**THE IMPACT OF INTEREST RATE ON DOMESTIC INVESTMENT**

**A PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR IN SCIENCE (B.SC) DEGREE IN ECONOMICS**

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**Title page**

**CERTIFICATION PAGE**

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**APPROVAL PAGE**

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**DEDICATION**

I dedicate this project work to my sponsor Mr and Mrs Chijioke Nneji and to my Late parents Mr and Mrs Micheal Nnaji.

**ACKNOWLEDGEMENT**

My profound gratitude goes to God Almighty for his blessings and mercy in my life. I am grateful for his endless love, protection guidance, and showers of blessings and mercy upon me and my family.

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**TABLE OF CONTENTS**

Title page i

Certification page ii

Approval page iii

Dedication v

Acknowledgement vi

Abstract vii

Table of content viii

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study 1

1.2 Statement of the Problem 2

1.3 Research Questions 3

1.4 Objectives of the Study 3

1.5 Hypotheses of the Study 4

1.6 Significance of the Study 4

1.7 Scope and Limitations of the Study 5

CHAPTER TWO: LITERATURE REVIEW

2.1 Conceptual Literature 6

2.1.1 The Concept of Interest Rate 6

2.1.2 The Concept of Investment 8

2.2 Theoretical Literature 9

2.2.1 The Classical Theory of Interest Rate 9

2.2.2 The Loanable Funds Theory of Interest Rate 10

2.2.3 Keynes Liquidity of Preference Theory of Interest Rate 11

2.2.4 Accelerator Theory of Investment 11

2.2.5 Tobin Q Theory of Investment 12

2.2.6 Keynes Theory of Investment 13

2.3 Empirical Literature 14

2.4 Gap in Literature 15

CHAPTER THREE: METHODOLOGY

3.1 Theoretical Framework 24

3.2 Model Specification 25

* 1. Method of Evaluation 25

3.3.1 Preliminary Tests 25

3.3.2 Economic Criterion Test (A priori Test) 25

3.3.3 Statistical Test of Significance 26

3.3.3.1 Test for Goodness of Fit 26

3.3.3.2 T-Test of Significance 26

3.3.3.3 f-test of Significance 26

3.3.4 Econometrics Test of Significance 27

3.3.4.1 Autocorrelation Test 27

3.3.11 Unit Root/Stationary Test 28

3.3.1.2 Co-integration test 28

3.3.1.3 Error Correction Model (ECM) 28

3.4 Data Required and Sources 28

CHAPTER FOUR:PRESENTATION AND ANALYSIS OF RESULTS

4.1 Unit Root Test 29

4.2 Cointegration Test 30

4.3 Regression Analysis 31

4.3.1 Coefficient Interpretation of the Variables 31

4.3.2 Coefficient of Determination (R-Squared, R2) 32

4.3.3 Autocorrelation Test 33

4.5 Test of Hypotheses 34

4.6 Implications of the Results 35

**CHAPTER FIVE:SUMMARY, CONCLUSION AND RECOMMENDATION**

5.0 Summary of Findings 36

5.2 Conclusion 37

5.3 Recommendation 37

Appendix 39

**ABSTRACT**

The relationship between interest rate and domestic investment has attracted the attention of economists and other economic experts. This study carried out an empirical analysis of the impact of interest rate on domestic investment in Nigeria covering the period 1980-2016. Data for the research was extracted from the central bank of Nigeria statistical bulletin. The methodology adopted in the research is the multiple linear regression with the application of Ordinary least Squares (OLS) technique. Findings from the study reveal that interest rate has a negative and significant impact on domestic investment in Nigeria, inflation has no significant impact on domestic investment in Nigeria and money supply has no significant impact on domestic Investment in Nigeria. It is therefore the recommendation for the study that the federal government through the Central Bank should boost the level of domestic investment through an optimal reduction in interest rate and the federal government should ensure a conducive and comfortable macroeconomic atmosphere so that domestic investment can strive.

**KEY WORDS** : Interest Rate, Domestic Investment, Inflation.

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background of the Study**

The behaviour of interest rates, to a large extent, determines the investment activities and hence economic growth of a country. Investment depends upon the rate of interest involved in getting funds from the market, while economic growth to a large extent depends on the level investment. According to Jhingan (2003), if the rate is high investment is at low level. A low rate of interest leads to an increase in investment. There is therefore a need to promote an interest rate regime that will ensure “inexpensive” spending for investment and consequently enhancing economic growth at low financial cost.

Interest rate is a critical variable in the loanable funds market, given its role in the mobilization and efficient allocation of financial resources. Prior to the adoption of the Structural Adjustment Programme (SAP) in 1986, the authorities in Nigeria fixed the level and structure of interest rate. The major reasons for regulating interest rates were the desire to obtain the social optimum in resource flow to the preferred sector; promote an orderly growth of the financial markets; combat inflation and lessen government’s debt service burden. In order to facilitate the flow of domestic credit to the priority sectors, discriminatory and below market interest rates were fixed for credit to agriculture, manufacturing and residential housing construction. This policy generally led to the unintended consequences of moral hazard and adverse selection.

The financial sector reforms, which commenced in July 1986, relied on market forces. Its objective was the elimination of financial repression in order to improve the incentive structure and ensure allocative efficiency. The policy stance of the regulatory authorities has been guided by the general economic conditions and developments in the financial markets. At various times, there had been policy shifts induced by the need to deal with emerging problems. However, by October 1996, all forms of control on interest rates had been removed, following further liberalization of the financial sector, thus the Central Bank of Nigeria’s minimum rediscount rate became the nominal anchor of its interest rate in the flow of banks credit, which averaged 19.8 percent in 1980 – 1986, 28.6 percent in 1987 – 1996 and averagely 42.9 percent in 1997 – 2000s respectively. However, the unintended consequence of the policy shift from controls to liberalization has been the rise in interest rates, especially between 1986 and 1993. Interest rate was relatively stable between 1994 and 1997 and, thereafter, became volatile (CBN, 2015)

Based on the foregoing, this study is aimed at carrying out an empirical analysis on the impact of interest rate on domestic investment in Nigeria covering the period 1980-2016.

