AN EMPIRICAL STUDY OF THE RELATIONSHIP BETWEEN INTEREST RATE AND INVESTMENT IN NIGERIA (1980-2013)

Udude, Celina Chinyere (PhD)
Department of Economics, Ebonyi State University Abakaliki
Email: celinaudude@yahoo.com, Cell: +2348032763424

Nwachukwu, Udochukwu Gabriel
Department of Economics, Ebonyi State University Abakaliki
Email: ugabn@yahoo.com, Cell: +2348030667911

Abstract
This study was undertaken to analyze interest rate and equally evaluate its basic impact on the Nigeria’s economy. Specifically, it determined the extent interest rate impacts on the investment in Nigeria. The study used existing data to predict future outcomes. Ex-post facto research design was used because inferences about relations among variables are made, without direct intervention, from commitment variables of independent and dependent variables. The results of cointegration showed revealed that the variables are cointegrated. This implies that there is long run relationship between interest rate and investment in Nigeria within the period under review. It is estimated from the VECM equation at the upper chamber that 1% increase in INT, will result to decrease by 0.2% in investment (LINV). The sign borne by the coefficient estimate of interest rate met the apriori expectation. It is an indication that increase in the cost of borrowing, on the average, will discourage investment in Nigeria. Also, 1% increase in savings (LSAV), will result to decrease by 1.2% in investment (LINV). In the light of the findings, it was recommended that the relevant authority 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 pursued implementation of policy is usually multidimensional and hence calls for effective co-ordination among the various government department, banks and other relevant sectors. Government should improve the country’s infrastructural facilities like power and access roads. They should be improved upon to create an enabling environment for investment to strive. Also, government should work with the informal financial sector by granting interest-free loans for investment purposes. These efforts would help to boost investment in Nigeria.

Keywords: Interest rate, investment, Nigeria, Cointegration,
1.1 INTRODUCTION

Interest rate is the price paid for the use of money. It is the opportunity cost of borrowing money from a lender to finance investment project (Udubah, 2000). It can also be seen as the return being paid to the provider of financial resources, for going the fund for future consumption. Interest rates are normally expressed as a percentage rate. 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.

Investment on the other hand 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 (2004). Banks are given the primary responsibility of financial intermediation in order to make fund available for economic agents. Banks as financial intermediaries move fund. Surplus sector/units of the economy to deficit sector/units by accepting deposits and channeling them into lending activities. The extent to which this could be done depend upon the rate of interest and level of development of financial sector as well as the saving habit of the people in the country. Hence, the availability of investible funds is therefore regarded as a necessary starting part for all investment in the economy which will eventually translate to economic growth and development (Uremadu, 2006).

The interest rate policy in Nigeria is perhaps one of the most controversial of all financial policies. The reason is because interest rate policy has direct bearing on many other economic variables such as agriculture, exchange rate, GDP etc. Interest rate plays a crucial role in the efficient allocation of resources aimed at facilitating growth and development of an economy and as a demand management technique for achieving both internal and external balance. The focus on the agricultural sector is centered on the ability of the sector in raw materials production for industries and food for consumption.

Prior to the introduction of Structural Adjustment Programmes (SAP) in Nigeria in 1986, the Nigerian financial sector was characterized by rigid exchange rate and interest rate controls, mandatory sectoral allocation of bank credit to the private sector, all of which engendered distortion and inefficiencies that results to low direct investment. Funds were inadequate, the Nigeria currency was overvalued and the monetary and credit aggregate moved rather sluggishly such that the economy was sort of engulfed with a general lull. The introduction of SAP led to some financial regulations like; interest rate, exchange rate and other deregulations according to Ogwuma and Ojo (1993).

However, as an instrument of monetary policy the central Bank of Nigeria CBN (2000) indirectly influenced the level and direction of change in interest rate movement through its invention rate on various money market assets especially the Minimum Rediscount Rate (MRR) as well as the stop rate of weekly tender for treasury bills. The MRR as the nominal anchor of CBN’s interest rate policy continued to be used proactively in line with prevailing economic conditions while the rate of treasury bills is made market related and competitive with comparable money market instruments CBN (2006). Further, the MRR has undergone some fluctuations since 1987 to date as a result of the changes in the CBN policies which in turn have changed the overall economic conditions. In August 1987, was 15.0% and was reduced to 12.75% in December of 1987 with the objective of stimulating investment and growth in the economy. In 1989, the MRR was raised to 13.25% in order to contain inflation.

