article

Table 4.1: THE BEST LAG PERIOD TEST

Lag	LogL	INT	ExR	InfR	DINTR	INVD
0	-174.0547	NA	70.77774	70.41810	3.10e*17	70.71014
1	-141.1104	10.18717	48.74737	48.74441	7.11e*18	48.41058
1	-171.0311	11.08740	47.44037*	47.81111*	141e*18*	47.13138*

Source: Authors' calculations

The lag mark* is the best. It follows the principle of INT, ExR, InfR and INVD. As can be seen from the table 7, lag 1 is available. Then the stability test for the VECM is needed through the AR roots graph to test it.

Table 4.3: The Johansen Cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical value	Prob.**
None	0.487443	13.73057	17.47471	0.0504
At most 1	0.057178	0.877477	3.841444	0.3738

Trace test indicates no cointegration at the 0.05 level

* Denotes rejection of the hypothesis at eh 0.05 level

** MacKinnon-Haug-Michells (1777) P-values

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical value	Prob.**
None	0.487443	11.87105	14.14440	0.0810
At most 1	0.057178	0.877477	3.841444	0.3738

Max-eigenvalue test indicates no cointegration at the 0.05 level

*Denotes rejection of the hypothesis at the 0.05 level

** denote Mackinnon-H au-Michelis (1977) p-values

Source: Authors' calculations

Through the Johansen test it can be seen that under the confidence level of 77%, the statistic rejects the null hypothesis which means there is not one co-integration relationship and accepts the alternative hypothesis, which says that there is at least one co-integration. In conclusion, there is long run association among variables. The standardized co-integration vector can be expressed as follows:

INVD= 1304 - 0.7714INTR (1.7010) (0.31718)

It can be seen that the rate and investment have a negative long-term relationship. If the rate reduces by 1%, the investment decision will increase by 77.14%.

GRANGER CAUSALITY TEST.

Original Article

Granger causality is used to test the causality between interest rate and investment decision in Nigeria.
The 1 lag is available to make Granger causality test. The result is shown below:

Table 4.4:

Pairwise Granger Causality Tests
Date: 11/08/17 Time: 05:17
Sample: 1003 1017
Lags: 1

Null Hypothesis	Obs	F-Statistics	Prob.
INVD does not Granger Cause INTR	11	1.04473	0.3170
INTR does not Granger Cause INVD		0.17134	0.4170

Source: Authors' Calculations

As the table shows, INVD is the Granger Cause of INTR, and INTR is also the Granger Cause of INVD. This means there is a bi-directional causality between interest rate and investment.
So the interest rate and investment may promote each other.

GRANGER CAUSALITY TEST

Granger causality is a statistical concept of causality that is based on prediction. According to Granger causality, if a signal X_1"Granger-causes" (or "G-causes") a signal X_1, then past values of X_1 should contain information that helps predict X_1 above and beyond the information contained in past values of X_1 alone. (Granger 1747). Thus, it can determine whether there is causality relationship between variables. From the study there is a bi-directional causality between interest rate and investment decision in Nigeria. So the interest rate and investment may promote each other.

VECTOR ERROR CORRECTION MODEL

Vector Error Correction Model (VECM) is a constraint VAR model (Vector auto regression model). If there is a co-integration relationship between two variables, VECM can be established. After finding the long-term equilibrium relationship between variables, then the VECM can be used to test the short-term relationship between them.

The coefficient and t-test value of each variables are shown in Table 7.

Table 4.7: The coefficient and t-test value

Variable	coefficient	t-test value		
ECM_{t-1}	- 0.77144	0.31718		
$D(INVD_{t-1})$	-1.0401	1.010		
$D(INTR_{t-1})$	7.7701	1.010		
C	-0.01771	-0.41147		
R^1= 0.4417	ADJ-R^1=0.71444	F= 4.74013	AIC = 3.31777	SC= 3.44148

Source: Authors' Calculations

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From table 7, ECM coefficients negative and significant. This shows a short run relationship between variables. The speed of adjustment towards long run equilibrium is 77.14 percent. As can be seen from table 7, in the short term, the interest rate and the investment decision in Nigeria have a positive relationship. If the rate increases by 1%, the investment decision in Nigeria will increase 7.77%. So it can be concluded that increasing interest rate will promote investment in the short term. However, at the same time, it is found that the goodness of fit has positive relationship which is good referring to the R^1value. And the t-test value is up to 1 is significant according to the rule of thumb which means the coefficient is significant. Thus, one can say there is a positive and significant short run relationship between interest rate and investment decision in Nigeria during the period (1990-2022) under study.

This model is a non-theory model, so impulse response analysis and variance decomposition are usually used to analyze the model.