**1.2 Statement of the Problem**

The influence of interest rate in determining the level of domestic investment in an economy cannot be overemphasized. However, over the years in Nigeria, interest rate has always been fluctuating and this has adversely affected the level of domestic and foreign investment in the economy. Various measures have been taken by the government to stabilize the level of interest rate in the economy but these steps and policy strategies were ineffective in the economy. Firstly, through the Central Bank of Nigeria (CBN), the interest rate has been pegged at various rates so as to prevent fluctuations and volatility movements. This was facilitated by the policy of interest rate deregulation in the economy in 1986. However, despite these policies, the level of interest rate has not been impressively stable and the level of domestic investment has not been optimally on the increase. This study is thus focused on the evaluation of the impact of interest rate on domestic investment in Nigeria.

**1.3 Research Questions**

In the course of this study, the following research questions will be addressed:

1. To what extent has interest rate affected the level of domestic investment in Nigeria?
2. To what extent has inflation impacted on the level of domestic investment in Nigeria?
3. To what extent has money supply impacted on the level of domestic investment in Nigeria?

**1.4 Objectives of the Study**

The general aim of this study is to evaluate the impact of interest rate on domestic investment in Nigerian economy. The specific objectives of the study include:

1. To ascertain the impact of interest rate on domestic investment in Nigeria.
2. To evaluate the impact of inflation on domestic investment in Nigeria.
3. To evaluate the impact of money supply on domestic investment in Nigeria.

**1.5 Hypotheses of the Study**

The following hypotheses of the study will be tested:

Ho: Interest rate has no significant impact on domestic investment in Nigeria

Ho: Inflation has no significant impact on domestic investment in Nigeria

Ho: Money supply has no significant impact on domestic investment in Nigeria

**1.6 Significance of the Study**

A research draws its relevance from the present and prospective beneficiaries and its contribution(s) to academia at large. The pertinence of this research is justified on the grounds that it will show the impact of interest rate on domestic investment in Nigeria for the years under review; and thus provides a framework for policy prescriptions and interventions. In furtherance to the above, this research will find its relevance as made evidence in the following:

**The Banking Sector:** The banking sector will benefit significantly from this study as it will reveal the impact of interest rate on domestic investment in Nigeria. This is because the banking sector use interest rate as an instrument of lending and this study will show the impact it has on domestic investment in Nigeria over the years.

**Government:** The federal government will find this study highly relevant as it will provide a picture of the relative impact of interest rate on domestic investment and thus motivate relevant policy reforms or sustenance. This research will also find its relevance in the coffers of financial variable analysts given that the subject under study is purely a monetary phenomenon.

**Subsequent Analysts:** This investigation will also serve as a stepping stone for researchers who develop interest in carrying an empirical analysis on the concept of interest rate and domestic investment.

**Scholars**: Students will find this piece highly relevant as it will undeniably increase their knowledge horizon on the concept of interest rate and domestic investment.

**The Academia:** The education sector is also considered as one of the significant beneficiaries because it is believed that this research will be an addition to the existing stock of knowledge.

**1.7 Scope and Limitations of the Study**

The primary focus of this study is to carry out an empirical analysis of the impact of interest rate on domestic investment in Nigeria between 1980 and 2016. In the course of carrying out this research, the researcher was confronted with a lot of limiting threats which amongst others included time constraint, dearth of data and some discouraging attitudes from the staff of some statistical agencies. However, despite these limitations, the researcher will ensure that the objectives of the study are duly met and actualized.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Conceptual Literature**

**2.1.1 The Concept of Interest Rate**

According to Sanusi (2002), interest rates are the costs a borrower has to pay when obtaining a loan in any economy. This definition implies that, interest rates are the determinants of the cost of credits in an economy. The impact of high cost of interest rates in the society is not unconnected to the fact that borrowers may hesitate to borrow when they should. This may be because the cost of credit and the credit itself may aggregate to an amount that may be unaffordable to the borrower to pay back within the stipulated due date of the loan. The implication of this on the economy is that GDP of the economy would be low since equity financing alone cannot adequately sponsor the production activities in an economy

According to Keynes, the 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 (2002) defines interest rate as the return or yield on equity or the opportunity cost of deferring current consumption in the future. Some examples of interest rate include the saving rate, lending rate, and the discount rate.

Professor Lerner, in Jhingan (2003), defines interest as the price which equates the supply of credit or savings 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 an interest rate is the price of credit, which like other price is determined by the forces of demand and supply; in this case, the demand and supply of loanable funds (Jelilov, Gylych; Muhammad Yakubu, Maimuna, 2015).

Ibimodo (2005) defined interest rates, as the rental payment for the use of credit by borrowers and return for parting with liquidity by lenders. Like other prices, interest rates perform a rationing function by allocating limited supply of credit among the many competing demands.

Bernhardsen (2008) defines the interest rate as the real interest rate, at which inflation is stable and the production gap equals zero. That interest rate very often appears in monetary policy deliberations.

However, Irving Fisher (1936) states that interest rates are charged for a number of reasons, but one is to ensure that the creditor lowers his or her exposure to inflation. Inflation will cause a nominal amount of money in the present to have less purchasing power in the future. Expected inflation rates are an integral part of determining whether or not an interest rate is high enough for the creditor (Jelilov, 2016).

The real interest rate represents a fundamental valuation of temporary provision of capital (money) corresponding to a price level constant in time. It is also obvious from the above relation that if inflationary expectations change, nominal interest rates have to change aliquot at a constant real interest rate (Cottrell, 2005).

The real interest rate concept is irreplaceable in the research into the mutual relations of inflation, because assuming that the creditors are rational, inflation and nominal interest rates influence each other. For similar reasons, the real interest rate is used in broader economic analyses. Expected inflation is an unobservable quantity. In an expose analysis, it can be replaced by the actual rate of inflation in the following period, which is equivalent to assuming rational expectations (Bencik; 2009).

**2.1.2 The Concept of Investment**

This refers to real capital formation that will produce a stream of goods and services for present and future consumption (Bannock, Baxter & Rees, 2003). In common terms, investment is defined as the capital formation in the production. Stiglitz (1993) defines investment as the acquisition of an asset with the aim of receiving a return. It could also mean the production of capital goods; goods which are not consumed but instead used in future production. An example includes building of rail roads or factory. There are several motive for investment, the basic motive is profit/return. According to Keynes theory, this motive depends on the expected marginal efficiency of capital (MEC) in relation to the expected rate of interest. Investment is categories into public and private investment (induced and autonomous). Public investments are the investment which are being carried out by the government in order to provide social amenities to her citizens such as the provision of electricity, housing, good roads, and so on. While private investments are carried out by the individuals in the economy, they source for funds from the financial institutions to establish industries in the economy.