To further liberalize interest rate management, the cap on interest rate was lifted in 1992 and re-imposed in 1994 when inflationary spiral could not contained. The cap on interest rates introduced in
1994 was retained in 1995 with a little modification for flexibility but was lifted in October 1996 to pursue a flexible, interest rate regime as observed by Omole and Falokun (1999). In line with the adoption of the market-based technique of monetary management, interest rates policy remained flexible and responsive to changes in market conditions.

However, in October 1996, interest rates were fully deregulated with the banks given freedom to determine the structure of interest rates in consultation with their customers. The CBN however, retained its discretionary power to intervene in the money market to ensure orderly developments in interest rates. The policy of interest rate deregulation has been retained since 1997. Interestingly, the MRR was replaced with the Monetary Policy Rate (MPR). Again, the MPR was brought down to 10% from 14% MRR, with a lending rate of 13% and a deposit rate of 7% which stood as a standing facility intended to stem volatility in interest rates especially that of the interbank rates.

1.2 Statement of the Problem

One of the major objectives of monetary policy on interest rate in Nigeria is price stability so as to boost the investment in the economy. But despite the various monetary regimes that have been adopted by the Central Bank of Nigeria over the years, inflation still remains a major threat to Nigeria’s economy thereby lowering the investment levels. The Nigeria economy has encountered the problem of disequilibrium, inability to mobilize domestic savings and unsatisfactory expansion of domestic output. These problems have consistently and presently done severe damage to Nigeria economy; but most strikingly these problems have continued to play the economy unabated that is, the economy is becoming less strong.

Ojo (2007) observed that, the Nigerian investment has evolved over the past 50 years. It has grown structurally and has had improved monetary policy role. The economic growth rate (real GDP growth rate) has also been volatile over the past years. The financial sector which had the Central Bank of Nigeria (CBN), a handful of commercial banks, insurance companies, a stock market in the 1970s, now consist of the CBN, 24 deposit money banks, 5 discount houses, 840 micro finance banks, 5 development finance institutions, 1 stock exchange, 1 commodity exchange, 73 insurance companies, 80 primary mortgage institutions, 102 finance companies, and 1,264 bureau de change (CBN, 2008). Also, major financial ratios like M2/GDP, ratio of credit to private sector/GDP (CBN Private Investment indicators) and ratio of currency outside banks/M2 have shown some improvement over the years. Despite the growth experienced in the financial sector over the years, the Nigerian financial sector has been described as weak, fragmented, unable to provide domestic credit to the private sector and not in a position to effectively support a strong expansion of the real sector as well as contribute to economic growth.

Previous researches have dealt separately with monetary policy as a whole and investment but not based on specifically on interest rate and investment. Based on this understanding, it is clear that there exists a gap in literature with regard to understanding the impact of interest rate on investment suggesting the need for research that will consider specifically on monetary policy instrument like interest and its impact on investment. This is accomplished by emphasizing the effects of monetary policy variables such as money supply and interest rate whilst estimating the long run relationship.
1.3 Research Question
1. To what extent does interest rate impact on investment in Nigeria?

1.4 Objectives of the Study
The overall objective of this study is to investigate and to analyze interest rate and its basic impact on the Nigeria’s economy.
1 To determine the extent interest rate impacts on the investment in Nigeria.

1.5 Hypothesis of the Study
In order to seek and proffer solution to this above stated researched questions, the following hypothesis shall be tested.
H₀: Interest rate has no significant impact on investment in Nigeria.

1.6 Scope and limitations of the Study
This research work will examine the impact of interest rate on investment in Nigeria’s economy for a period of 1980-2013. However, the study is constrained by the variables considered in the model specified as investment as a function of interest rate and savings.

REVIEW OF RELATED LITERATURE
2.0 Theoretical Literature
Interest can be defined as the return or yield on equity or opportunity cost of deferring current consumption into the future (Uchendu, 1993:35). This definition clearly shows that interest is a concept which can mean different things depending from the perspective it is viewed. Interest rate can therefore be seen as a nebulous concept, a position affirmed by the availability of different types of this rate. Some of which are; savings rate, discount rate, lending rate and Treasury bill rate. Apart from this, interest rate can also be categorized as nominal or real. This categorization credited to Irvin Fisher tries to accommodate the moderating influence of inflation on interest rate. Nominal interest rate is the observed rate of interest incorporating monetary effects while real interest rate is arrived at by considering the implications of inflation on nominal interest rate (Uchendu, 1993:35; Essia, 2005; 82).

