Impact of Interest Rate Deregulation on Investment Growth in Nigeria

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ABSTRACT

The study examined the impact of interest rate liberalization on investment in Nigeria from 1961 to 2017 using error correction model and variance decomposition of vector autoregressive model. The empirical findings of the study showed that interest rate liberalization has no significant impact on investment in Nigeria. The result further showed that prime lending rate had a negative insignificant impact on investment in Nigeria both in the pre and post liberalization period. Private sector credit and nominal exchange rate were also observed to be insignificant factors explaining variations in investment in Nigeria. However, national income and government expenditure exerted a positive and negative significant impact on investment respectively. The study therefore recommended that government through the Central Bank of Nigeria should use her monetary policies to influence interest rate in such a way as to stimulate investment growth in the country instead of allowing it to be freely determined by the market forces as the theory on liberalization suggests.

Keywords: Interest Rate, Investment, Nigeria
JEL Classifications: E43, E22

1. INTRODUCTION

The liberalization of interest rates in Nigeria was essentially part of the general framework for the deregulation of the economy. This implied the elimination and reduction of the excessive controls which inhibited growth and development of the economy. The policy in general was anchored on the need to promote savings, reduce distortions in investment and induce effective information between savers and investors.

Prior to July 31, 1987, interest rate in Nigeria was directly managed by the monetary authorities' i.e. Central Bank of Nigeria (CBN). During this period, lending and deposit rates were fixed by the CBN on the basis of monetary policy thrusts rather than on the operation of market mechanism. In addition, interest rate policy was closely aligned with the credit policy where the various sectors of the economy were classified into preferred and less preferred sectors. With these classifications in focus the monetary authorities

fixed interest rates to direct financial resources at concessionary rates to the preferred sectors which were considered important for faster economic growth. These concessionary rates were often below the minimum rediscount rate (MRR) (monetary policy rate). The non-priority sectors on the other hand attracted rates which were non-concessionary in nature.

However, according to McKinnon (1973) and Shaw (1973), this kind of interest rate regime led to financial repression which occurs mostly when a country imposes ceiling on deposit and lending rates at a low level relative to inflation. The resulting low/negative interest rates discouraged savings mobilization, hampered financial intermediation, investment decisions and hence economic growth.

An examination of interest rate structure from 1960 to 1987 revealed that between 1970 and 1974 the minimum rediscount was between 4% and 5%. In 1975 it was reduced to 3.5% and in 1977 it was raised to 4%. Furthermore, between 1978 and 1983 it

ranged between 5% and 8%. In 1984 however it was raised to 10% and remained like that until 1987 when it was further increased to 12.75% (Central Bank Statistical Bulletin, 2011). On the other hand, commercial bank weighted average deposit and lending rates between 1970 and 1974 were 3% and 7% respectively. In 1974, the deposit rate was increased to 4% while the lending rate was reduced from 7% to 6%. This lasted from 1975 to 1978 when the deposit and lending rate further increased to 5% and 7% respectively. The deposit rates between 1980 and 1986 ranged between 6% and 9.5% while the commercial bank lending rates ranged between 7.5% and 10.5%. In 1987 however, the deposit rate was raised to 14% while the prime and maximum lending rates stood at 17.5% and 19.20% respectively.

Judging from the above trend it will be observed that the MRRs were very low during the period of 1970-1985 and as a result, all money market rates were low. This low interest rate policy sustained a situation where the demand for loanable funds exceeded the supply leading to a high level of irrationality in resources use and allocation (Nzotta, 1999).

In order to correct some of the identified problems associated with the regulated interest rate structure, the CBN on July 31, 1987 announced the deregulation of interest rate hence abolished all controls in interest rate and allowed it to be determined by the forces of demand and supply. According to Ikhide and Alawade (2001), the major aim of the policy was to achieve efficiency in the financial sector, increase private savings and also engender financial deepening. In agreement Odhiambo and Akinbode (2009) stated that interest rate liberalization would among other things, enhance the provision of sufficient funds for investors especially manufacturers who are considered to be the prime agents of investment and economic growth.

Thus, as a result of the liberalization of interest rate the MRR was increased from 10% to 12.75% in 1988 while the maximum lending rate stood at 17.60%. In 1989, the MRR was further raised to 18.5% while the maximum lending rate stood at 24.6%.

A major objective of the deregulation exercise as stated earlier was to increase savings for investment and economic growth. However, despite this policy effort, investment is still in the doldrums not strong enough to significantly promote economic growth in Nigeria (Nnanna et al., 2004). The World Bank report of 2010 also noted that the level of savings and investment rate in Nigeria has remained inadequate and insufficient to fuel the growth needed to raise living standards and attain full capacity utilization resources.
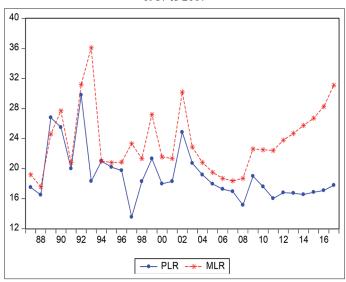
According to Nnanna et al. (2004), except for some years prior to the introduction of the structural adjustment programme SAP in 1986, gross capital formation as a proportion of the GDP has been dismally low on annual basis. An examination of investment GDP ratio as reported in CBN statistical bulletin 2016 revealed that aggregate investment expenditure as a share of GDP grew from 16.9% in 1970 to a peak of 29.7% in 1976 before declining to 4.58% in 1995. Thereafter it increased to 7.78% in 2002 before declining to all time low of 3.61% in 2005. Beginning from 2011, investment/GDP ratio increased significantly to 14.55%

and remained within that range until 2016 when it decreased marginally to 13.65%.