**2.2 Theoretical Literature**

**2.2.1 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. Time preference and productivity of capital depend upon waiting or saving. The demand for capital is determined by the investors because it is productive. 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.

**2.2.2 The Loanable Funds Theory of Interest Rate**

The neo-classical or the loanable fund theory examines interest rate in terms of demand and supply of loanble funds or credit. According to this theory, the rate of interest is the price of credit which is determined by the demand and supply for lonable funds. In the words of Prof Lerner in Jhingan (1992); it is the price which equates the supply of credit, or saving plus the net increase in the amount of money in a period, to the demand for credit, or investment plus net hoarding in the period. The demand for loanble fund has primarily three source; government, businessmen and consumers who need them for purpose of investment, hoarding and consumption. The government borrows funds for constructing public works or for war preparations. The businessmen borrow for the purpose of capital goods and for starting investment projects. Such borrowings are interest elastic and depend mostly on the expected rate of profit as compared with the interest rates. The demand of loanable fund on the part of consumers is for the purchase of durable consumer goods like scooters, houses etc. individuals borrowings are also interest elastic. The tendency to borrow is more at a lower rate of interest at a higher rate.

**2.2.3** **Keynes Liquidity of Preference Theory of Interest Rate**

Keynes defines the rate of interest as the reward of not hoarding but the reward for parting with liquidity further specified period. It is not the price which brings into equilibrium the demand for resources to invest with the readiness to abstain from consumption. It is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. In other words, the rate of interest in the Keynesian sense is determined by the demand for and the supply of money.

**2.2.4 Accelerator Theory of Investment**

The simple accelerator model asserts that investment spending is proportional to the change in output and is not affected by the cost of capital. This theory was advanced by Clark (1917). The simple (also called naïve) accelerator model was based on the view that firms install new capital when they need to produce more. Therefore, firms would invest if output was expected to change, but they would not otherwise undertake net investment. The simple accelerator model did a reasonable job of explaining the data but was regarded as inadequate since it failed to take the costs of investing into account. Much research has been devoted to the question of whether the cost of capital significantly affects investment. If the accelerator model is extended by relating investment to current and past changes in income, it seems in some studies to do a better job in explaining investment than the neoclassical model. This finding would imply that the cost of capital is not a major determinant of the rate of investment.

**2.2.5 Tobin Q Theory of Investment**

James Tobin (1969) propounded the theory of Tobin Q. Tobin Q is the ratio of market value of a firm to replacement cost of capital. When the ratio is more than one, firms will want to invest more capital, such that investment will be rapid. When the ratio is equal to one or unity, then firms would be indifferent as to whether to invest more capital or not. When the ratio is less than one, then the firm would be better off selling the existing assets than acquiring new ones. One critique of Tobin Q is that it is difficult to measure or quantify replacement costs. For empirical consideration, the average Q, which is the ratio of the market value of the existing stock of capital to its replacement costs, is often used instead of the marginal Q which is hard to measure. Tobin Q’s application to developing countries is limited in the sense that it makes oversimplifying assumptions such as perfect capital markets, perfect flow of information and little or no public investment. Developing countries lack well-developed capital markets and suffer from financial repression, huge national debts, influx of imports and macroeconomic instability (Ag’enor and Montiel, 1996). Kenya, for a long time has suffered the effects of corruption and bad governance, and it would be important to see how these two factors affect domestic private investments.

**2.2.6 Keynes Theory of Investment**

Keynes (1936) advanced his theory of investment based on ‘animal spirits’. He stated that despite the fact that investment and savings must be identical *expost*, savings and investment decisions are generally taken by different decision-makers hence there was no reason why *ex post* savings should equal *ex ante* investments. Keynes formulated an investment function of the form I = I0 + i(r), where I is investment, I0 is autonomous investment and i(r) is interest rates. Investment is inversely proportional to interest rates. The higher the interest rate, the less likely the firm will be willing to undertake any given investment project. In this regard, Keynes stated that firms rank various investment projects depending on the internal rate of return (IRR), or marginal efficiency of investment. Given a certain rate of interest, firms would choose projects whose IRR exceeded the rate of interest. The criticism of this theory was that ranking of investments may most likely be dependent on interest rates.

**2.3 Empirical Literature**

In this section of the research, some of the related studies previously carried out on the subject matter were reviewed in this section of the study.

Utile et al (2018) investigated the effect of interest rate on the economic growth of the Nigerian economy. The aim of the study was to determine the effect of inflation rate, exchange rate and deposit interest rates on the gross domestic product of the country. The data for the study was obtained from the statistical bulletin of the Central Bank of Nigeria from 1980-2016. The research design adopted for the study was the ex-post facto research design. Multiple regression technique was used for the analysis of data. The student t-test was used to test the hypotheses formulated. It was found that INF and EXR have negative and insignificant effect on GDP. Also it was found that DIR has positive and significant relationship with GDP. The study generally concludes that interest rate has a negative and insignificant relationship with GDP.

Chris (2012) investigated the effect of interest rate fluctuation on the economic growth of Nigeria. Two research hypotheses were formulated to investigate the relationship between interest rate and economic growth and the difference in economic growth before and after interest rate deregulation regime in Nigeria. Ex-post facto research design was adopted for this study. Data for the study were obtained from the Central Bank of Nigeria statistical bulletin. Data collected were analyzed and tested using the ordinary least square multiple regression analytical technique. The result of the findings revealed that: there existed an inverse relationship between interest rate and economic growth in Nigeria, meaning that increase in interest rate will decrease GDP of the country, thus retarding growth of the real sector. It was recommended that a strong monetary policy for Nigeria should be evolved that would enhance lending to the real sector economy for productive economic activities.

Fatoumata (2017) with the application of regression technique examined the impact of interest rate of economic growth in Nigeria from 1990 to 2013. The result found that the interest rate has a slight impact on growth; however the growth can be improved by lower the interest rate which will increase the investment. As a result of the study was found out that Nigerian authorities should set interest rate policies that will boost the economic growth. Therefore, proper measure should be taken in order to have a more rapid economic growth.

Obamuyi (2009) investigated the relationship between interest rates and economic growth in Nigeria, using time series analysis and annual data from 1970 - 2006. The co-integration and error correction model were used to capture both the long-run and short-run dynamics of the variables in the model. The empirical results indicate that real lending rates have significant effect on economic growth. There also exists a unique long-run relationship between economic growth and its determinants, including interest rate. The results imply that the behaviour of interest rate is important for economic growth in view of the relationships between interest rates and investment and investment and growth. Thus, the formulation and implementation of financial policies that enhance investment-friendly rate of interest is necessary for promoting economic growth in Nigeria.