The importance of interest rate is hinged on its equilibrating influence on supply and demand in the financial sector. Colander (2001:649) and Ojo (1993; 10) confirmed this by saying that the channeling of savings into financial assets and the willingness of individuals to incur financial liabilities is strongly influenced by interest rates on those financial assets and liabilities. The developmental role of interest rate is possible because of the interlocking linkage existing between the financial and real sectors of economies. It is therefore through this linkage that the effect of interest rate on the financial sector is transmitted to the real sector. For instance, the lending rate which translates into the cost of capital has direct implications for investment. High lending rate discourages investment borrowing and vice versa. Savings rates, on the other hand, when high encourages savings which ultimately translates into increased availability of loanable funds. The snag here is that the high savings rate is also bound to translate into high lending rates with attendant negative consequences on investment (Chizea, 1993:6).

The link between savings and investment is no less important as the level of savings in an economy also plays a role in the determination of investment levels. This is why monetary authorities in their
pursuit of monetary policies try to influence level of savings and availability of credit by directly, in the case of administratively fixed rates or indirectly during deregulated era, influencing the rate of interest (Ogwuma, 1996:5; Ojo, 1993:288).

To achieve the desired level of interest rate, the Central Bank of Nigeria (CBN) adopts various monetary policy tools, key among which is the Monetary Policy Rate (MPR). This rate, which until 2006 was known as the Minimum Rediscount rate (MRR), is the rate at which the CBN is willing to rediscount first class bills of exchange before maturity (Onoh 2007). He further opined that by rising or lowering this rate the CBN is able to influence market cost of funds. If the CBN increases MPR, banks’ lending rates are expected to increase with it, showing a positive relationship. In recent past, the need to possess certain class of assets as collateral to assess the CBN’s discount window was dispensed with due to global crisis (BusinessDay, 2009).

Interest rate is the rate at which interest is paid by a borrower for the use of money that they borrow from a lender. It can also be said as rate which is charged or paid for the use of money; it is usually expressed as an annual undertaking. Oxford Dictionary of Economics (2003) defines rate of interest as the extra payment per unit of the loan normally calculated as an annual rate. Jhingan (2005) defined interest rates as the rental payment for the use of credit by borrowers and return for parting with liquidity by lenders. Interest rate is the price of money that is the amount of interest paid per unit of time expressed as a percentage of the amount borrowed. The cost of borrowing money, measured in naira, per year per naira, borrowed, is the interest rate.

Like other prices interest rates perform a rationing function by allocating limited supply of credit among the many competing demands. Interest rate may also be seen as the price of credit which might be subject to distortions due to inflation. Interest rates differ mainly in term/maturity that is the length of time for repayment and liquidity that is quick conversion of assets to funds. When maturity and liquidity together with other factors are considered, many different financial instruments and so many different interest rates will emerge (Anyanwu, 1997). Interest rates can either be nominal or real. Nominal interest rate can be measured in naira terms, not in terms of goods. The nominal interest rate measures the yield in naira per year, per naira invested while the real interest rate is corrected for inflation and is calculated as the nominal interest rate minus the rate of inflation (Pandey, 1999)

According to Afolabi et al. (2005) government intervention in the form of interest rate ceilings and sectoral allocation of credits created highly concentrated market structure leading to monopolistic and/or oligopolistic tendencies as well as promoting other inefficiencies which caused distortions in the economy. Agu (1988) pinpointed that the central bank is faster than its shadow in its aim to induce the achievement of its objectives through the ongoing Structural Adjustment Programme (SAP) which gave both to the recommendation of deregulation of the economy. He is of the view that the central bank embarked on deregulation in other to kill a lot of industries most especially the standard and medium scale industries because interest rate deregulation will lead to a very high leading rate which the small and medium scale industries would not be able to afford due to their limited capital and production base. The Central Bank of Nigeria on its part increased its lending rate from 11 to 15% in situations where they feel that naira is undervalued. Sequel to the above the commercial banks increased its lending rate to between 17 to 22% as opined by Adofu et al. (2010). Although this rates was later increased following the new policy of the CBN in March 2009 to between 22 to 24% at the
maximum including other charges as opined by Williams (2009). In line with the above, Williams (2009) further buttressed that, the mandatory interest rate policy will result to a near shut down in lending rate volume to any bank with major credit concerns because the new policy ensures that only the highest quality borrower have access to new bank credits within the year.

Nwankwo (1989), however, believes that interest rate deregulations will definitely lead to more efficient allocation of financial market resources because interest rate will now reflect scarcity and relative efficiency in different use. That is, only efficient investors will have access to scarce financial. With the subsistence nature of agricultural production in Nigeria, it therefore becomes difficult for the sector to access the resources.