Furthermore, the high lending rates (Figure 1 and Table 1) observed during the post liberalization era especially between 1989 and 1995 which was 26% on the average has been frequently blamed for investment contraction in Nigeria thus leading to the country's slow growth performance and therefore a major failure of SAP. This belief is premised on the assumption that the demand for funds is for the purpose of investment and that investment demand will be lower at higher lending rate. According to Ekpo (2016; 2017), high lending rate of 26.5% on the average is extremely discouraging to investors. Ekpo (2016) noted that high lending rate discourages investment resulting in the persistent decline in the real sector. According to Ekpo, it is difficult to borrow at that rate, invest, and make profit and payback. Ekpo (2016) argued that the consequent poor investment performance will lead to a near collapse of the real sector and high rate of unemployment in the country. The MPR according to Ekpo (2017) which is supposed to be an anchor rate only has some bearing on the inter-bank bank rates but has no impact on lending rates thus concluding that market forces would not bring down the lending rate because the banking structure in the country is oligopolistic in nature.

Thus, it is against this backdrop that the present study attempts to examine the impact of interest rate liberalization on investment

Figure 1: Prime lending rates and maximum lending rates from 1987 to 2017

Source: Central Bank Statistical Bulletin 2017

Table 1: Average prime and maximum lending rates from 1987-2017

Periods	Average prime lending rate (%)	Average max. lending rate (%)
1987-1991	21.26	21.98
1992-1996	21.81	25.99
1997-2001	17.88	22.95
2002-2006	19.99	22.42
2007-2011	16.94	20.92
2012-2017	16.96	26.74

in Nigeria. In essence the study will seek to answer the following research questions:

1. To what extent has interest rate affected investment in Nigeria?
2. Is there any differential impact of interest rate liberalization on investment in Nigeria during the pre and post liberalization regimes?
3. What is the difference in the structural response of investment to changes in interest rate in Nigeria overtime?

Answering the above research questions would enable us to determine the effect of interest rate on investment in Nigeria. Furthermore, it would enable us to do a comparative analysis of the impact of interest rate liberalization in promoting investment in Nigeria and also assess the desirability or otherwise the occasional resort to financial system regulation and control as practiced from 1961-1986 to 1987-2017.

The rest of this paper is structured as follows; section two briefly reviews various related literature, section three discusses the methodology, section four presents the result of the analysis and interpretation of findings and section five provides the conclusion and recommendations.

2. LITERATURE REVIEW

2.1. Theoretical Literature

2.1.1. Theories of interest rate

There is a general lack of theoretical consensus on how interest rate is determined and no single theory of interest rate determination is completely determinate.

The classical theory of interest rate for instance posits that the interest rate is determined by the supply of and demand for capital. The supply of capital is governed by time preference while the demand for capital is governed by the expected productivity of capital. The theory is regarded as a real theory of interest since it explains the determination of the rate of interest by real force such as thriftiness, time preference and productivity of capital (Olubanjo, 2015).

The neo-classical or the loanable funds theory on the other hand explains the determination of interest rates in terms of demand and supply of loanable funds. The theory posits that the rate of interest is the price of credit which is determined by the demand and supply of loanable funds. The three main sources of demand for loanable funds are the government, the businessmen and consumers. Borrowings by businessmen and consumers are interest elastic which means that the tendency to borrow is more at a lower rate of interest than at a higher rate. It also depends mostly on the expected rate of profit relative to the rate of interest. The supply of loanable funds comes from savings, dishoarding and bank credit which are all interest elastic (Olubanjo, 2015).

Keynesian theoretical framework opined that interest rate is determined by liquidity preferences which incorporate the impact of expansionary and contractionary monetary policies of central banks on the interest rates as key policy variable in pursuit of its monetary policy objectives. Keynes defined the rate of interest as the reward of not hoarding but the reward for parting with liquidity for a specified period. It is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. In the Keynesian sense, the rate of interest is determined by the demand for and the supply of money. This theory is, therefore, characterized as the monetary theory of interest rate, as distinct from the real theory of the classical. The supply of money refers to the total quantity of money in the country for all purposes at any time. Though the supply of money is a function of the rate of interest to a degree, it is considered to be fixed by the monetary authorities, that is, the supply curve of money is taken as perfectly inelastic.

Keynes coined the term liquidity preference for the demand for money. Liquidity preference is the desire to hold cash. In the words of Keynes, the rate of interest is the "premium which has to be offered to induce people to hold their wealth in some form other than hoarded money." The higher the liquidity preference, the higher will be the rate of interest that will have to be paid to the holders of cash to induce them to part with their liquid assets. The lower the liquidity preference, the lower will be the rate of interest that will be paid to the cash-holders (Olubanjo, 2015).

2.1.2. Theories of investment

On investment we have the neoclassical, Keynesian and acceleration theory of investment. The neo classical theory of investment posits that investment is a function of rate of interest. The theoretical basis for the neoclassical theory of investment is the theory of the optimal accumulation of capital. According to the theory, the desired capital stock is determined by output and the price of capital services relative to the price of output. The price of capital services depends on the price of capital goods i.e. interest rate and the tax treatment of business income. As a consequence, changes in output or the price of capital services relative to the price of output alter the desired capital stock, hence, investment (Nzotta, 1999). According to the neoclassical theory, interest rate is the main determinant of the desired capital stock. Thus, monetary policy, through its effect on the interest rate, is capable of altering the desired capital stock and investment. The Keynesian theory on the other hand argues that investment is a function of income and rate of interest.

Finally, the acceleration principle states that the investment in an economy at any point in time is dependent on the rate of change of income rather than by the absolute level of income.

The principle whose origin dates back to the Pre-Keynesian era is an attempt to explain the relationship between investment and the rate of change of income.

2.1.3. Theory of financial repression and liberalization - the McKinnon–Shaw hypothesis (1973)

The McKinnon–Shaw hypothesis focuses on the distortions in the market caused by financial repression. The hypothesis argued that in a developing country, liberalizing interest rate would lead to an increase in the real interest rate and savings which in turn would boost investment growth. The initial framework of McKinnon (1973) and Shaw (1973) centered on financial repression and the need to remove financial repression and other forms of credit

control by allowing the market to determine real interest rates. The outcome of repression, according to McKinnon (1973) and Shaw (1973) are evidenced by low savings, high consumption, low investments and repressed economic growth. Thus, McKinnon–Shaw framework argues that in order for an economy to experience economic growth via greater efficiency in capital accumulation and allocation, interest rate ceilings, credit control and other restrictive financial legislations should be removed.