Itodo (2011) assessed the impact of interest rate deregulation on economic growth in Nigeria. Using an autoregressive model, GDP growth rate (G) was regressed against lending rate (LR), savings rate (SR), Inflation rate (IF), exchange rate (X), financial deepening (FD) and lagged G (G-1) for two separate periods; the regulation era (1970-1986) and deregulation era (1987–2009). The result showed that deregulated interest rate (represented by LR) has an insignificant impact on economic growth. However, inflation rate and exchange rates were found to have positive and significant impact on economic growth.

Lucky and Lyndon (2016) examined the relationship between interest rate, economic growth and bank lending in Nigeria. Secondary time series panel data on the study variables were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin for the period 1985 – 2014. The study employed Ordinary Least Squares (OLS) technique to analyze data. The study found that interest rate had negative relationship with bank lending in Nigeria. While economic growth had positive correlation with bank lending in Nigeria. The study recommended a policy shift towards infrastructural development and an increased productive base of the notion in order to improve the financial sector performance by stabilizing the macroeconomic instruments. This it is hoped would not only help in enhancing the profitability of banks in the country but would also improve the standard of living of the Nigerian people*.*

Malede (2014) examined the determinants of commercial bank lending in Ethiopia, using time series panel data from selected banks for the period 2005 – 2011. He employed OLS technique to the study variables such as bank size, credit risk, gross domestic product, investment, deposit, interest rate, liquidity ratio and cash reserve requirement. The results revealed significant relationship between bank size, credit risk, gross domestic product, liquidity ratio and commercial bank lending, while deposit, investment cash reserve requirement and interest rate had no effect on bank lending in Ethiopia. In a similar study, Tomak (2013) investigated the effect of bank size, deposit, interest rate, inflation and gross domestic product on bank lending in Turkey, using data collected from selected banks for the period 2003 – 2012. The study employed Breusch-Pagan/Cook-Weisberg test to analyze data. The results indicate that bank lending in Turkey depended on bank size and inflation rate.

Ajayi and Atanda (2012) examined the effect of monetary policy instruments on bank performance in Nigeria using time series data for the period 1980 – 2008. The study model defined bank total loan as a function of minimum policy rate, cash reserve ratio, liquidity ratio, inflation and exchange rate. The study employed a regression model based on the Engle-Granger two-step co-integration approach. They found that interest rate, inflation rate and exchange rate had positive effect on bank loan, while liquidity ratio and cash reserve ratio had negative effect on bank loan. They concluded that monetary policy instruments are not effective stimulants for bank lending in Nigeria. In another study, Amidu (2006) examined the impact of monetary policy on bank lending in Ghana using cross sectional panel data collected from the Bank of Ghana covering the period 1998 – 2004. The study adopted money supply and prime lending rate as proxy for monetary policy and the independent variables. These were regressed against bank loan, the dependent variable. The found that money supply had positive effect on bank loan, but prime lending rate had negative influence on bank loan in Ghana.

Adeyeye (2006­) examined empirically the relationship between interest rates and economic growth in Nigeria over a 30 year period. The roles of monetary policy in increasing the growth of the economy by controlling the availability and cost of credit (interest rates) through various interest rate policies were discussed. Adequacy and structure of interest rates as well as the factors that affect interest rates were reviewed. Various interest rate regimes in Nigeria vis-à-vis macroeconomic indicators and performance were examined. Hypotheses were formulated to determine the direction of causality between savings and economic growth. Empirical models were formulated using Nigerian data for the period 1970 to 2003 and the study adopted ordinary least square method in its estimation. The study reveals, among others, that financial savings as well as bank loans were negatively but significantly related to gross domestic investment suggesting that real interest rate policy cannot be used to promote investment and economic growth without fuelling inflation. There is therefore the need for government to make it a matter of national priority the putting in place policies through practical strategies that will ensure consistently moderate and acceptable levels of inflation and interest rate for the economy.

Obansa, Aluko and Millicent (2012) established empirically the relationship exiting among Exchange rate, Interest rate and economic growth in Nigerian economy over the period of 1970-2010. Fundamentally, the period of the study was fractured into two prominent distinctions of economic era- the regulation era and the deregulation era. The study adopted vector auto- regression (VAR) technique, with specific emphasis on Impulse Response factor and the Forecast Error Variance Decomposition. The result indicated that Exchange rate had a stronger impact on Economic growth than Interest rate. Particularly, Interest rate impact was found to be positive but however declined as the time horizon increased. It had a little impact on Economic growth in the period of regulation than in the deregulation era. The conclusion arising from the study shows that Exchange rate liberalization was good to Nigerian Economy as it promotes Economic growth. Interest rate liberalization on the other hand does not make an appreciable impact on the Economic growth as it undermines investment drive. The paper therefore recommends that Interest rate liberalization and deregulation should be replaced with the policy of Interest rate regulation as obtained in the 1970s and early 1980s.

Kamo (2012) found that interest rates have insignificant association with economic growth in Nigeria using OLS regression technique for data analysis. The data was collected from 1987- 2009. On the other hand, Babalola, Oladepo, Danladi, Akomolate and Ajiboye (2015) found that inflation and interest rate have a negative effect on economic growth using 1981-2014 as the study period with data collected from the Central Bank of Nigeria. A negative effect of interest rates on economic grown in Kenya was obtained in the study conducted by Mutinda (2014) who collected data from the Central Bank of Kenya using the period 2003-2012. This study used the leading rate as a proxy for interest rate. The study also used GDP as the dependent variable with multiple regression analysis as its major technique of data analysis to arrive at the findings stated above.

Abdul and Marwan (2013) investigated the effect of interest rate, inflation rate, and GDP on real economic growth in Jordan over the period 2000-2010. Unit root test (Augmented Dickey-Fuller test) has been exploited to check the integration order of the variables. A cointegration analysis with four variables (economic growth, interest rate, GDP, and inflation level) is employed. Study adopted Johansen test. Findings indicated that both trace test and max eigen-value static showed that the four equations have significant existent 1% or 5%. It means that all variables have long term equilibrium relationship. Study adopted the same four variables to discuss Granger Causality relationship; findings indicated that inflation causes interest rate. On the other hand all other variables are independent with each other. Regression was conducted to test growth rate with interest rate which showed that current interest rate has an influence power on growth rate. Also, regression used to test growth rate with inflation rate; it showed that inflation rate has influence power on growth rate. Finally regression used to test GDP, interest rate, and inflation rate together; results have shown that current GDP and one lag GDP have influence power to growth rate.

