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Article

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Interest Rate and Economic Growth as Determinants of Firm's Investment Decision in Nigeria: A Cointegration Approach

Olaniyan Niyi Oladipo[1], Adegboyo Olufemi Samuel[2], Owoniya Babajide Olumuyiwa[3], Alaketu Akeem Abidemi[4]

Abstract: The study examined the impact of interest rate and economic growth as determinant of the firm's investment decision in Nigeria between the period of 1989 and 2019. The study disaggregated interest rate and economic growth into external borrowing, exchange rate, inflation rate, and gross domestic product in line with the predicated theories reviewed. The data were obtained from the Central Bank of Nigeria Statistical Bulletin. Based on the mixed level of stationarity of the variables as revealed by the unit root test, the study made use of the auto-regressive distributed lag (ARDL) technique to analyze the data. The bound test revealed that; there was the presence of co-integration (long-run relationship) among the dependent and all the explanatory variables consequently the study estimated the ARDLECM. The findings from the result point to a unique long-term relationship between interest rates, external borrowing, exchange rate, and economic growth. The result also revealed that there is no strong empirical evidence that there is a link between the interest rate and investment decisions in Nigeria. It was concluded that as a prerequisite for economic growth, the government must embark on growth-enhancing reforms and be tender to the behavior of interest rates in the economy. This will guide the formulation of private sector development policy as an enabler of global economic growth in Nigeria.

Keywords: Interest Rate; Economic Growth; Investment Decision

JEL Classifications: D92; E21

Introduction

Interest rates have received a lot of attention from economists, lenders, and borrowers, because they have been very important to the economy. The interest rate facilitates the movement of money between lenders and borrowers. This is the cost of borrowing and demonstrates what a borrower pays the lender for the use of the money. Interest rates facilitate the flow of credit into the economy and help financial entities such as corporate organizations, banks, mutual funds and insurance companies to play their intermediary role (Eregha, 2010). This means that the economic activity of any economy is largely influenced by interest rates. Oliver, (2016) pointed it out that interest rate has an effect on the demand and allocation of available funds. It also has implications for the level of consumption, the level and structure of investment. A high interest rate discourages borrowing and, as a result, encourages economic slowdown. Low interest rates, on the other hand, encourage borrowing and

[1] Department of Accounting, Faculty of Management Science, Federal University, Nigeria, Corresponding author: niyi.olaniyan@fuoye.edu.ng
[2] Department of Economics Federal University, Nigeria, E-mail: Olufemi.adegboyo@fuoye.edu.ng.
[3] Department of Accounting, Faculty of Management Science, Ekiti State University, Nigeria, E-mail: Jide_muyiwa05@yahoo.com.
[4] Department of Banking and Finance, Federal Polytechnic, Ado Ekiti, Nigeria, E-mail: tripleabidemi2017@gmail.com.

economic growth in the sense that the lower the interest rate, the higher the earnings expectations (all things being equal) are high as businesses are expected to pay a small proportion of their income in the form of interest on borrowed funds (Mahmudul, Gazi Salah, 2009)

Conversely, the higher the interest rate, the lower the profit margins. In today's world, money is used to exchange goods and services. People generally save all the money left over from the purchase of goods and services that could be used for investment in the economy. To make this process easier, a price is put on the use of this money which is always called the interest rate. Generally, the interest rate can be considered the cost of borrowing or the return on money loaned, depending on the perspective. Either way, the interest rate reflects the temporal value of money, or the principle that people usually prefer to have money today. (Obute, 2012)

Osundina and Osundina (2016) believed that the long-term objective of the deregulation of the interest rate to promote investment in Nigeria's agricultural and manufacturing sector was to establish a positive link between the interest rate and investment in Nigeria to foster economic growth and the development. The link between the interest rate and investment in Nigeria by economic academics call for the need to embark on this study, this study intends to examine what is happening to investment with the variation in the interest rate.

The main objective of the study is to examine the nexus between interest rates and economic growth as determinant of firm's investment decision in Nigeria. The study covered the period of 30 years between 1989 and 2019.

Research Hypothesis

$H_{0:}$ There is no significant relationship between the interest rate and economic growth as determinant of firm investment decision in Nigeria.

2. Review of Related Literature

2.1. Theoretical Framework

Theories of interest rates try to explain variables which determined interest rates. These theories differ because of differences of opinion as to whether rates are monetary or real phenomenon.