2.2. Empirical Literature

The pioneering study of Mackinnon (1973) and Shaw (1973) engineered a great lot of empirical research into the working of financially repressed economies and the beneficial effects of financial liberalization. The major argument in their study is that a repressed financial system impedes growth and development through its negative effects on savings mobilization and allocation of capital. However, the liberalization of the financial sector will lead to increase in savings, encourage investment and induce economic growth. In a model which analyzed the effect of interest rate on the economic growth of 7 Asian countries, Fry (1980) found that around half a percentage point in economic growth was forgone for everyone percentage point by which the real rate of interest is set below its equilibrium level.

In a sample of 119 countries which comprised developed and developing countries covering the period 1974-1989, Levine and Renelt (1992) found that countries with average real interest rate below 0.5% tended to grow more slowly than countries with average real interest rates >0.5%. In addition they found that countries with severely depressed interest rates tend to have low investment rates.

Ozdemir and Erbril (2008) empirically examined whether financial liberalization could trigger long-run economic growth in Turkey and ten other European countries for the period of 1995-2007 using panel data regression analysis. The result of their panel data estimates showed a strong link between long-run growth and financial liberalization thus emphasizing the importance of financial liberalization as a policy tool.

Using ordinary least square (OLS) to examine the impact of interest rate liberalization on savings, investment and GDP growth in Ghana, Asamoah (2008) found that the increase in interest rate in post liberalization years led to a corresponding increase in savings which had a positive impact on GDP growth.

Furthermore, studying the relationship between interest rate and economic growth in Nigeria, Obamuyi (2009) found that lending rate has significant effect on economic growth. Employing co-integration and error correction model (ECM) techniques, the study advocated for investment friendly interest rate policies to spur economic growth.

Majed and Ahmed (2010) analyzed the impact of real interest rate liberalization on investment in Jordan from 1990 to 2005. The study found that interest rate liberalization had a negative impact on investment. Precisely the study found that a 1% increase in interest rate will lead to 44% decrease in investment.

Examining the variations in interest rate and investment determination in Nigeria between the periods of 1970 and 2012, Eregha (2010) found that investment has a negative relationship with interest rate variations in Nigeria.

Owumere et al. (2012) investigated the impact of interest rate liberalization on savings and investment in Nigeria using OLS techniques. The study found out that interest rate liberalization has a negative significant impact on investment in Nigeria. The study therefore concluded that liberalization though a good policy was counter-productive in Nigeria.

Orji et al. (2013), examined the nexus between financial liberalization and private investment in Nigeria from 1970 to 2012. The regression result revealed that financial liberalization proxied by real interest rate had a positive statistically significant impact on private investment in Nigeria. The chows test result showed that there was a structural break between financial liberalization and private investment in Nigeria within the period under review. In addition the granger test result revealed that there is no causal relationship between financial liberalization and private investment in Nigeria.

Employing autoregressive distributed lag (ARDL) bounds testing approach, Owusu and Odhiambo (2014) investigated the link between financial liberalization and economic growth in Nigeria. Constructing an index for financial liberalization the study found that financial liberalization policies had a positive and significant effect on economic growth in Nigeria both in the short-run and in the long-run.

Nwadiubu et al. (2014) examined the nexus between financial liberalization and economic growth in Nigeria from 1987 to 2012 using Johnansen co-integration test and error correction mechanism. The study found that financial liberalization which was measured by lending rate had an insignificant impact on economic growth in Nigeria within the period under review.

Orji et al. (2015) examined the link between financial liberalization and economic growth in Nigeria using OLS methodology and co-integration analysis. The result from their study revealed that financial liberalization and private investment had significant positive impact on economic growth. The result further showed that lending rate had a negative but insignificant impact on economic growth in Nigeria.

Agbaeze and Onwuka (2016) assessed the impact of financial liberalization on private sector investment in Nigeria from 1991 to 2011 using OLS estimation technique. The empirical result from the study showed that financial liberalization did not improve private sector investment in Nigeria. According to the study, the sequencing of the liberalization process and hostile macroeconomic environment combined to minimize the expected benefits of financial liberalization.

Examining the effect of financial sector liberalization on economic growth in Nigeria from 1980 to 2013, Ubesie (2016) using real interest rate as a proxy for financial liberalization found that

found that financial liberalization had a positive but statistically insignificant impact on economic growth in Nigeria.

Egbetunde et al. (2017) analyzed the structural interaction between interest rate liberalization and growth performance of Sub Saharan African (SSA) economies for the period 1980-2013. The empirical result from the study supports the hypothesis of McKinnon and Shaw (1973). The results further revealed that trade openness and price stability are significant factors for interest rate liberalization and economic growth in SSA countries.

Akinsolaand Odhiambo (2017) examined the impact of financial liberalization on economic growth, using Arellano and Bover approach of linear generalized method of moments for a sample of 30 SSA countries. The study found that the coefficient of financial liberalization variable is positive and significant for SSA. Furthermore, the result showed that the financial liberalization dummy sign was negative for low-income countries and also statistically insignificant.

Using time series data from 1970 to 2014 Okwuchukwu and Ariwa (2017), examined the impact of financial system liberalization, Savings and Investment on the Nigerian economy. The study found that financial liberalization proxied by real interest rate had a negative significant impact on the Nigerian economy. The result further showed that the dummy variable which captured the liberalization policy was however not statistically significant.

Akpansung and Waziri (2018) attempted to ascertain whether or not financial liberalization policies promoted economic growth in Nigeria for the period spanning 1986-2014, using ARDL-bounds testing approach and unrestricted ECM to co integration analysis. Employing three alternative measures of financial liberalization the empirical findings showed that the impact of financial liberalization on economic growth varied for different measures of financial liberalization undertaken; and were significant both in the short run and the long run.