Hitlar (2012) investigated the impact of interest rate liberalization on investment in Nigeria from 1970-2012. Using the Error Correction Model (ECM), the result indicates that a long run relationship exists among the variables. The result further reveals that all the variables have significant impact on investment. The study equally shows that there is no differential impact of interest rate liberalization on investment in Nigeria during the pre and post-liberalization regimes. Also, the impulse responses of these variables to shocks in the extraneous variables were verified; using the Multiple-Equation VAR models. In addition, the variance decomposition result shows that Period 2 shows a standard deviation value of 97.23 in investment resulting from own shock, 2.44 to a response to a shock from interest rate, 0.0186 to a response from market capitalization rate,0.205900 to a response to public expenditure and 0.101933 to response to trade openness. In period 10, investment responds positively with a standard deviation of 18.77 originated from own shock and standard deviation values of 8.05, 7.94, 12.43 and 15.59 arising from a shock from interest rate, market capitalization rate, public expenditure and trade openness respectively. It is recommended that polices to make interest rate attractive to investors as well as improve trade should be encouraged. Also broadening the capital market and improving infrastructure through increased capital expenditure should be pursued. In addition to these, there should be consistency in policies so that policy summersaults does not affect investment.

**2.4 Gap in Literature**

It can be clearly seen that there is an avalanche of studies on the effect of interest rate on selected macroeconomic variables. However, one can clearly see that majority of the studies are anchored on estimating the impact of interest rate on economic growth. There are few studies on the impact of interest rate on investment. This study is therefore focused on analyzing the impact of interest rate on investment in Nigeria.

**CHAPTER THREE**

**METHODOLOGY**

This study makes use of econometric procedure in estimating the impact of interest rate on economic growth in Nigeria. The Ordinary Least Square (OLS) technique is employed in obtaining the numerical estimates of the coefficients in different equations. The OLS method is chosen because it possesses some optimal properties: its computational procedure is fairly simple and it is also an essential component of most other estimation techniques. Secondly, this technique has been adopted by many other researchers and has yielded optimal results. Thirdly, the OLS technique possesses the feature of simplicity as it is not complex in computation. Finally, the data requirement of this technique is not excessive as compared with other techniques and methods.

**3.1 Theoretical Framework**

The theoretical basis of this research is the Keynesian theory of interest rate. This theory assumes a closed economy and a perfect competitive market with fairly price- interest aggregate supply function. The economy is also assumed not to exist at employment equilibrium and also that it works only in the short run because as Keynes aptly puts it ‘’ In the long run, we also will be dead’’. The Keynesian theory is rooted on one notion of price rigidity and possibility of an economy setting at a less than full employment level of output, income and employment.

**3.2 Model Specification**

In this research, interest rate will be the independent variable with inflation rate and money supply as control variables while domestic investment will be the dependent variable. The model is thus:

DI = f (INTR, INF, MS) …………………………………………….. 3.1

DI = +INTR + INF + MS + µ……………………………. 3.2

By Definition:

DI = Domestic Investment

INTR = Interest Rate

INF = Inflation Rate

MS = Money Supply

µ = Stochastic Error Term

* 1. **Method of Evaluation**

**3.3.1 Preliminary Tests**

**3.3.2 Economic Criterion Test (A priori Test)**

The a priori test of the analysis will be based on the regression coefficient based on the coefficient of the algebraic signs of the parameters. It is a test that will be based on evaluating the conformity of the relationship between the variables on economic theory.

**3.3.3 Statistical Test of Significance**

**3.3.3.1 Test for Goodness of Fit**

This test involves the test of the goodness of fit. To evaluate the working hypothesis of this study. R2 the co-efficient multiple of determination is used to test the explanatory power of the variable. R2 lies between zero and one (0 < r2 < 1). The closer R2 is to 1 the greater the proportion of the variation in the dependent variables attributed to the independent variables.

**3.3.3.2 T-Test of Significance**

To test for the statistical significance of individual regression co-efficient, t-statistic is used. A two-tailed test will be conducted at 5% level of significance and n-k degree of freedom; where, n = sample size and k = number of parameters in the model. The null hypothesis Ho will be tested against the alternative hypothesis H1.

**Decision Rule (T-Test)**

If t0.025 < t\* Ho will be rejected and the H1 accepted. Otherwise, the alternative hypothesis H1 will be rejected and the null hypothesis Ho be accepted.

 **3.3.3.3 f-test of Significance**

To Test the statistical significance of the entire regression, the f-ratio is used. The test will be conducted at 5% level of significance and V1/V2 degree of freedom (df); where, V1 = df for the numerator and V2 = df for the denominator.

**Decision Rule (F-Test)**

If f\* > (f0.05), we say the regression is statistically significance but if otherwise, it implies that it is statistically insignificant

Note: t\* = computed t – value

 t0.025 = tabulated t – value

 f\* = Computed f-value

 f0.05 = tabulated f – value

**3.3.4 Econometrics Test of Significance**

**3.3.4.1 Autocorrelation Test**

To evaluate the reliability of the expected numerical estimates, the Durbin – Watson (D-W) statistics at 5% will be used to test for the presence of autocorrelation problem. The region of autocorrelation remains:

du < d\* < (4-du)

Where:

du = Upper Durbin – Watson

d\* = Computed Durbin-Watson

**Decision Rule (Autocorrelation Test)**

If the computed value of Durbin-Watson lies within the region, it means there is no presence of autocorrelation problem. But if the Durbin-Watson computed value lies outside the regions there is the presence of autocorrelation problem and a remedial measure like the use of first difference equation will be adopted.

**3.3.11 Unit Root/Stationary Test**

This is will be used to test whether a variable’s mean value and variance varies over time. It is necessary in time series variables in order to avoid the problem of spurious regression. The Augmented Dickey Fuller (ADF) test will be used for the analysis.

**3.3.1.2 Co-integration test**

This will be used to test if there exists a long-run relationship between the variables under investigation. The Johansen or Engel-Granger methodology will be used.

**3.3.1.3 Error Correction Model (ECM)**

If cointegration exists among the variables, the error correction model will be estimated. The ECM is estimated to estimate the short-run dynamics and the speed at which the short run disequilibrium corrects to achieve a long-run relationship.