Mundell–Fleming Model

The **Mundell–Fleming model**, known as the **IS-LM-BP model**, is an economic model first put together in 1960s by Robert Mundell and Marcus Fleming (Olivier, 2016).. The Mundell-Fleming model applied to a small open economy facing perfect capital mobility, in which the domestic interest rate is exogenous determined by the global interest rate, has marked differences compared to the closed economy model. Consider exogenously increasing government spending. Based on the IS-LM model, the IS curve moves upwards with the LM curve intact, increasing the interest rate and output. Only for a small open economy with perfect capital mobility and a flexible exchange rate, the domestic interest rate is predetermined by the horizontal BOP curve, and thus by the LM equation given previously there is exactly one degree of output that can draw the money market be in equilibrium at that interest charge per unit. (Chris & Anyingang, 2017)

According to Dennis Robertson, the basic principles of the neoclassical theory of the interest rate on loaned funds are that saving and investing are responsible for determining the long-term interest rate. The interest rate is the price equivalent to the demand and supply for marketable funds (Jhingan, 1997). The demand for credit funds for investments such as the purchase of capital equipment, buildings, etc., depends on the anticipated rate of profit relative to the interest rate. This demand is satisfied by past savings or savings and interest is elastic. The loan fund sees the interest rate as a function of four variables: savings, investment, hoarding and money supply. (Ahuja, 2013)

Classic Interest Rate Theory

The classic interest rate theory defined the interest rate as the component that assimilates savings and investment. The theory maintains the proposal based on the theory of the general balance of the interest rate determined by the demand and supply of capital. Capital demand is driven by the investment decision, while capital supply is driven by savings in the community. (Gujarati, & Porter, 2009)

Keynesian Theory of Liquidity

The Keynesian theory of liquidity preference determines the interest rate by the demand and supply of currency in a stock exchange theory. He points out that the interest rate is simply a monetary phenomenon. This is an inventory analysis because it takes the given short-term currency supply and determines the interest rate by liquidity preference or currency demand. Keynesian theory suggests that low interest rates as a component of administered cost impede growth in savings and therefore investment demand. They argue that increase in the real interest rate will have strong positive effects on savings which can be utilized in investment, because those with excess liquidity will be encouraged to save because of the high interest rate, thus banks will have excess money to lend to investors for investment purpose thereby raising the volume of productive investment. (Gujarati, & Porter, 2009)

Financial Liberalization Theory

The theory of financial liberalization advocated by Mckinnon and Shaw (1973) posits that the regulation of interest rates usually results in low and negative real interest rates, which hampers economic growth in developing countries. Financial repression that causes low interest rates discourages saving and hence reduces investment. The quality of the investment will also be low as projects that would be undertaken under a system of repression would have a low rate of return. They argued that deregulation of interest rates would increase interest rate hikes, which would encourage savings and investment and thereby boost economic growth. Mckinnon and Shaw both argued that deregulation of interest rates was necessary to address the problems created by the policy of financial repression in developing countries. This study examines investment performance since the Nigeria Structural Adjustment Programme, when the interest rate was deregulated, in order to observe the directional flow of investment over this period.

The literature reviewed indicates that much work has been done on interest rates and investment in the economy in developed countries. Few studies captured the connection between interest rate and economic growth over a long period in the broad sense in Nigeria and most of these studies have focused on the interest rate, as it positively influences the naira's behavior. But there has been no attempt to look at the impact of the interest rate and economic growth as determinant for investment decisions in Nigeria, in view of this, the researcher is interested to undertake a study which hinged on

the intent to examine interest rate and economic growth as determinants of firm's investment decision in Nigeria. We found a gap in this area and this is the contribution that this study will provide for policy making.

2.3 Literature Review

Concept of Interest Rate

Teriba, (2012) defined interest rate as the amount billed on the borrowed money, expressed as a percentage of the principal, from a lender to a borrower for the use of the money. It is frequently stated as a percent of the sum of money borrowed (principal) for one year or whatever other time period – month, week, day etc.as agreed between the lender and the borrower when taking out the loan. Specifically, the interest rate is the percentage of the principal which is paid as a fee over a given period. It may as well be described as lease payments for the use of credit by borrowers and the return to get rid of liquidity by lenders over time. Interest rates may be expressed in nominal or real terms depending on whether or not changes in price levels (inflation) are taken into account in their calculations. If no adjustment is made for price level variations, the interest rate is expressed in nominal terms. A nominal interest rate is the interest rate which does not include inflation. It is practically the most elementary case of interest rate. (Teriba, 2012)

Nexus between Interest Rate and Other Macroeconomic Variables

Inflation

According to Tomori (2012), inflation is another factor that has an effect on interest rates. The higher the forecasted inflation rate, the higher the interest rate is likely to be because of the need to maintain a positive real interest rate to encourage other economies. If expected inflation falls, other things being equal, the interest rate would also fall.

Rising prices and rising inflation expectations would tend to raise interest rates, while low inflation levels and an improvement in projected inflation would generally lead to lower interest rates. This leads to a positive relationship between inflation and the interest rate. Higher interest rates than the rate of inflation would protect savers from the harmful effects of inflation; conversely, when the rate of inflation exceeds the rate of interest, borrowers tend to gain at the expense of savers (Tomori, 2012).

Exchange Rate

Adebiyi, (2017) posited on the relationship between the interest rate and the exchange rate may be examined through the demand for and supply of foreign currency on the foreign exchange market. Speculators normally rely on higher interest rates in other countries to trade in foreign exchange in order to benefit from higher gains. For example, investors in Ghana would be attracted to a higher interest rate in Nigeria by purchasing Naira-based securities in an effort to earn higher income. This would likewise contribute to an admiration of the Naira. Hence, an increase in the interest rate is expected to assess the value of a currency, in this case the naira against the cedi. On the other hand, a reduction in the interest rate would lead to a depreciation of the value of the naira. (Uchendu, 2013)

Investment

Mahmudul and Gazi (2009) reiterated that a high interest rate makes the cost of borrowing costly and negatively affects the level of investment. This is explained by the fact that households, businesses and governments frequently borrow money from banks and other credit institutions to finance investments. Similarly, the high level of interest rates serves as a signal for economics agents to save more money in exchange for better rewards. Moreover, low interest rates mean that the funds are cheaper to borrow and signal a growing investment. Firms usually source of funds to venture into investments in new factories, more efficient machines, raw materials, etc. expect to receive more return from their investments. However, if the interest rate (loan cost) is above the expected return on investment, it would not be economically plausible to undertake such an investment and vice versa. Thus, when interest rates are lower, firms are more likely to do invest (Acha &Acha 2011).

The Impact of the Interest Rate on the Economy.

The impact of interest rate in the economy cannot be overemphasized. The interest rate is an instrument for financial intermediary in the economy. It influences economics' savings and investment decisions. It also guides the flow of funds among investors and borrowers. These funds are channeled through financial intermediaries like MDBs, money and financial markets, insurance companies, mutual funds, government securities, etc. The crucial role of the interest rate in the economy could be highlighted in the consumption and saving behaviour of consumers and companies (Acha &Acha 2011). Changes in interest rates would influence consumer spending and the level of household savings, as well as business production and investment decisions. This behaviour is best captured by the balance and imbalance positions of the goods and the money market sectors. The goods sector presents the income and interest rate combinations at equilibrium, while the currency sector shows the relationship between the quantity of money requested and the quantity provided which describes the credit market representing the demand and supply of credit. The level of balance of production in the economy is consistent with the balance of the goods and credit market; therefore, any deviation from the point of balance in any market will result in an adjustment of an interest rate (Eregha, 2010).

Related Empirical Review

Aydemir and Demirhan (2009) studied the behaviour of interest rates and investments in Nigeria from 1976 to 2006, using time series data, and found that investment behaviour significantly influences the interest rate and the inflation rate.

Ologunde et al (2006) studied the impact of the interest rate on investment in Jordan between 1990 and 2005 with the help of the joint integration technique. The study revealed that the real interest rate negatively affects investment. A 1 percent increase in the real interest rate reduces the level of investment by 44 percent.

Kurihara (2016) examined the determinants of private investment in the least developed developing countries for 23 countries between 1975 and 1987, and found that the interest rate on real deposits had a negative impact on private investment.

Doong, Wang and Yang (2015) examined the decline in private investment in Pakistan. They found that a higher real interest rate diminished private investment.

Hsing (2004) adopted a structural VAR model that allows the simultaneous determination of several endogenous variables such as production, actual interest rate, the exchange rate, the stock exchange index and found that there is an opposing relationship between the share prices and the interest rate. Zhou (2006) also studied the relationship between interest rates and exchange rates by means of a regression analysis. He noted that interest rates have a significant effect on equity returns.

Agenor and Montiel (2016) in their study in Jordan on stock investment (based on the monthly data from January 1988 to March 2003) found that interest rate exerts significant negative relationship with share price for markets of Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain, and Venezuela. For six countries in this sample, they argued that there was a significant negative relationship between interest rate changes and stock price changes.

Recently, Olubanjo, Atobatele and Akinwumi (2010) simulated the relationship between interest rates, savings and investment in Nigeria between 1993 and 2010 using the two-step least square approach. Based on their results, a strong decline in the real interest rate would not automatically translate into an increase in domestic investment.

Eregha (2010) investigated changes in the interest rate and determination of investments in Nigeria and deduced that the investment has an indirect relationship to the change in interest rates and other variables used.

3. Methodology

The data for this study was obtained mainly from secondary sources. In order to investigate the impact of interest rate and economic growth as determinants of firms investment decision in Nigeria, information from the CBN Statistical bulletin financial report concerning; External Borrowing, Rate, Exchange Rate, Interest Rate and Gross Domestic Product as explanatory variables covering the period of years 1989-2019 (30years) was used. Other Secondary Sources of data are relevant articles, journals and newspapers.

Source of Data

Before model specification it is necessary to mention the source of this time series data from 1989-2019. The time series data was obtained from CBN Statistical bulletin. The data for all variables except investment was available in nominal form and was deflated with investment deflator to convert all the variables in real values.

3.1 Model Specification

The following mathematical model was developed to analyse the relationship between investment ,economic growth and investment decision in Nigeria using External Borrowing (DEBT), Rate (INFR), Exchange Rate (EXR) Interest Rate (INTR) and Gross Domestic Product (GDP) as explanatory variables and regressed against the dependent variables Investment (INV)

This study employed the model specified below.

$$Y_{lt}=\alpha_{it} + \beta_1 DEBT_{lt} + \beta_2 INFR_{lt} + \beta_3 EXR_{lt} + \beta_4 INTR_{lt} + \beta_4 GDP + \varepsilon_{it} \quad \text{.....3.1}$$

where Y represents the Investment Decision in Nigeria measured by Investment (INV).

α= the constant term

External Borrowing=(DEBT)

Rate= (INFR),

Exchange Rate=(EXR)

Interest Rate= (INTR)

Gross Domestic Product=(GDP)

β= the coefficient of the function

e = error term.

4. Data analysis

4.1 Variables Descriptive Properties

The descriptive properties of the variables are presented in Table 1 below. The mean values of the INV, DEBT, EXR, INFR, INTR and RGDP are 5.6889, 6.2504, 86.28779, 19.0678, 17.6786 and 10.2531 respectively, their median values are 5.4927, 6.6781, 92.338, 12.675, 17.5533 and 10.019 respectively. Exchange rate has the highest value among the variables, it also has the lowest values. The standard deviation shows that exchange rate is the most volatile variable with 87.130, follow by inflation rate with 17.093 then interest rate with 4.8789 while real gross domestic product (RGDP) is the least volatile variable with 0.5625. The result also shows that all the variables are positively skewed towards normality except debt which is negatively skewed towards normality. The kurtosis that measures the peakness of the distribution reveals that inflation rate and interest rate are leptokurtic which means that their distributions are peaked relative to normal distribution, and investment, debt and real gross domestic product are platykurtic, indicating that their distribution are flat relative to normal distribution while exchange rate is mesokurtic, indicating that the variables is normal distribution i.e the distribution of the variables is bell shaped.. Lastly, the Jarque-Bera statistics reveals that the variables were normally distributed at 5% significant level except inflation rate

Table 1. Descriptive Analysis

	LOG(INV)	LOG(DEBT)	EXR	INFR	INTR	LOG(RGDP)
Mean	5.688921	6.250385	86.28779	19.06782	17.67857	10.2531
Median	5.49265	6.678099	92.3381	12.675	17.55333	10.01902
Maximum	9.739162	9.455198	306.0837	72.84	31.65	11.15353
Minimum	2.174752	2.387845	0.55	5.38	8.431667	9.53092
Std. Dev.	2.364017	2.215366	87.13028	17.09292	4.878873	0.562522
Skewness	0.083574	-0.26888	0.833024	1.786261	0.14381	0.383163
Kurtosis	1.798482	1.837415	3.0064	4.998305	3.736578	1.649204
Jarque-Bera	2.391323	2.666285	4.510603	27.22871	1.016067	3.919346
Probability	0.302504	0.263647	0.104842	0.000001	0.601678	0.140904
Observations	39	39	39	39	39	39

Source: *Author's computation* (2020)

4.2. Correlation Matrix

The correlation matrix of the model variables in table 2 below reveals that debt, exchange rate and economic growth have strong positive correlation with investment while interest rate has a weak positive correlation with investment. The result also reveals that inflation rate has a weak negative correlation with investment.

Table 2. Result of correlation

	LOG(INV)	LOG(DEBT)	EXR	INFR	INTR	LOG(RGDP)
LOG(INV)	1	0.974585	0.93166	-0.2419	0.172994	0.97037259
LOG(DEBT)	0.974585	1	0.890532	-0.19222	0.282886	0.94520446
EXR	0.93166	0.890532	1	-0.3504	0.063748	0.92625738
INFR	-0.2419	-0.19222	-0.3504	1	0.154076	-0.3030394
INTR	0.172994	0.282886	0.063748	0.154076	1	0.08259938
LOG(RGDP)	0.970373	0.945204	0.926257	-0.30304	0.082599	1

Source: *Author's computation* (2020)

4.3 Unit Root Test

Time series data are often non-stationary and the result obtained from non-stationary variables are spurious. Consequently it is sacrosanct to conduct the stationary test on each variable. This study employs Phillips-Perron test to determine the stationary of each variable. The result present below reveals that inflation rate is stationary at level I(0) while real gross domestic product, investment, interest rate, debt, exchange rate were stationary at first difference I(1). Base on this result, this study will employ Auto-regressive Distributed Lag Bound co-integration technique

Table 3. Result of the Phillips-Perron Unit root test

variables	Level	First difference	status
EXR	1.487	-6.269	I(1)
INFR	-2.867	-10.841	I(0)
INTR	-2.505	-6.938	I(1)
LOG(INV)	0.341	-5.228	I(1)
LOG(RGDP)	1.323	-3.616	I(1)
LOG(RGDP)	1.451	-4.726	I(1)

Source: *Author's computation* (2020)

4.4 Co-integration Estimate

The bound co-integration result as presented in table 4 shows that the value of F-statistics which is 4.352 is greater than the upper bound critical value at both 5%, indicating that there is co-integration among the variables in the model.

Table 4. ARDL Bound Co-integration Test

		Critical Value	Lower Bound	Upper Bound
F-statistic	4.351975	10%	2.08	3
k	5	5%	2.39	3.38
		1%	3.06	4.15

Source: *Author's computation* (2020)

4.5 ARDLECM

Consequent upon the result of ARDL Bound test which reveals that there is cointegration among the variables in the model, the appropriate estimation technique for this study is Auto-Regressive Distributed Lag Error Correction Model. Therefore, the result is presented below:

Table 5. ARDLECM Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR)	-119.606	60.27202	-1.98444	0.0285
DLOG(RGDP)	30455.21	8335.825	3.653533	0.0053
DLOG(DEBT)	9060.107	1897.072	4.775838	0.0001
D(EXR)	12.20455	14.26524	0.855545	0.4144
D(INFR)	86.20503	17.1683	4.95001	0.0008
CointEq(-1)*	-0.461806	0.345491	7.12552	0.0001

Source: *Author's computation* (2020)

The ARDL regression estimate presented in Table 5 above shows that interest rate had negative and significant impact on investment i.e as interest rate increase, investment reduces. This is because when the cost of borrowing (interest rate) is high, the tendency of borrowing to invest is small as investor

will be careful to borrow for investment especially when the interest is higher than the return on investment. This conform to the apriori expectation. Contrariwise, economic growth has a positive and significant effect on investment i.e as the economy grows, investment increases in Nigeria. This conform to the apriori expectation. Furthermore, debt was found to have a positive impact on investment. This could be because the loan obtained were been used to provide infrastructure to the country as such investor will want to invest because of the enabling environment. This conform to the apriori expectation. However, exchange rate was found to have an insignificant impact on investment.

Inflation rate has a positive and significant impact on investment. This could be because as inflation rate increases, investors would increase the price and consequently their profit would increase, also when inflation increases as a result of higher money in circulation demand increases as such drive investment. This does not conform to the apriori expectation. Lastly, the ECM result shows that the model converges to equilibrium at a speed rate of 46.18% when there is disequilibrium in the investment. This implies that 46.18% of the previous year's equilibrium in investment is been corrected by interest rate, exchange rate, economic growth, debt and inflation rate while the remaining 53.82% is been corrected by other variables not included in this model.

4.6 Diagnostic test

This study conducts diagnostic test to determine how reliable and valid the result analyzed above were. The probability value of Jarque-Bera statistics which is greater than 5% in figure 1 below indicates that the residuals from the estimates were normally distributed.

Also, the probability value of Breusch-Godfrey Serial heteroskedaticity (ARCH test) which is greater than 5% as revealed in table 6 below indicates that the residuals are Homoskedasticity. Lastly, the probability value of Breusch-Godfrey Serial correlation test is greater than 5% also means that there is no serial correlation in the estimate.

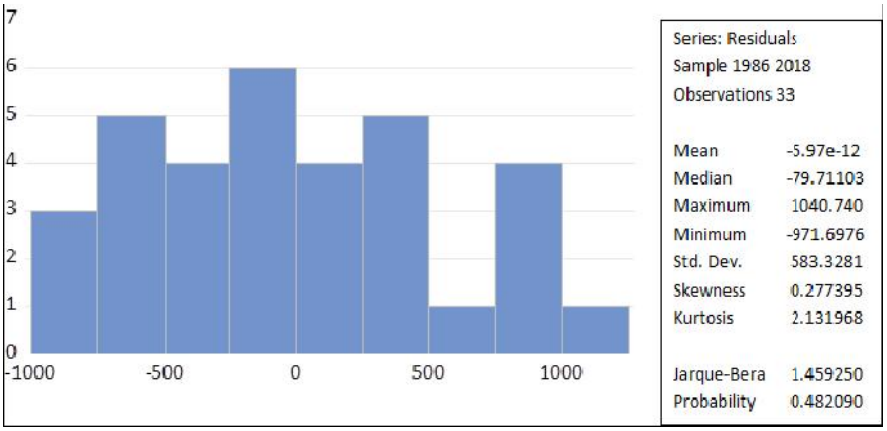

Figure 1. **Normality test**

Source: *Author's computation* (2020)

Table 6. Diagnostics Tests

Heteroskedasticity Test: Breusch-Godfrey Serial	F-Statistics 0.772973	Prob. 0.7072	
Breusch-Godfrey Serial correlation test	F-Statistics 12.19542	Prob. 0.5052	F(2,15)
Ramsey RESET Test	F-Statistics 0.32882	Prob. 0.5781	F(1,16)

Source: *Author's computation* (2020)

Conclusion and Policy Recommendation

This study investigated the impact of interest rate and economic growth as determinant of firm's investment decision in Nigeria between the periods of 1989 and 2019. Based on the mixed level of stationarity of the variables as revealed by the unit root test, the study made use of auto-regressive distributed lag (ARDL) technique to analysis the data. The bound test showed that the variables co-integrate consequently the study estimated the ARDLECM. The result showed that debt, exchange rate and economic growth have strong positive correlation with investment while interest rate has a weak positive correlation with investment. The result also reveals that inflation rate has a weak negative correlation with investment.

The findings of this study is in tandem with Keynesian Liquidity preference theory, Ologunde et al (2006); Kurihara (2016);Doong, Wang and Yang (2015);Hsing (2004);Zhou (2006) ;Agenor and Montiel (2016);Olubanjo, Atobatele and Akinwumi (2010);Eregha (2010) This implies that impact of interest rate and economic growth as determinant of firms investment decision in Nigeria has mixed result due to the hyperinflation and unstable exchange rate which hinder economic growth and also left investor indecisive on the nature of their investment.

Policy Recommendation

The research study assesses the connection between interest rate and economic growth as determinant of firm's investment decision in Nigeria using variables like; Interest rate, exchange rate, external borrowing, inflation rate, exchange rates and GDP at factor cost from 1989 to 2019.It adopted the multiple regression method of Econometrics to estimate the data collated from the CBN statistical bulletin.

The study found that interest rates and investment decision are weakly correlated, meaning there is no solid evidence to suggest that there is an empirical relationship between interest rates and investment decision. Despite the assertion that there is no link between interest rates and investment decision, there are many views that both are directly or indirectly related to economic growth in Nigeria.

- The findings point to a unique long-term relationship between interest rates, external borrowing, exchange rate and economic growth. Thus, as a prerequisite for economic growth, the government must embark on growth enhancing reforms and be tender to the behavior of interest rates in the economy. This will guide the formulation of private sector development policy as an enabler of global economic growth in Nigeria.

- Possible policy directions could include encouraging the provision of investment funds by substantially reducing the personal tax rate and, therefore, by providing incentives for wealth creation; support the control of interest rates to stimulate the growth of the stock market; improve the regulatory framework Only an interest rate policy which can attract savings and encourage domestic investment will help the economy.
- The importance of income levels to increase investment cannot be overstated, as income levels determine the level of savings that determines the investment that can be made to increase mechanized agricultural production in Nigeria.

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