Impulse response analysis focuses on the analysis of dynamic effect on the system when an error term changes and the model suffers from a certain impact. This method is used to describe how the dependent variable in a single equation responds to the impact given by other factors.

Impulse response analysis for each variable of the former 10 periods.

VARIANCE DECOMPOSITION TABLE

Variance Decomposition of INVD:

Period	S.E.	INTR	INVD
1	7.14E+08	41.17177	77.74843
1	1.08E+05	77.34483	14.43317
3	1.11E+05	71.01771	18.77148
4	1.37E+05	47.14713	34.73087
7	1.44E+05	43.11487	34.77713
4	1.81E+05	40.81744	37.17174
7	1.74E+05	78.33117	41.44871
8	3.11E+05	74.73717	43.14051
7	3.17E+05	77.37378	44.41411
10	3.41E+05	74.05104	47.71774

Cholesky Ordering: INTR INVD

Source: Authors Calculations

It is found that the impact of investment on itself is averagely strong. The contribution ratio keeps fluctuating and is not stable until seventh period where it has a value within same range till the tenth period which means investment may not be impacted by its historical value easily. The contribution ratio of interest rate to investment keeps falling till the tenth period. So it can be concluded that interest rate though falling has been one of the main contributing factors of investment and with a strong impact.

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INTERPRETATION OF RESULTS

The various tests carried out in the study is therefore discussed under this subsection; The ADF (Augmented Dickey Fuller) Unit root test showed that the variables in the study are both stationary at 7% level of significance following was the best lag period test which showed that the lag mark* is best and the Inverse AR root showed that the inverse root are all in the unit circle. So the VECM is stable. Hence the study moved on to examine the cointegration test which showed there's a long run relationship between the variables and the granger causality test showed that there's a bidirectional relationship between Interest rate and Investment. Thus, Interest rate and Investment may promote each other. The study using the Vector Error

Correlation Model showed that there's a significant and positive relationship between the variables (Interest rate and Investment) in Nigeria during the period under review. This assertion is in line with some Economists opinions, led by McKinnon (1973) and Shaw (1973), who began to support financial liberalization as a medium of promoting saving, investment, and growth. This was based on the argument that real interest rates are frequently negative in developing countries because of administrative controls on the nominal interest rates and heavy regulation in the financial market.

CONCLUSION AND RECOMMENDATION CONCLUSION

The research work assesses the link between interest rate and investment decision in Nigeria using investment as a dependent variable while interest rate, is the explanatory variables from 1990-2022. Data used were gotten from the CBN bulletin and World Bank Data Index and the Johansen Co-integration method of econometrics was used in estimation. The study found that interest rate is a significant determinant of investment decision in Nigeria. This should be expected as the cost on capital plays major role in investment decisions and the prospects of investment in most economies.

The study carried out a comparative analysis on the impact of interest rate on investment decisions in Nigeria to see if the same occurrence in China can be experienced in Nigeria during the period under study. The finding shows that there exists a comparison between interest rate behavior and investment decision in Nigeria as we have in China. Hence, there is no difference in the impact of interest rate on investment decisions during the period in both countries. Finally, the result of the co-integration shows that there's a long run relationship which makes investment responds negatively to shocks arising from interest rate and positively in the short run as seen in the study. Hence, any change in these variables exerts positive influence on investment.

RECOMMENDATIONS

The study found that interest rate is a significant determinant of investment decision in Nigeria. Thus, can be established from the findings of this study that there's a negative and long run relationship between Interest rate and Investment. In order to boost investment decision in Nigeria, certain recommendations have been made in this study which when considered hold the key to unlocking the investment potentials in the country.

To give suggestion as how to manage successfully the public sector for an optimum investment in the country. Also, to proper suggestion for sound interest rate management that will make for an optimum investment climate in Nigeria. This is because economic growth and development came from investment, in the light of the researcher's finding. The recommendations are:

1. Monetary authorities should promote policy that will improve deposits and also make available loanable funds to encourage investment.

2. 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 interest rate and eventually rise in investment.
3. The CBN should be independent from the control of the government. In this way, the CBN can establish open market operation (omo) for government borrowing. This will not only limit government expenditure to their revenue but will help to stabilize the investment rate according to the dictate of the free market by this the traditional relationship between interest rate and public investment will be restored.
4. The policy market should embark on a policy that will reduce interest rate as will stimulate investment and increase output, proper implementation and co-ordination of policy objective should be rigorously pursed implementation of policy is usually multidimensional and hence calls for effective co-ordination among the various government department, banks and other relevant sectors.

Since savings encourage investment and income lead to savings, the researcher therefore recommend programme or polices by government that will facilitate increased income level under of poverty cycle citizen order to ensure sufficient serving that bring about high rate of investment which will eventually lead to economic growth and development.

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