 **3.4 Data Required and Sources**

The data required for this research are time series secondary data on interest rate, inflation rate, money supply and domestic investment. Data will be extracted from the Central Bank of Nigeria (CBN) statistical bulletins and National Bureau of Statistics (NBS).

**CHAPTER FOUR**

**PRESENTATION AND ANALYSIS OF RESULTS**

**4.1 Unit Root Test**

In a research involving the use of time series data, it is ideal to carry out stationarity tests on the series to be used. This is justified on the grounds that data not found stationary have the tendency of yielding spurious regression results and thus misleading policy projections. Below is the variables made stationary with their corresponding order of integration.

**Table 4.1:** *Unit Root Test*

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLE** | **ADF STAT** | **CRITICAL VALUE @ 5%** | **ORDER OF INTEGRATION** |
| **INVESTMENT** | -3.179487 | -2.948404 | I(0) |
| **INTEREST RATE** | -5.860018 | -2.951125 | I(1) |
| **INFLATION** | -2.987689 | -2.945842 | I(1) |
| **MONEY SUPPLY** | -3.407776 | -2.963972 | I(1) |

**Source:** *E-views Computation.*

The table above shows that investment is stationary at level form while interest rate, inflation and money supply are all stationary at first difference. This further reveals that investment has a constant mean, mode and other statistical properties at order zero while interest rate, inflation and money supply has a constant mean, mode and other statistical properties at order one.

**4.2 Cointegration Test**

The Cointegration using the Engel-Granger technique was adopted to evaluate if there exists a long run relationship among the variables. The summary is displayed in table 4.2 while the main output is displayed in the appendix I.

**Table 4.2:** *Cointegration Result*

|  |  |  |  |
| --- | --- | --- | --- |
| **STATISTIC**  | **ADF STATISTIC** | **CRITICAL VALUE** | **CONCLUSION** |
| Residuals | -2.242545 | -2.945842 | No Cointegration |

**Source:** *Cointegration Result in Appendix I*

This essence of carrying out a cointegration test is to evaluate the long-run relationship status of the variables under analysis. The test was carried out using the Engel-Granger Approach. It can be seen that in absolute terms, the ADF statistic is less that the critical value at 5%. Hence, there exists no long-run relationship among the variable under investigation.

**4.3 Regression Analysis**

A regression analysis was conducted on interest rate against investment. The summary of the regression is displayed in table 4.3 below while the main output is deposited in appendix I.
**Table 4.3:** *Regression Table*

**Dependent Variable:** Domestic Investment

**Method of Analysis:** Regression Analysis

**Time Scope:** 1980-2016

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **VARIABLE** | **COEFFICIENT** | **T-STATISTICS** | **STD.ERROR** | **P-VALUES** |
| Constant | 11.49135 | 25.14505 | 0.457003 | 0.0000 |
| INTR | -0.051053 | -2.069417 | 0.024670 | 0.0464 |
| INF | 0.002142 | 0.239358 | 0.008949 | 0.8123 |
| MS | 0.017821 | 0.276603 | 0.064429 | 0.7838 |
| R-Squared | 0.551292 |  |  |  |

**F-statistics =** 1.960880

**Durbin-Watson =** 0.751843

**4.3.1 Coefficient Interpretation of the Variables**

It can be clearly seen from table 4.3 above that the coefficient of interest rate yielded a negative value. The negative value implies that on the average, interest rate contributes negatively to investment in Nigeria. It entails that a 1% increase in interest rate will lead to a -0.51053 decrease in investment and vice versa. This entails that there exists a negative relationship between interest rate and investment. This conforms to economic a priori expectation because an increase in interest rate make borrowing costly and hence investment is reduced and vice-versa.

The result also shows that inflation yielded a positive coefficient valued at 0.002142. This implies that there exists a positive relationship between inflation and investment in Nigeria. Hence, a 1% increase in inflation will increase investment by 0.002142 naira. This conforms to economic a priori expectation because inflation means increase in price and investors will be propelled to invest more to take advantage of the high prices to maximize more profit and when inflation is low, investment will also reduce in accordance.

Finally, money supply coefficient yielded a positive value at the magnitude of 0.017821. This implies that money supply increased by 1% will lead to an increase in investment by 0.017821 naira. This conforms to economic a priori expectation because increase money supply introduces liquidity in the economy and hence increases investment through the simple multiplier effect and vice-versa.

**4.3.2 Coefficient of Determination (R-Squared, R2)**

Based on the regression analysis in table 4.3, the R2  which measures the goodness of fit yielded 0.551292. This implies that the explanatory power of the independent variables is approximately 55%. It further shows that the variation in the dependent variable is explained by the independent at 55%. This is reasonably above average and it shows that variables outside the model influence the dependent variable at 45%.

**4.3.3 Autocorrelation Test**

The autocorrelation test with the instrumentality of Durbin-Watson is used to ascertain if the error terms are serially correlated. The Durbin-Watson statistic yielded a value of 0.751843. This value which is absolutely less than two implies that there exists a positive serial correlation in the model.

**4.4 Statistical Test of Significance**

The table below is a summary display of the computed and tabulated values of t and f statistics.

**Table 4.4**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Computed t\*** | **Tabulated t0.025** | **Decision**  |
| Interest Rate | -2.069417 | 1.68 | Significant |
| Inflation | 0.239358 | 1.68 | Not Significant |
| Money-Supply | 0.276603 | 1.68 | Not Significant |

|  |  |  |
| --- | --- | --- |
| **Computed F\*** | **Tabulated F0.05** | **Decision** |
| 1.960880 | 0.751843 | Not Significant |

**4.5 Test of Hypotheses**

**Hypothesis One**

Ho: Interest rate has no significant impact on domestic investment in Nigeria.

**Decision:** Based on the results in table 4.4, it can be seen that the computed t-statistics for interest rate is greater than its tabulated value. Hence, we reject the guiding null hypothesis and accept its alternative. Hence, interest rate has significant impact on domestic investment in Nigeria.

**Hypothesis Two**

Ho: Inflation has no significant impact on domestic investment in Nigeria

**Decision:** Based on the results in table 4.4, it can be seen that the computed t-statistics for inflation is less than its tabulated value. Hence, we accept the guiding null hypothesis. Hence; inflation has no significant impact on domestic investment in Nigeria.