Theories on Investment
Various frameworks have guided perception and understanding of interdependent processes in which the private sector investment plays a key role of economic development. Three theoretical constructs are reviewed in the literature that addresses the major issues attending the impact of monetary policy on investment.

Classical Theory on Investment
From the classical standpoint investment is negatively affected by changes in monetary policy particularly government domestic debt that is viewed in competition with the private sector for scarce loanable funds available in the economy. Increases in government expenditure financed by changes in monetary policy tend to decrease the ability of the investment to access funds for investment. The displacement of private sector investment by government borrowing was termed crowding out effect. Barro (1997), distinguishes the two ways in which private sector investment can be displaced as arising from a tax cut or an increase in government consumption spending. This induces increased public debt which he describes as; “the decline in investment that may result from a tax cut financed by a government budget deficit and the decrease in private consumption and investment that results from an increase in government consumption respectively”.

Keynesian Theory on Private Sector Investment
The Keynesians believe that governments are justified to stimulate economic growth through the use of deficit causing fiscal policy. They assume that the economy is not at full employment and that the interest rate sensitivity of investment is low. In such a situation increased government spending causes minimal increase in the interest rate whilst increasing output and income. Further they argue government expenditure increases private investment due to the positive effect of government spending on the expectations of the investors.

Their argument is based on the principle of the multiplier where a change in government spending induces a greater change in output. Barro (1997) illustrates this point by explaining that in the Keynesian model an increase in aggregate demand leads to increased output, that entails more real income, hence a further increase in aggregate demand. This change leads to another rise in output and thence more demand. As each successive increase in output is smaller than the previous one the process is not infinite.
Credit Channel Theory
Analysis of the relationship between monetary policy and output reveals that credit plays a significant role. Kahn (2010) explains that conventionally changes in short-term interest rates brought about by the central bank, through an open-market operations change the cost of capital, that then changes the rate of fixed investment, (housing expenditures, inventories). The change in aggregate demand then leads to a change in output (GDP). Citing Bernanke and Gertler (1995), Kahn (2010) posits that empirical evidence to support the conventional view of the effects of monetary policy on GDP is weak and this led to the development of the credit channel theory, whose basic premise is that market frictions create a spread between a firms’ internal and external financing sources. They argue that changes in what Bernanke and Gertler (1995) call the “external finance premium” can better explain movements in investment and, therefore, overall output, than can interest rates.

According to Kahn (2010), in the context of the credit transmission channel, monetary policy affects the supply or relative pricing (the external finance premium) of loans by banks. As tighter monetary policy causes banks to lose the use of some funds which cannot be replaced with other sources of funds (such as CDs or equity), then the relative cost of funds will increase, decreasing the supply of loans to bank-dependent borrowers who are squeezed out, due to an increase in the external finance premium. In developed financial markets generally firms have access to other sources of financing, unlike in SSA where financial markets are not as well developed and only large corporate can borrow from external markets while the smaller firms have recourse only to internally generated funding and bank borrowing. In such a market the internal rate of return has a greater impact in the investment decision making then the rate of interest.

Theories of Interest Rates
Anyanwu (1990) explicated the following interest rate theories: (a) the classical theory, (b) the loanable funds theory (c) the Keynesian theory and (d) the modern theory of interest or the Hicks-Hanson ISLM Model.

A. The Classical Theory
The classical theory of interest otherwise called the supply and demand theory of saving maintained that the rate of interest is determined by the supply and demand for capital by businessmen and household respectively. The supply of capital is governed by the time preference and the demand for capital by the expected productivity of capital. The classical theory fails to proffer solution hence indeterminate.

Figure 1: Classical Interest Rate Determination
B. The Loanable Funds Theory

This is a flow theory that determines the interest rate by the interaction of demand for and supply of loanable funds or credit. It involves the linking of the interest rate with dissaving, investment and hoarding of funds sourced from government, businessmen and consumers, on the demand side with saving, dishoarding and bank money on the supply side from private individuals and corporate bodies. Hansen asserted that the loanable funds theory like the classical and the Keynesian theories of interest indeterminate unless the income level is already known.

C. Keynesian Liquidity Preference Theory

Keynesian liquidity preference theory is a stock theory. The theory determines the interest rate by the demand for and supply of money. It emphasizes that the rate of interest is a purely monetary phenomenon as distinct from the real theory of the classics. It is a stock analysis because it takes the supply of money as given during the short run and determines the interest rate by liquidity preference or demand for money.