3. METHODOLOGY

3.1. Model Specification
Based on financial repression theoretical framework, the research will be guided by the model specified below following Nnanna et al. (2004). The functional form of the model is specified thus:

$$INV = f(PLR, PSC, NER, Y, GEXP) \quad (1)$$

PLR = Prime lending rate
PSC = Credit to private sector
NER = Nominal exchange rate
Y = National Income
$GEXP$ = Government capital expenditure.

Model 1:
In order to estimate the first objective of our study which is to determine the effect of interest rate on investment in Nigeria, equation (5) is rewritten in an econometric form below:

$$INV_t = \alpha_0 + \alpha_1 PLR_t + \alpha_2 PSC_t + \alpha_3 NER_t + \alpha_4 Y_t + \alpha_5 GEXP_t + \mu_t \quad (2)$$

Where:
α_0 = Intercept of the model; $\alpha_1 - \alpha_5$ = slope coefficient of explanatory variable; μ_t = error term.

Model 2:
In order to estimate the second objective of our study which is to determine the differential impact of interest rate liberalization on investment in Nigeria during the pre and post liberalization regime, equation (1) is rewritten in the form below with the introduction of dummy variables:

$$INV_t = \alpha_0 + \alpha_1 PLR_t + \alpha_2 PSC_t + \alpha_3 NER_t + \alpha_4 Y_t + \alpha_5 GEXP_t + \beta_0 Dum + \beta_1 DumPLR_t + \mu_t \quad (3)$$

Where:
α_0 and β_0 = Intercept of the model; $\alpha_1 - \alpha_5$ and β_1 = slope coefficient of explanatory variable;

Dum = (Dummy variable to control for changes in the pre and post liberalization regimes, 1987-2017 = 1 and 0 otherwise); μ_t = error term.

Model 3:
In order to estimate the third objective of our study which is to examine the structural responses of investment to changes in interest rate in Nigeria, vector auto regression (VAR) estimation technique is employed. The specification is as follows:

Putting equation (1) in a VAR model we have:

$$INV_t = \alpha_1 + \beta_{11}\sum_{i=1}^{n} INV_{t-i} + \beta_{12}\sum_{i=1}^{n} PLR_{t-i} + \beta_{13}\sum_{i=1}^{n} PSC_{t-i}$$
$$+ \beta_{14}\sum_{i=1}^{n} NER_{t-i} + \beta_{15}\sum_{i=1}^{n} Y_{t-i} + \beta_{16}\sum_{i=1}^{n} GEXP_{t-i} + U_1 \quad (4)$$

$$PLR_t = \alpha_2 + \beta_{21}\sum_{i=1}^{n} INV_{t-i} + \beta_{22}\sum_{i=1}^{n} PLR_{t-i} + \beta_{23}$$
$$\sum_{i=1}^{n} PSC_{t-i} + \beta_{24}\sum_{i=1}^{n} NER_{t-i} + \beta_{25}\sum_{i=1}^{n} Y_{t-i} + \beta_{26}\sum_{i=1}^{n} GEXP_{t-i} + U_2 \quad (5)$$

$$PSC_t = \alpha_3 + \beta_{31}\sum_{i=1}^{n} INV_{t-i} + \beta_{32}\sum_{i=1}^{n} PLR_{t-i} + \beta_{33}\sum_{i=1}^{n} PSC_{t-i}$$
$$+ \beta_{34}\sum_{i=1}^{n} NER_{t-i} + \beta_{35}\sum_{i=1}^{n} Y_{t-i} + \beta_{36}\sum_{i=1}^{n} GEXP_{t-i} + U_3 \quad (6)$$

$$NER_t = \alpha_4 + \beta_{41}\sum_{i=1}^{n} INV_{t-i} + \beta_{42}\sum_{i=1}^{n} PLR_{t-i} + \beta_{43}\sum_{i=1}^{n} PSC_{t-i}$$
$$+ \beta_{44}\sum_{i=1}^{n} NER_{t-i} + \beta_{45}\sum_{i=1}^{n} Y_{t-i} + \beta_{46}\sum_{i=1}^{n} GEXP_{t-i} + U_4 \quad (7)$$

$$Y_t = \alpha_5 + \beta_{51}\sum_{i=1}^{n} INV_{t-i} + \beta_{52}\sum_{i=1}^{n} PLR_{t-i} + \beta_{53}\sum_{i=1}^{n} PSC_{t-i}$$

$$+\beta_{54}\sum_{i=1}^{n} NER_{t-i} + \beta_{55}\sum_{i=1}^{n} Y_{t-i} + \beta_{56}\sum_{i=1}^{n} GEXP_{t-i} + U_5 \tag{8}$$

$$GEXP_t = \alpha_6 + \beta_{61}\sum_{i=1}^{n} INV_{t-i} + \beta_{62}\sum_{i=1}^{n} PLR_{t-i} + \beta_{63}\sum_{i=1}^{n} PSC_{t-i}$$

$$+\beta_{64}\sum_{i=1}^{n} NER_{t-i} + \beta_{65}\sum_{i=1}^{n} Y_{t-i} + \beta_{66}\sum_{i=1}^{n} GEXP_{t-i} + U_6 \tag{9}$$

Where:

i is the lag length, α's are the constant terms, U's are the stochastic error terms which in the language of VAR is referred to as Impulses or Innovations and INV, PLR, PSC, NER, Y, $GEXP$ are as defined earlier. The model above can be stated more compactly as below:

$$Y_{it} = a_i + \beta_i \sum_{i=1}^{n} y_{t-i} + \lambda_i \sum_{i=1}^{n} x_{it-i} + V_i \tag{10}$$

Where:

Y_{it} = vector of endogenous variables (such that $y_{it} = INV_t\ldots GEXP_t$); α_i = vector of constant terms; β_i = coefficient of the autoregressive terms; λ_i = coefficients of the explanatory variables (vector of coefficients); V_i = vector of innovations.