**Hypothesis Three**

Ho: Money supply has no significant impact on domestic investment in Nigeria

**Decision:** Based on the results in table 4.4, it can be seen that the computed t-statistics for money supply is less than its tabulated value. Hence, we accept the guiding null hypothesis. Hence; money supply has no significant impact on domestic investment in Nigeria.

**4.6 Implications of the Results**

The main finding of the research is that interest rate has a significant but negative relationship and impact on investment for the years under analysis. This implies that an increase in interest rate leads to a significant decrease in investment. The implication of this is that investment can be enhanced in Nigeria through an optimal decrease in interest rate.

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND RECOMMENDATION**

**5.0 Summary of Findings**

The main focus of this research has been to carry out empirically the impact of rate on domestic investment in Nigeria covering the period 1980-2016. In the course of the study, the historical background of interest rate and investment were reviewed. Furthermore, the problems of interest rate fluctuations and its possible effect on investment was evaluated. The chapter two was a compendium of literature was the views and researches of previous authors were reviewed and analyzed. Data used in the research was collected from the Central Bank of Nigeria (CBN) statistical bulletin and the methodology employed to estimate the parameters was the linear regression with the application of Ordinary Least Squares (OLS) technique. The summary of findings from the analysis is reported thus:

1. Interest rate has significant impact on domestic investment in Nigeria
2. Inflation has no significant impact on domestic investment in Nigeria
3. Money supply has no significant impact on domestic investment in Nigeria

**5.2 Conclusion**

This study has been able to carry out an empirical analysis of the impact of interest rate on domestic investment in Nigeria covering the period 1980-2016. The main finding of the research was that interest rate has a negative relationship with domestic investment in Nigeria and that interest rate has a significant negative impact on domestic investment in Nigeria. With this, it can be concluded that over the years in Nigeria, the cause of low investment in Nigeria is due to high and fluctuating interest rate.

**5.3 Recommendation**

Findings from the study compelled the following recommendations:

1. The federal government through the apex bank (CBN) should compel the commercial banks to reduce their level of interest rate charged to borrowers/investors. This is expected to increase the level of domestic investment in the economy.
2. The Central Bank of Nigeria (CBN) should use effective monetary policies to stabilize the level of interest rate, inflation and money supply in the economy.
3. The federal government should ensure a conducive and comfortable macroeconomic atmosphere so that domestic investment can prosper well.
4. The commercial banks should ensure that loans borrowed from them for investment purposes are used as claimed.

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**Appendix I**

**DATA USED FOR THE ANALYSIS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **YEAR** | **INTR** | **INVESTMENT** | **INF** | **MS** |
| 1980 | 7.500000 | 118265.2 | 9.900000 | 13.65230 |
| 1981 | 7.750000 | 133217.5 | 20.90000 | 14.47000 |
| 1982 | 10.25000 | 103313.0 | 7.700000 | 15.79000 |
| 1983 | 10.00000 | 67751.34 | 23.20000 | 17.69000 |
| 1984 | 12.50000 | 43363.02 | 39.60000 | 20.11000 |
| 1985 | 9.250000 | 40934.55 | 5.500000 | 22.30000 |
| 1986 | 10.50000 | 35536.21 | 5.400000 | 23.81000 |
| 1987 | 17.50000 | 27159.19 | 10.20000 | 27.57000 |
| 1988 | 16.50000 | 28369.81 | 38.30000 | 38.36000 |
| 1989 | 26.80000 | 28937.12 | 40.90000 | 45.90000 |
| 1990 | 25.50000 | 40121.31 | 7.500000 | 52.86000 |
| 1991 | 27.70000 | 39968.52 | 13.00000 | 75.40000 |
| 1992 | 20.80000 | 38771.57 | 44.50000 | 111.1100 |
| 1993 | 31.20000 | 44973.00 | 57.20000 | 165.3400 |
| 1994 | 36.09000 | 40404.28 | 57.00000 | 230.2900 |
| 1995 | 21.00000 | 29820.29 | 72.80000 | 289.0900 |
| 1996 | 20.79000 | 35216.28 | 29.30000 | 345.8500 |
| 1997 | 20.86000 | 38329.17 | 8.500000 | 413.2800 |
| 1998 | 23.32000 | 36390.66 | 10.00000 | 488.1500 |
| 1999 | 21.34000 | 35325.93 | 6.600000 | 628.9500 |
| 2000 | 27.19000 | 41342.64 | 6.900000 | 878.4600 |
| 2001 | 21.55000 | 6331.640 | 18.90000 | 1269.320 |
| 2002 | 21.34000 | 7936.780 | 12.90000 | 1505.960 |
| 2003 | 30.19000 | 12991.61 | 14.00000 | 1952.920 |
| 2004 | 22.88000 | 44443.72 | 13.45000 | 2131.820 |
| 2005 | 20.82000 | 39795.29 | 13.72500 | 2637.910 |
| 2006 | 19.49000 | 63428.72 | 8.500000 | 3797.910 |
| 2007 | 18.70000 | 89896.86 | 6.600000 | 5127.400 |
| 2008 | 18.36000 | 89244.50 | 15.10000 | 8008.200 |
| 2009 | 18.70000 | 120273.6 | 13.90000 | 9411.110 |
| 2010 | 22.62000 | 142316.5 | 12.70000 | 11034.94 |
| 2011 | 22.51000 | 126942.8 | 13.80000 | 12172.49 |
| 2012 | 22.42000 | 101699.7 | 14.90000 | 13895.39 |
| 2013 | 23.79000 | 11478.08 | 15.32000 | 15160.29 |
| 2014 | 24.69000 | 13595.84 | 14.21000 | 17679.29 |
| 2015 | 25.74000 | 14112.17 | 13.45600 | 18901.30 |
| 2016 | 24.54000 | 15223.19 | 13.30000 | 19647.12 |