D. Modern Theory of Interest: The Hicks-Hanson IS-LM Model

It is evident that no single theory of interest rate is adequate and determinate. An adequate theory to determine interest rates must take into consideration both the real and monetary factors that influence the interest rate. Recall that \( Md = L(r, Y) \), thus money demand is also a function of output, \( Y \). When output rises, the money demand curve will thus rise and therefore the equilibrium level of interest rates, \( r^* \), will also rise.

**Figure 2:** Hicks-Hansen IS-LM Model

2.2 Empirical Literature

Supporting the view of Lucas, some studies do not find evidence of finance led-growth. For example Mohamed (2008) adopts the autoregressive distributed lag approach, investigated the relationship between investment and economic performance in Sudan over the period 1970-2004. He used the ratio of M3 to GDP and ratio of credit to the private sector to GDP as indicators of financial development. The results indicated a weak relationship between financial development and economic growth. The
The coefficient of M3/GDP was found to be negative and significant while the ratio of credit to the private sector to GDP was also negative but insignificant.

The studies of (Klein 1992), (Bryan 1971), (Ezenduyi 1994), (Nnana 2003), Levine et al., (2000), Anyawu (2002), (Khan et al. 2005), and (Bright 2004), support a positive relationship between private sector investment development and economic growth through monetary policy in Nigeria.

According to (Adamu et al 2009), empirical studies that are based on cross-sectional and panel data generally support the positive effect of private investment development on economic growth and monetary policy for short run effect but may not satisfactorily address country-specific effects since these countries could be at different stages of financial and economic development. The different stages could be as a result of different institutional characteristics, policies and differences in their implementation (Badun 2009). This has therefore necessitated the need to investigate the finance-growth relationship on a country case.

Tobin (1978) expands the interest rate concept include those of equity and section. Tobin’s first transmission mechanism involves part folios adjustment similar to that of the monetarist but which influence the cost of capital. He argues that an increase in money supply leads to asset substitution between corporate bonds, equities, bank deposits, short term treasures or commercial paper. The substitution affects the rate on short- term instruments and those on other assets. He expresses the possibility of external shocks and non-monetary policy issues such as low retained earnings and increased uncertainties affecting the cost of capital and transmission process.

Many studies have investigated these transmission mechanisms, which tally with interest rate policy regimes articulated in Nigeria prior to and after the 1986 deregulation. Khat and Bathia (1993) used non-parametric method in his study of the relationship between interest rates and other macroeconomic variables, including savings and investment. In his study he grouped sixty-four developing countries including Nigeria into three bases on the level of their real interest rate. He then computed economic rate among which were gross savings, income and investment for countries. Applying the Mann-Whitny test, he found that the impact of real interest was not significant for the three groups. However, his method of study was criticized by Balassa (1989) that a relationship has been established by the use of regression analysis.

A study by Omar et al (2007) 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.

Oshikoya (1992) used time series econometrics to investigate the impact of interest rate deregulation on economic growth in Kenya. Using data from 1970 to 1989, he found real interest rate to have a significant and negative impact on economic growth. The sample was then split into sub-periods 1970-1979 (regulation era) and 1980-1989 (deregulation era). The real interest rate had a negative and significant coefficient for the 1970-1979 periods, but was positive and significant for the 1980-1989 period; thus offering no robust result of the impact of interest rate deregulation on economic growth of that country. In their work titled “The impact of Interest Rate Liberalization: Empirical Evidence
for Sub-Saharan Africa (SSA) (2002), Charlier and Oguie found the real interest rate to have a significant and positive relationship with economic growth. A study conducted by Drees and Parabasioglu (1998) 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.

Osterbaan et al. (2000) estimated the relationship between the annual rate of economic growth (YC) and the real rate of interest (RR) using the basic equation YC = Bo + B1 (RR+ B2) (RR + B2), he showed the effect of a rising real interest rate on growth. He also showed that growth is maximized when the real rate of interest lies within the normal range of say, -5 to +15%. De Gregorio and Guidotti (1995) suggest that the relationship between real interest rates and economic growth might resemble an inverted U-curve. Very low and negative interest rates tend to cause financial disintermediation and hence to reduce growth.

Gupta (1970) in his study of personal savings in developing countries argued that high real interest rate increases savings. While a contrary view opined by Ajayi (1978), in his study concludes that savings deposits rates in a deregulated regime is not significant in explaining the demand for savings. In line with the above, the empirical works by McKinnon (1973) and Fry (1989) have shown evidence to support the hypothesis that interest rate determine investment. This pinpoints that there are two transmission channels through which interest rate tends to affect investment via vise; that they relates to investment as cost of capital and that they relate to cost of capital investment as cost of capital.

Albu (2006) studied trends in the interest rate, investment, GDP growth relationship. The study used two partial models to examine the impact of investment on GDP growth and the relationship between interest rate and investment in the case of the Romanian economy. The study found that the behavior of the national economy system and interest rate-investment relationship tend to converge to those demonstrated in the normal market economy.

**METHODOLOGY**

3.1 Research Design

The study explored cause and affect relationships where causes already exist and cannot be manipulated the Causal Comparative or Ex Post Facto Research Design was adopted. The study used existing data to predict future outcomes. Ex-post facto research design is systematic empirical inquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulated. Inferences about relations among variables are made, without direct intervention, from commitment variables of independent and dependent variables. The researcher adopted the multiple regression analysis based on the classical linear regression model, otherwise known as Ordinary Least Square (OLS) technique.

3.2 Model Specification

In this study, hypothesis has been stated with the view of assessing the impact of interest rate on investment in Nigeria’s economy (1980-2013). In capturing study, these variables were used as proxy.
Thus, the model is represented in a functional form. It is shown as below:

\[ \text{INV} = F (\text{INT}, \text{SAV}) \]

Where

\[ \text{INV} = \text{Investment (Dependent variable)}, \quad \text{INT} = \text{Interest rate (Independent variable)} \]
\[ \text{SAV} = \text{Savings (Independent variable)} \]

In a linear function, it is represented as follows,

\[ \text{INV} = b_0 + b_1 \text{INT} + b_2 \text{SAV} + U_t \]

Where

\[ b_0 = \text{Constant term}, \quad b_1 = \text{Regression coefficient of INT}, \quad b_2 = \text{Regression coefficient of SAV and } U_t = \text{Error Term} \]

3.3 Model Evaluation

The researcher estimates the model with ordinary least square method. This method is preferred to others as it is best linear unbiased estimator, minimum variance, zero mean value of the random terms, etc (Koutsoyiannis 2003).

3.4 Model Estimation

In the preliminary test, the following tests shall be conducted. They include:

- Unit root test
- Co-integration test
- Error Correction Mechanism
- Granger Causality Test

**Unit Root Test:** It is used to test for the stationarity of the time series data. Augmented Dickey fuller will be used in the process. In considering the levels the data could be said to be integrated of, Augmented Dickey fuller (ADF) test statistics shall be compared with the critical values at 5% level of significance. A situation whereby the (ADF) test statistics is greater than the critical values with consideration on the absolute values, the data at the tested order will be said to be stationary. Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favour of the alternative hypotheses of stationarity.

**Co-integration Test:** It is used to test for the long run relationship between the variables. And a long run relationship is found on these variables in which we will study. Johansen Co-integration Approach will be undertaken by the researcher in the course of the analysis. Hence, the use of Johansen Co-integrating Normalized coefficients to ascertain the nature of the long run relationship between the estimated variables. Engel and Granger (1987) pointed out that a linear combination of two or more non-stationary variables may be stationary. If such a stationary combination exists, then the non-stationary time series are said to be co-integrated.

**Error Correction Mechanism (ECM):** The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model from the short-run to the long-run equilibrium.

**Granger Causality Test:** It is used to test for pair-wise relationship between variables.

3.5 Sources of Data

The data for this research project are obtained from the following source:

- Central Bank of Nigeria Statistical Bulletin for various years.

**DATA PRESENTATION AND ANALYSIS**

Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. However, some variables were transformed in this study so as to obtain statistics for their better analysis.
**Unit Root Test**

The Augmented Dickey-Fuller (ADF) test statistics were employed to test for the existence of unit roots in the data using trend and intercept. The test results are presented below:

### Augmented Dickey Fuller Unit Root Test

Trend and Intercept (Series at level)

<table>
<thead>
<tr>
<th>Series</th>
<th>ADF Test Statistic</th>
<th>5% critical values</th>
<th>10% critical values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINV</td>
<td>-2.530249</td>
<td>-3.552973</td>
<td>-3.209642</td>
<td>Not Stationary</td>
</tr>
<tr>
<td>INT</td>
<td>-2.747358</td>
<td>-3.552973</td>
<td>-3.209642</td>
<td>Not Stationary</td>
</tr>
<tr>
<td>LSAV</td>
<td>-2.347933</td>
<td>-3.562882</td>
<td>-3.209642</td>
<td>Not Stationary</td>
</tr>
</tbody>
</table>

Sources: Researcher’s compilation from E-views 7

Augmented Dickey Fuller Unit Root Test

Trend and Intercept (Series at 1st Difference)

<table>
<thead>
<tr>
<th>Series</th>
<th>ADF Test Statistic</th>
<th>5% critical values</th>
<th>10% critical values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINV</td>
<td>-4.319975</td>
<td>-3.557759</td>
<td>-3.212361</td>
<td>Stationary</td>
</tr>
<tr>
<td>INT</td>
<td>-7.286790</td>
<td>-3.557759</td>
<td>-3.212361</td>
<td>Stationary</td>
</tr>
<tr>
<td>LSAV</td>
<td>-3.857807</td>
<td>-3.557759</td>
<td>-3.212361</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

Sources: Researcher’s compilation from E-views 7

Considering the variables, LINV, INT and LSAV, the series are not stationary at level but became stationary at first difference $1(1)$. The results show that the time series are integrated of the same order; $I(1)$, with the application of ADF test. A linear combination of series integrated of the same order are said to be co-integrated. The level of their integrations indicates the number of time series have to be differenced before their stationarity is induced.

**Co-integration Test**

The summary of the Johansen Co-integration Test is shown in the Table below. The model with lag 1 was chosen with the linear deterministic test assumption. Johansen co-integration test for the series; LINV and the explanatory variables; INT and LSAV is stated below:

### Table 3: Unrestricted Cointegration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.523163</td>
<td>29.87151</td>
<td>29.79707</td>
<td>0.0490</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.172223</td>
<td>6.172951</td>
<td>15.49471</td>
<td>0.6751</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.003886</td>
<td>0.124601</td>
<td>3.841466</td>
<td>0.7241</td>
</tr>
</tbody>
</table>

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Under the Johansen co-integration test, there is one co-integrating equation. In Johansen’s Method, the trace statistic determines whether co-integrated variables exist. As can be seen from the trace
statistics, [29.87] greater than 5% critical value [29.79]. The significance of the trace statistics is confirmed by the eigenvalues [0.523163] which is significantly greater than zero. In other words; the null hypothesis of no co-integration among the variables is rejected since at least one equation at 5% were statistically significant. The test result shows the existence of a long-run equilibrium relationship among the variables.

VECM Estimated Result

<table>
<thead>
<tr>
<th>Cointegrating Eq:</th>
<th>CointEq1</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINV(-1)</td>
<td>1.000000</td>
</tr>
<tr>
<td>INT(-1)</td>
<td>-0.164001</td>
</tr>
<tr>
<td></td>
<td>(0.04641)</td>
</tr>
<tr>
<td></td>
<td>[-3.53348]</td>
</tr>
<tr>
<td>LSAV(-1)</td>
<td>-1.156771</td>
</tr>
<tr>
<td></td>
<td>(0.08185)</td>
</tr>
<tr>
<td></td>
<td>[-14.1331]</td>
</tr>
<tr>
<td>C</td>
<td>7.498168</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Error Correction:</th>
<th>D(LINV)</th>
<th>D(INT)</th>
<th>D(LSAV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CointEq1</td>
<td>-0.447452</td>
<td>1.083115</td>
<td>0.032538</td>
</tr>
<tr>
<td></td>
<td>(0.09311)</td>
<td>(0.63455)</td>
<td>(0.02212)</td>
</tr>
<tr>
<td></td>
<td>[-4.80564]</td>
<td>[ 1.70689]</td>
<td>[ 1.47075]</td>
</tr>
<tr>
<td>D(LINV(-1))</td>
<td>0.401706</td>
<td>0.013484</td>
<td>0.040335</td>
</tr>
<tr>
<td></td>
<td>(0.13311)</td>
<td>(0.90718)</td>
<td>(0.03163)</td>
</tr>
<tr>
<td></td>
<td>[ 3.01777]</td>
<td>[ 0.01486]</td>
<td>[ 1.27525]</td>
</tr>
<tr>
<td>D(INT(-1))</td>
<td>-0.110678</td>
<td>-0.215280</td>
<td>0.007602</td>
</tr>
<tr>
<td></td>
<td>(0.02523)</td>
<td>(0.17196)</td>
<td>(0.00600)</td>
</tr>
<tr>
<td></td>
<td>[-4.38645]</td>
<td>[-1.25194]</td>
<td>[ 1.26795]</td>
</tr>
<tr>
<td>D(LSAV(-1))</td>
<td>-0.275432</td>
<td>-8.661651</td>
<td>0.330241</td>
</tr>
<tr>
<td></td>
<td>(0.71214)</td>
<td>(4.85328)</td>
<td>(0.16921)</td>
</tr>
<tr>
<td></td>
<td>[-0.38677]</td>
<td>[-1.78470]</td>
<td>[ 1.95168]</td>
</tr>
<tr>
<td>C</td>
<td>0.192872</td>
<td>2.185665</td>
<td>0.140753</td>
</tr>
<tr>
<td></td>
<td>(0.18797)</td>
<td>(1.28101)</td>
<td>(0.04466)</td>
</tr>
<tr>
<td></td>
<td>[ 1.02611]</td>
<td>[ 1.70621]</td>
<td>[ 3.15151]</td>
</tr>
</tbody>
</table>
The system equation is personated below:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
<td>-0.447452</td>
<td>0.093110</td>
<td>-4.805645</td>
<td>0.0001</td>
</tr>
<tr>
<td>C(2)</td>
<td>0.401706</td>
<td>0.133113</td>
<td>3.017772</td>
<td>0.0055</td>
</tr>
<tr>
<td>C(3)</td>
<td>-0.110678</td>
<td>0.025232</td>
<td>-4.386454</td>
<td>0.0002</td>
</tr>
<tr>
<td>C(4)</td>
<td>-0.275432</td>
<td>0.712135</td>
<td>-0.386770</td>
<td>0.7020</td>
</tr>
<tr>
<td>C(5)</td>
<td>0.192872</td>
<td>0.187965</td>
<td>1.026105</td>
<td>0.3139</td>
</tr>
</tbody>
</table>

R² = 0.580760, F-Statistics = 9.35, Prob(F-Statistics) = 0.000071, LM = 2.13

The above result shows that the ECM(-1) value is -0.448 implying that the speed of adjustment should there be any disequilibrium, is 44.8% per year. This means that it takes 44.8% per year for any deviation to be corrected from the short run to the long run equilibrium. However, R-Square indicated that 58.1% of the total variation in the investment (LINV) is accounted for, the explanatory variable; interest rate (INT), and savings (LSAV). The regression plane of the model indicated that the joint influence of the explanatory variables is statistically significant. This is confirmed by the P-value of the F-Statistics [0.000071]. There is no presence of serial correlation as confirmed by the Durbin Watson statistic [2.13] which is greater than the upper limit of the tabulated DW Statistic [1.580] at 5% level of significance.

4.2 Test of the Hypothesis
The working hypotheses of the study are stated as follows:

H₀: Interest rate has no long run significant impact on investment in Nigeria’s economy.

The statistical test for the first hypothesis is trace statistics. This is found in the Johansen cointegration test. The trace statistics [29.87] greater than 5% critical value [29.79] Therefore, we conclude that interest rate has long run significant impact on investment in the Nigeria’s economy within the period under study.

4.3 Implications of the Study
The results of cointegration shown revealed that the variables are cointegrated. This implies that there is long run relationship between interest rate and investment in Nigeria within the period under review. It is estimated from the VECM equation at the upper chamber that 1% increase in INT, will result to decrease by 0.2% in investment (LINV). The sign borne by the coefficient estimate of interest rate met the apriori expectation. It is an indication that increase in the cost of borrowing, on the average, will discourage investment in Nigeria. Also, 1% increase in savings (LSAV), will result to decrease by 1.2% in investment (LINV). Though this sign borne by the coefficient estimate of LSAV did not meet the expected sign, it remains valid on the basis that increase in interest rate will discourage savings and continuous decrease in savings will impact on the investment level negatively.

4.4 Conclusion
The study evaluated the impact of interest rate on investment in Nigeria from 1980-2013. Econometrics techniques have been applied in order to test the hypotheses. As concerns econometric analysis, the ADF/PP test was used to test for stationarity, Johansen cointegration analysis was used
to determine long while VECM was used to determine the speed of adjustment from the short run to the long run equilibrium. The results indicated that interest rate has long run significant impact on the investment in Nigeria’s economy from 1980-2013.

In the light of the findings, the following recommendations are presented:

- It was found that interest rate has a negative relationship with investment; the relevant authority 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 pursued implementation of policy is usually multidimensional and hence calls for effective co-ordination among the various government department, banks and other relevant sectors.
- Government should improve the country’s infrastructural facilities like power and access roads. They should be improved upon to create an enabling environment for investment to strive. Also, government should work with the informal financial sector by granting interest-free loans for investment purposes. These efforts would help to boost investment in Nigeria.

References