3.2. Method of Estimation

In order to estimate model one of our study, this research study utilized OLS multiple regressions to determine the effect of the independent variables on the dependent variable. The choice of OLS is mainly because it minimizes the error sum of squares and has a number of advantages such as unbiasedness, consistency, minimum variance and efficiency; it is widely used based on its property of BLUE (Best, Linear, Unbiased, Estimate), simple and easy to understand (Gujarati, 2003). In addition, dummy variable technique is employed to determine the differential impact of interest rate liberalization on investment during the pre and post liberalization regime. The dummy technique provides valuable information about the existence of a regime and would also help us to capture the second objective of our study. Finally, to estimate model three of our study which captures the structural responses of investment to changes in interest rate in Nigeria, VAR estimation technique is employed.

3.3. Nature and Source of Data

The data employed in this study are secondary data. The study employed annual time series data from 1961 to 2017. The data series were collected from CBN Statistical bulletin of various years.

4. PRESENTATION AND DISCUSSION OF RESULT

4.1. Unit Root Test Result

In order to verify the reliability of the time series data used for this analysis, a unit root test was conducted using Phillips-Perron (P-P) test statistic to determine whether the variables under study are stationary or non-stationary. The result of the time series behaviour of each of the series is presented in Table 2.

From the Table 2, it is observed that all the variables (INV, PLR, PSC, NER, Y and GEXP) were non-stationary in their level forms but became stationary after first difference. At 5% test critical value, the null hypothesis of non-stationary could not be rejected thus leading us to conclude that they are integrated of order one {1(1)}. Since the variables are integrated of the same order i.e., {1(1)} we proceed to examine their co integrating relationship using Engel Granger two step procedure.

4.2. Co integration Test Result

A necessary but insufficient condition for co integration is that the variables under investigation are integrated of the same order say {1(1)}. Hence a co integration test was carried out to ascertain if there is a long-run relationship between the dependent variable (INV) and the independent variables employed in the model.

The result in the Table 3 clearly shows that the P-P test statistic (−6.14) is >5% test critical value (−2.92) in absolute terms. This implies that the residuals are stationary leading us to conclude that the variables are co integrated and also a good reason to apply the ECM.

4.3. Presentation of ECM Results and Interpretation
4.3.1. Model 1
The result of the ECM model which answers the first question of our study is presented in the Table 4.

From Table 4, it is observed that interest rate [D (PLR)] has a negative relationship with investment in Nigeria. This negative relationship is in line with neo classical theory of interest rate however, the t-statistic value of interest rate which is −1.38

Table 2: Phillips-Perron test statistic

Variable	Level form		First difference		Order of integration
	P-P stat.	5% Critical value	P-P stat.	5% Critical value	
INV	−1.241943	−2.915522	−6.081077	−2.916566	I (1)
PLR	−1.899170	−2.915522	−11.77623	−2.916566	I (1)
PSC	−1.598519	−2.915522	−5.884338	−2.916566	I (1)
NER	−1.970014	−2.915522	−3.780174	−2.916566	I (1)
Y	−0.154173	−2.915522	−9.645381	−2.916566	I (1)
GEXP	−0.045971	−2.915522	−5.641739	−2.916566	I (1)

P-P: Phillips-Perron

demonstrates that the negative effect of interest rate on investment in Nigeria is not statistically significant.

Furthermore, we observe that private sector credit (PSC) and nominal exchange rate (NER) have a positive but insignificant relationship with investment in Nigeria. This simply means that PSC and NER are not significant factors influencing investment decisions in Nigeria. We arrived at this conclusion because their t-statistic values were <2 using the rule of thumb even though their positive coefficients are in line with a priori economic expectation.

National income (Y) is estimated to have a positive significant effect on investment in Nigeria. Its estimated coefficient and t-statistics being 0.0003 and 5.4916 respectively. This finding is consistent with a prior economic expectation which suggests a strong relationship between national income and investment.

The result further revealed that government expenditure (GEXP) has an estimated coefficient of −1.3727. This demonstrates the existence of a negative or indirect relationship between government expenditure and investment in Nigeria. This finding is consistent with crowding out effect of government expenditure on private investment as argued by the monetarist. According to this view, investment is highly sensitive to changes in Interest rate thus increase in government spending increases the level of income which in turn increases the demand for money however given fixed money supply, the

increase in the demand for money leads to increase in interest rate which in turn reduces private investment. The estimated t-statistic for GEXP which is −3.05 clearly testifies to the fact that the negative impact of government expenditure on investment is statistically significant.

The ECM lagged value is estimated to be −0.3285. Precisely, this speed of adjustment shows that about 32.85% of errors generated in each period are automatically corrected by the system in the subsequent period. The ECM has the correct sign of negative and it is also statistically significant. The value of the coefficient of determination (R^2) from our regression result is 0.6280. This implies that about 62.80% of the total variations in the dependent variables are accounted by the independent variables employed in the model. This shows goodness of fit and the high estimated value of the F-statistics (13.5) testifies to this fact. Finally, using Durbin Watson statistic to test for the existence or otherwise the presence of autocorrelation reveals that the model is free from the problem of serial autocorrelation.

4.3.2. Model 2
Presented below is the result of the ECM model which addresses the second objective of our study. The variables (INV, PLR, PSC, NER, Y and GEXP) are as defined earlier while DUM is a dummy variable introduced to capture the effect of interest rate liberalization policy.

From Table 5, it is observed that prior to liberalization; interest rate (D [PLR]) has a negative relationship with investment in Nigeria. This negative relationship is in line with neo classical theory of

Table 3: Unit root test on residual

Variable	P-P test stat.	5% Critical value	Remark
Residual (RESID 01)	−6.137018	−2.915522	Stationary

Table 4: Error correction mechanism (ECM) result for Model 1

Dependent variable: D (INV)			
Method: Least squares			
Date: 04/08/19 Time: 22:04			
Sample (adjusted): 1963 2017			
Included observations: 55 after adjustments			

Variable	Coefficient	SE	t-statistic	Prob.
D (PLR)	−43.44025	31.47641	−1.380089	0.1740
D (PSC)	0.113685	0.133906	0.848994	0.4001
D (NER)	7.731005	8.115647	0.952605	0.3456
D (Y)	0.000266	4.85E−05	5.491648	0.0000
D (GEXP)	−1.372705	0.449431	−3.054314	0.0037
RESID01 (−1)	−0.328529	0.042241	−7.777397	0.0000
C	−105.2438	122.4860	−0.859232	0.3945
R-squared	0.628045	Mean dependent variable		251.8264
Adjusted R-squared	0.581551	SD dependent variable		1160.853
SE of regression	750.9284	Akaike info criterion		16.19891
Sum squared RESID	27066889	Schwarz criterion		16.45439
Log likelihood	−438.4701	Hannan-Quinn criterion		16.29771
F-statistic	13.50800	Durbin-Watson statistic		1.781594
Prob. (F-statistic)	0.000000			

Table 5: Error correction mechanism (ECM) result for Model 2

Dependent variable: D (INV)			
Method: Least squares			
Date: 11/21/18 Time: 06:24			
Sample (adjusted): 1963 2017			
Included observations: 55 after adjustments			

Variable	Coefficient	SE	t-statistic	Prob.
D (PLR)	−32.12549	38.10953	−0.842978	0.4036
D (PSC)	0.105461	0.138523	0.761323	0.4503
D (NER)	10.08520	8.338598	1.209461	0.2327
D (Y)	0.000283	5.53E−05	5.117793	0.0000
D (GEXP)	−1.409820	0.451750	−3.120799	0.0031
DUM	321.0615	1150.489	0.279065	0.7814
DUMPLR	−30.44248	54.89478	−0.554561	0.5819
RESID01 (−1)	−0.338425	0.043148	−7.843396	0.0000
C	2.447991	153.8546	0.015911	0.9874
R-squared	0.641327	Mean dependent variable		251.8264
Adjusted R-squared	0.578949	SD dependent variable		1160.853
SE of regression	753.2593	Akaike info criterion		16.23528
Sum squared RESID	26100377	Schwarz criterion		16.56375
Log likelihood	−437.4701	Hannan-Quinn criterion		16.36230
F-statistic	10.28132	Durbin-Watson statistic		1.872810
Prob. (F-statistic)	0.000000			

interest rate however, the t-statistic value of interest rate which is −0.84 demonstrates that the negative impact of interest rate on investment in Nigeria is not statistically significant.

Furthermore, we observe that PSC and NER have a positive but insignificant relationship with investment in Nigeria. This simply means that PSC and NER are not significant factors influencing investment decisions in Nigeria. We arrived at this conclusion because their t-statistic values were <2 using the rule of thumb even though their positive coefficients are in line with a priori economic expectation.

National income (Y) is estimated to have a positive significant effect on investment in Nigeria. Its estimated coefficient and t-statistics being 0.0003 and 5.1178 respectively. This finding is consistent with a prior economic expectation which suggests a strong relationship between national income and investment.

The result further revealed that government expenditure (GEXP) has an estimated coefficient of −1.4098. This demonstrates the existence of a negative or indirect relationship between government expenditure and investment in Nigeria. This finding is consistent with crowding out effect of government expenditure on private investment as argued by the monetarist. According to this view, investment is highly sensitive to changes in Interest rate thus increase in government spending increases the level of income which in turn increases the demand for money however given fixed money supply, the increase in the demand for money leads to increase in interest rate which in turn reduces private investment. The estimated t-statistic for GEXP which is −3.12 clearly testifies to the fact that the negative impact of government expenditure on investment is statistically significant.

The intercept (C) indicate the average value of investment in the pre liberalization era after controlling for PLR, PSC, GEXP, Y and NER. The model indicates that holding all variables constant, the average value of investment in the pre liberalization era stands at about 2.45 billion naira.

In order to examine the impact of liberalization policy on investment we consider the coefficient of the variable DUM. Its value of 321.06 implies an average increase in investment of about 321.06 million naira in the post liberalization era. This increase is caused solely by the liberalization policy or other factors associated with liberalization policy that has not been accounted for in the model. Put differently, the coefficient of the dummy variable (DUM) implies that for the same value of PLR, PSC, GEXP, Y and NER average investment increased by about 321.06 million naira in the post liberalization era. However the dummy variable (DUM) is statistically insignificant indicating that the policy had no significant impact on investment in Nigeria for the period under review.

In addition, to determine whether the impact of interest rate on investment remained the same both in the pre liberalization era and in the post liberalization era (whether there was a change in the slope of interest rate with respect to investment as a result of the policy change) we examine the coefficient of the variable DUMPLR.

The effect of interest rate on investment after the policy change is given by (−32.12 ± 30.44 = −62.56). This indicates a more negative relationship after the policy change, hence, inconsistent with financial repression hypothesis which promoted positive interest rates but however agrees with the earlier finding of Owumere et al. (2012).

Although economically large, the variable is statistically insignificant indicating that there is no statistical evidence against the hypothesis that the effect of interest rate on investment is the same in both the pre and post liberalization era.

The ECM lagged value is estimated to be −0.3384. Precisely, this speed of adjustment shows that about 33.84% of errors generated in each period is automatically corrected by the system in the subsequent period. The ECM has the correct sign of negative and it is also statistically significant. The value of the coefficient of determination (R^2) from our regression result is 0.6413. This implies that about 64.13% of the total variations in the dependent variables are accounted by the independent variables employed in the model. Thus, the model can be said to fit the data well.

Furthermore, conducting a test for the statistical stability of the estimated model using F-test showed that the calculated F-statistic value (10.28) is statistically significant since the probability value (0.00) is less than (0.05). Finally, using Durbin Watson statistic to test for the existence or otherwise the presence of autocorrelation reveals that the model is free from the problem of serial autocorrelation. We arrived at this conclusion because the DW* is greater than the DU (i.e. DW* = 1.87 > DU = 1.86).

4.4. Innovation Accounting
In this section we shall present the results of the variance decomposition and impulse response function that will guide the interpretation of the structural responses of investment to changes in interest rate over time.

From the result of the variance decomposition in the Table 6, it is observed that for all the periods, investment responded positively to its own shock. Prime lending rate on the other hand had very little or no contribution to variations in Investment in Nigeria.

Its contribution was about 0.03% in the 2nd year then 1% in the 3rd year before rising to a maximum of about 2% in the 10th year.
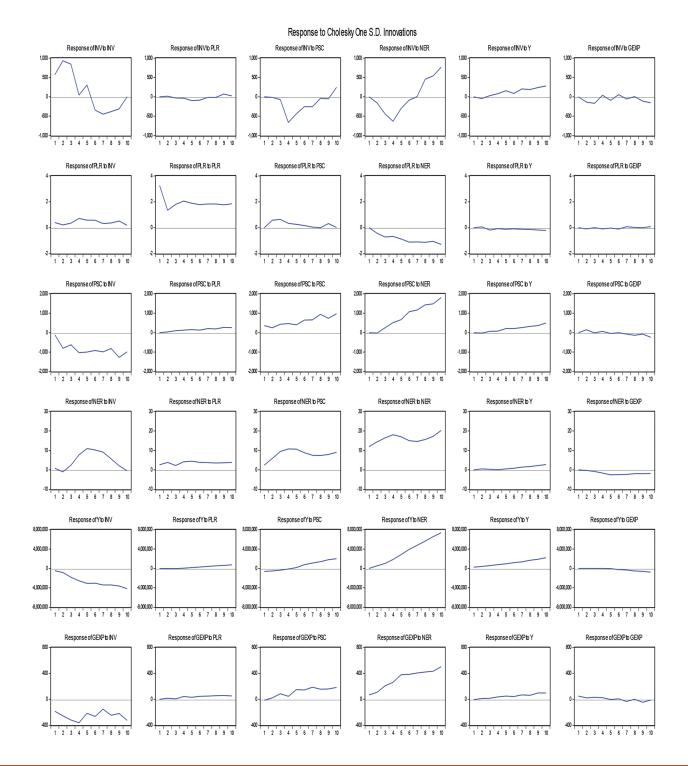
Taking a look at the other variables shows that apart from Investment itself most of the variations in INV can be attributed to changes in national income (Y). At its peak (i.e. 8th period) about 43% of the variations in investment was influenced by national income. In the 10th year period, Y and NER combined accounted for 50% of the variations in Investment.

Furthermore, it was also observed that the contributions of PSC to variations in INV declined over the years. Starting from 15.6% in the second period, it declined gradually over the years until the 10th year when it stood at 7.9%.

Similarly, the above finding is consistent with the impulse response result graph which showed a marginal and statistically insignificant

Table 6: Variance decomposition and impulse response function of INV

Period	SE	INV	PLR	PSC	NER	Y	GEXP
1	512.7975	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	967.9691	44.54261	0.026041	15.65906	2.568384	31.37360	5.830308
3	1081.145	37.24557	1.035089	13.96545	6.860650	34.76139	6.131845
4	1140.789	35.33609	1.167531	13.41367	7.090502	35.32272	7.669491
5	1262.139	38.81195	0.961971	11.31418	6.172302	36.31211	6.427478
6	1551.839	40.80758	0.659365	9.870915	4.096141	39.20799	5.358014
7	1788.206	40.84670	0.636808	8.929014	3.615721	41.77347	4.198286
8	1933.640	38.63913	0.916483	8.806220	4.978131	42.98274	3.677296
9	1982.481	36.80999	1.370691	8.510848	7.728204	41.96746	3.612806
10	2053.239	36.44146	1.829227	7.936974	11.05597	39.22512	3.511250

Response to Cholesky One S.D. Innovations

response of investment to changes in interest rate. The graph showed that there was little or no response from investment to changes in interest rate in the first 6 years with a slight or marginal response in the 7th year which stabilizes thereafter.

Furthermore, the impulse response graph showed a statistically significant response of investment to shocks in national income (Y). Initially it started out from a declining point then gradually increased to shocks in national income until it peaked in the 8th then declined thereafter.

5. CONCLUSION AND RECOMMENDATIONS

This research effort examined the impact of interest rate liberalization on investment in Nigeria form 1961-2017. The summary of the major findings are outlined below:

1. The result of the error correction mechanism in Model one revealed that prime lending rate had a negative but insignificant effect on investment in Nigeria. A Similar result was also obtained in Model two specifically in the pre and post liberalization era. The implication of the finding in Model two is that there exists no differential impact of interest rate on investment in Nigeria during the pre and post liberalization regimes

2. Furthermore, the result of the variance decomposition and impulse response function provided evidence that prime lending rate made very little contribution to the variations in investment in Nigeria

3. The result also revealed that PSC and NER had a positive but insignificant impact on investment in Nigeria both in the first and second model

4. National income on the other hand exerted a positive significant impact on investment in Nigeria

5. Government expenditure had a negative significant impact on investment in Nigeria hence suggesting that increase in government expenditure crowds out investment in Nigeria

6. Finally, the empirical result from our study showed that Liberalization policy which was captured by a dummy variable did not have any significant impact on investment in Nigeria.

5.1. Policy Recommendations

Based on the findings of the study, the following policy recommendations are suggested:

1. Since the empirical findings of our study showed that interest rate liberalization did not significantly influence variations in investment Nigeria, it is therefore recommended that government should not allow interest rate be determined by the forces of demand and supply as the policy of liberalization proposes.

    Government should rather use her monetary policies to influence interest rate in such a way that it will not serve as a disincentive to investment. This is because the high cost of borrowing has been a major source of concern for investors over the years.

2. Consequently, the central bank as part of its monetary policy stance must address the problem of high lending rates by pursuing aggressive monetary policy that would reduce to near

single – digit lending rates in order to stimulate investment growth.

3. Furthermore, government expenditure should be structured and implemented in such a way that it will not crowd out investment but significantly improve the level of investment in the country. One sure way this can be done is by ensuring that more funds are channeled into capital expenditures that will help address the decay in the critical infrastructures of power, roads etc. that supports investment growth.

4. Finally, there is the need for government to implement policies and programmes that will lead to an increase in the level of national income as the empirical findings from our study showed that it had a positive significant impact on investment in Nigeria.

REFERENCES

Agbaeze, E.K., Onwuka, I.O. (2016), Financial liberalization and investments the Nigeria experience. Journal of Research in Economics and International Finance, 3(1), 12-24.

Akinsola, A.A., Odhiambo, N.M. (2017), The impact of financial liberalization on economic growth in sub-Saharan Africa. Cogent Economics and Finance, 5(1), 33-51.

Akpansung, A.O., Waziri, S.E. (2018), Has financial liberalization promoted economic growth in Nigeria? Evidence from auto-regressive distributed lag (ARDL) approach. Asian Economic and Financial Review, 8(2), 172-188.

Asamoah, G.N. (2008), The impact of the financial sector reforms on savings, investment and growth of gross domestic product (GDP) in Ghana. International Business and Economic Research Journal, 7(10), 73-84.

Central Bank of Nigeria, (2011), Statistical Bulletin. Abuja: Central Bank of Nigeria.

Egbetunde, T., Ayinde, O., Balogun, A.A. (2017), Interest rate liberalization, financial development and economic growth in Sub-Saharan African economies. African Journal of Economic Review, 5(2), 20-30.

Ekpo, H.A. (2016), Addressing Stagflation with Sound Macroeconomic Policies. A Paper Presented at the Monetary Policy Technical Committee (MPTC) and Monetary Policy Implementation Committee (MPIC). Maitama, Abuja: Workshop/Retreat, CBN ITI, November 25.

Ekpo, H.A. (2017), The Nigerian Economy: Current Recession and Beyond. Kano: Convocation Lecture Delivered at Bayero University, March 17.

Eregha, P.B. (2010), Interest rate variation and Investment determination in Nigeria. International Business Management Medwell Journals, 4(2), 41-46.

Fry, M.J. (1980), Savings, investment, growth and the cost of financial repression. World Development Review, 8(7), 85-95.

Gujarati, N.D. (2003), Basic Econometrics. 4th ed. New York: McGraw-Hill Education.

Ikhide, S.I., Alawade, A.A. (2001), Financial sector reform, microeconomic instabilityand the order of economic liberalization: The evidence from Nigeria. Nairobi: African Economic Research Consortium Paper, No. 112.

Levine, R., Renelt, D. (1992), A sensitivity analysis of cross-country growth regressions. The American Economic Review, 82(4), 942-963.

Majed, B., Ahmed, I.M. (2010), The impact of interest rate on investment in Jordan: A Co-integration analysis. JKAU: Economic and Administration, 24(1), 199-209.

McKinnon, R.I. (1973), Money and Capital in Economic Development.

Washington, DC: Brooking Institution.

Nnanna, O.J., Englama, A., Odoko, F.O. (2004), Finance, Investment and Growth in Nigeria. Nigeria: Central Bank of Nigeria.

Nwadiubu, A., Ude, S., Onwuka, I. (2014), Financial liberalization and economic growth: The Nigerian experience. European Journal of Business and Management, 6(14), 124-135.

Nzotta, S. (1999), Money, Banking and Finance: Theory and Practice. 1st ed. Owerri: Intercontinental Educational Books and Publishers.

Obamuyi, T.M. (2009), An investigation of the relationship between interest rates and economic growth in Nigeria, (1970-2006). Journal of Economic and International Finance, 1(4), 93-98.

Odhiambo, N.M., Akinboade, O.A. (2009), Interest rate reform and financial deeping in Botswana: An empirical investigation. Economic Note, 38(1-2), 97-116.

Okwuchukwu, O., Ariwa, F.O. (2017), Financial system liberalization, savings, investment and economic growth in Nigeria. International Journal of Economics and Business Management, 3(5), 1-10.

Olubanjo, T.A. (2015), Factors that influence interest rate decision in Nigeria. Understanding in Monetary Policy Series, No 47. Nigeria: Central Bank of Nigeria.

Orji, A., Eigbiremolen, O., Ogbuabor, J.E. (2013), Impact of financial liberalization on private investment: Empirical evidence from Nigerian data. Review of Economics and Finance, 1, 77-86.

Orji, A., Ogbuabar, J.E., Orji, O. (2015), Financial liberalization and economic growth in Nigeria. An empirical evidence. International Journal of Economics and Financial Issues, 5(3), 663-672.

Owumere, J.U.J., Okore, A.O., Imo, G.I. (2012), The Impact of interest rate liberalization on savings and investment: Evidence from Nigeria. Research Journal of Financial and Accounting, 3(10), 130-136.

Owusu, E.L., Odhiambo, N. (2014), Financial liberalization and economic growth in Nigeria: An ARDL bounds testing approach. Journal of Economic Policy Reform, 7(2), 164-177.

Ozdemir, D., Erbil, C. (2008), Does Financial Liberalization Trigger Long-run Economic Growth? Evidence from Turkey and Other Recent EU Members. Berlin: Paper Prepared for the EcoMod International Conference on Policy Modelling, July 2-4.

Shaw, E.S. (1973), Financial Deepening in Economic Development. New York: Oxford University Press.

Ubesie, M. (2016), The effect of financial liberalization on economic growth in Nigeria. International Journal of Finance and Accounting, 5(40), 193-201.