**Source: CBN statistical Bulletin**

**Appendix II**

**Unit Root Tests**

|  |  |
| --- | --- |
| Null Hypothesis: INVESTMENT has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.179487 |  0.0298 |
| Test critical values: | 1% level |  | -3.632900 |  |
|  | 5% level |  | -2.948404 |  |
|  | 10% level |  | -2.612874 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INVESTMENT) |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 13:39 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INVESTMENT(-1) | -0.290064 | 0.091230 | -3.179487 | 0.0033 |
| D(INVESTMENT(-1)) | 0.370872 | 0.152747 | 2.428014 | 0.0210 |
| C | 12763.75 | 5860.242 | 2.178024 | 0.0369 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.287876 |     Mean dependent var | -3371.266 |
| Adjusted R-squared | 0.243369 |     S.D. dependent var | 22250.68 |
| S.E. of regression | 19354.66 |     Akaike info criterion | 22.66107 |
| Sum squared resid | 1.20E+10 |     Schwarz criterion | 22.79439 |
| Log likelihood | -393.5687 |     Hannan-Quinn criter. | 22.70709 |
| F-statistic | 6.468011 |     Durbin-Watson stat | 2.135616 |
| Prob(F-statistic) | 0.004374 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Null Hypothesis: D(INTR) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.860018 |  0.0000 |
| Test critical values: | 1% level |  | -3.639407 |  |
|  | 5% level |  | -2.951125 |  |
|  | 10% level |  | -2.614300 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INTR,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 13:50 |  |  |
| Sample (adjusted): 1983 2016 |  |  |
| Included observations: 34 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(INTR(-1)) | -1.637822 | 0.279491 | -5.860018 | 0.0000 |
| D(INTR(-1),2) | 0.259086 | 0.173311 | 1.494920 | 0.1450 |
| C | 0.751681 | 0.824014 | 0.912219 | 0.3687 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.674320 |     Mean dependent var | -0.108824 |
| Adjusted R-squared | 0.653308 |     S.D. dependent var | 8.033578 |
| S.E. of regression | 4.730214 |     Akaike info criterion | 6.029915 |
| Sum squared resid | 693.6225 |     Schwarz criterion | 6.164594 |
| Log likelihood | -99.50856 |     Hannan-Quinn criter. | 6.075844 |
| F-statistic | 32.09272 |     Durbin-Watson stat | 2.023285 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Null Hypothesis: INF has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -2.987689 |  0.0456 |
| Test critical values: | 1% level |  | -3.626784 |  |
|  | 5% level |  | -2.945842 |  |
|  | 10% level |  | -2.611531 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INF) |  |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 13:52 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INF(-1) | -0.412947 | 0.138216 | -2.987689 | 0.0052 |
| C | 8.311642 | 3.566430 | 2.330522 | 0.0258 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.207944 |     Mean dependent var | 0.094444 |
| Adjusted R-squared | 0.184649 |     S.D. dependent var | 15.08663 |
| S.E. of regression | 13.62275 |     Akaike info criterion | 8.115312 |
| Sum squared resid | 6309.696 |     Schwarz criterion | 8.203285 |
| Log likelihood | -144.0756 |     Hannan-Quinn criter. | 8.146017 |
| F-statistic | 8.926284 |     Durbin-Watson stat | 1.689343 |
| Prob(F-statistic) | 0.005188 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Null Hypothesis: MS has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 6 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.407776 |  0.0186 |
| Test critical values: | 1% level |  | -3.670170 |  |
|  | 5% level |  | -2.963972 |  |
|  | 10% level |  | -2.621007 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(MS) |  |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 14:04 |  |  |
| Sample (adjusted): 1987 2016 |  |  |
| Included observations: 30 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| MS(-1) | -0.246906 | 0.072454 | -3.407776 | 0.0025 |
| D(MS(-1)) | 0.796150 | 0.210101 | 3.789358 | 0.0010 |
| D(MS(-2)) | 0.892064 | 0.263600 | 3.384159 | 0.0027 |
| D(MS(-3)) | -0.055200 | 0.283654 | -0.194602 | 0.8475 |
| D(MS(-4)) | 0.125201 | 0.276936 | 0.452091 | 0.6556 |
| D(MS(-5)) | 0.442842 | 0.286075 | 1.547994 | 0.1359 |
| D(MS(-6)) | 0.983466 | 0.317669 | 3.095884 | 0.0053 |
| C | 114.7424 | 103.0094 | 1.113902 | 0.2773 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.775430 |     Mean dependent var | 654.1103 |
| Adjusted R-squared | 0.703975 |     S.D. dependent var | 793.1470 |
| S.E. of regression | 431.5365 |     Akaike info criterion | 15.19576 |
| Sum squared resid | 4096922. |     Schwarz criterion | 15.56941 |
| Log likelihood | -219.9364 |     Hannan-Quinn criter. | 15.31529 |
| F-statistic | 10.85212 |     Durbin-Watson stat | 2.166595 |
| Prob(F-statistic) | 0.000007 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Co-integration Test Result**

|  |  |
| --- | --- |
| Null Hypothesis: RESID01 has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -2.242545 |  0.1956 |
| Test critical values: | 1% level |  | -3.626784 |  |
|  | 5% level |  | -2.945842 |  |
|  | 10% level |  | -2.611531 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(RESID01) |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 14:40 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| RESID01(-1) | -0.266558 | 0.118864 | -2.242545 | 0.0316 |
| C | -1915.838 | 4023.906 | -0.476114 | 0.6370 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.128853 |     Mean dependent var | -2249.172 |
| Adjusted R-squared | 0.103231 |     S.D. dependent var | 25477.83 |
| S.E. of regression | 24126.96 |     Akaike info criterion | 23.07400 |
| Sum squared resid | 1.98E+10 |     Schwarz criterion | 23.16197 |
| Log likelihood | -413.3320 |     Hannan-Quinn criter. | 23.10471 |
| F-statistic | 5.029007 |     Durbin-Watson stat | 1.568730 |
| Prob(F-statistic) | 0.031556 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Regression Analysis**

|  |  |
| --- | --- |
| Dependent Variable: LOG(INVESTMENT) |  |
| Method: Least Squares |  |  |
| Date: 06/03/18 Time: 14:58 |  |  |
| Sample: 1980 2016 |  |  |
| Included observations: 37 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 11.49135 | s0.457003 | 25.14505 | 0.0000 |
| INTR | -0.051053 | 0.024670 | -2.069417 | 0.0464 |
| INF | 0.002142 | 0.008949 | 0.239358 | 0.8123 |
| LOG(MS) | 0.017821 | 0.064429 | 0.276603 | 0.7838 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.551292 |     Mean dependent var | 10.59268 |
| Adjusted R-squared | 0.524137 |     S.D. dependent var | 0.797728 |
| S.E. of regression | 0.767588 |     Akaike info criterion | 2.410680 |
| Sum squared resid | 19.44333 |     Schwarz criterion | 2.584833 |
| Log likelihood | -40.59757 |     Hannan-Quinn criter. | 2.472077 |
| F-statistic | 1.960880 |     Durbin-Watson stat | 0.751843 |
| Prob(F-statistic) | 0.139045 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |