Analysis of Interest Rate Liberalization and Private Domestic Investment in Nigeria

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Abstract
This study analyzed the relationship between interest rate liberalization and private domestic investment in Nigeria. Over the years, private domestic investment has been identified to be one of the engines of economic growth that requires concerted efforts by various governments via monetary authority through the interest rate liberalization in Nigeria. All efforts channeled to reduce the interest rate liberalization to improve private domestic investment remain abortive over the years. Thus, the study therefore examined the effect of interest rate on private domestic investment in Nigeria applied unit root, co-integration test and ordinary least square method. The study employed time series data from Central Bank of Nigeria, Statistical Bulletin and National Bureau of Statistics which spanned from 1980-2014. The unit root test applied to the variables showed that the variables were stationary in the short run and co-integration test confirmed a long run relationship between the variables. The result further confirmed that an inverse relationship existed between interest rate and private domestic investment in the model in Nigeria. The study concluded that private domestic investment was influenced by real interest rate, private domestic saving, inflation rate, real exchange rate and money supply in Nigeria.

Keywords: interest rate liberalization, private domestic investment, private domestic saving and financial liberalization

INTRODUCTION
Following the introduction of the financial liberalization concept in the 1970s, many countries such as Angola, Burundi, Congo, Cote d’Ivoire, Gambia, Ghana, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Zambia, Zimbabwe, India, China, Turkey, etc. have made attempts at liberalizing their financial sectors by deregulating interest rates, eliminating or reducing credit controls, allowing free entry into the banking sector, giving autonomy to commercial banks, permitting private ownership of banks and liberalizing international capital flows. Odhiambo (2009) posits that of these six dimensions of financial liberalization, interest rate liberalization seems to have been the main center of attention.

In the study of Soyibo and Olayiwola (2000), the Nigerian economy witnessed financial repression in the early 1980s. There were rigid exchange and interest rate controls resulting in low direct investment. Funds were inadequate as there was a general lull in the economy. Monetary and credit aggregates moved rather sluggishly. Consequently, there was a persistent pressure on the financial sector, which in turn necessitated a liberalization of the financial system. The Nigerian government deregulated interest rate in 1987 as part of the Structural Adjustment Programme (SAP) policy package introduced in 1986. The official position then was that interest rate liberalization would among other things; enhance the provision of sufficient funds for investors, especially manufacturers, who are considered to be prime agents, and by implication, promoters of economic growth. However, in a dramatic policy reversal, the government in January, 1994 out-rightly introduced some measures of regulation into interest rate management. It was claimed that there were “wide variations and unnecessarily high interest rates” under the complete deregulation of interest rates (CBN, 2010).

The Nigerian financial sector liberalization or reforms began with the deregulation of interest rates in August 1987 (Ikhide and Alawode, 2001). Prior to this period, the financial system, as earlier
stated, operated under financial regulation and interest rates were highly repressed. The resulting low or negative interest rates discourage saving mobilization and channelling of the mobilized savings through the financial system. Proponents of liberalization argue that it keeps interest rate relatively high and competitive, encourages savings mobilization, motivates private investment and engenders economic growth while repression has a negative impact on the quantity and quality of investment and hence economic growth (Obamuyi and Olorunfemi, 2011). The removal of the maximum lending rate ceiling in 1993 saw interest rates rising to unprecedented levels in sympathy with rising inflation rate which rendered banks’ high lending rates negative in real terms. In 1994, direct interest rate controls were restored. As these and other controls introduced in 1994 and 1995 had negative economic effects, total deregulation of interest rates was again adopted in October, 1996 (CBN 2010). The cap on interest rates introduced in 1994 was retained in 1995 with a minor modification to allow for flexibility. The cap stayed in place until it was lifted in October 1996. The lifting remained in force till 1997, thus enabling the pursuit of a flexible interest rate regime in which bank deposit and lending rates were largely determined by the forces of demand and supply for funds (Omole and Falokun, 1999).

Investment strives economic growth and development of any economy. Investment depends upon the rate of interest involved in getting funds from the financial institutions. The behaviour of interest rates, to a large extent, determines the investment activities and dictates the level of economic growth of a country. As stated by Jhingan (2003), if interest rate is high, investment is at low level and when interest rate falls, investment will rise. Therefore, there is need to promote an interest rate regime that will ensure inexpensive spending for investment and consequently enhancing economic growth at low financial cost. The role of interest rate in the determination of investment and hence economic growth in Nigeria has been a matter of controversy over a long period of time. Yet, what constitutes an appropriate interest rate policy still remains to be a puzzling question.

Despite the liberalization efforts of Nigeria, the World Bank report of 2010 noted that 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 of resources. However, Dipo (2008) suggests that private investment in Nigeria within 1970-1995, contributed significantly to the gross domestic product. Although investment typically represents a much smaller component of aggregate demand than consumption, it determines the rate at which physical capital is accumulated. Amongst the components of aggregate demand, Private investment is identified as having more impact on the economy. Consequently, private sector and market led economy have been stressed while de-emphasizing heavy public sector participation in production. In the light of these policy shifts, the Private sector led development has been encouraged in Nigeria (Kalu and James, 2012).

Before the advent of the Structural Adjustment Programme (SAP) in Nigeria in 1986, the financial sector was dominated by static and relatively low interest rates, mandatory sectoral allocation of bank credit and quantitative ceilings on bank credit to the private sector, all of which engendered inefficiencies and distortions. The Pre-SAP period was seen an era of financial repression characterized by the policies of directed credit and interest rate ceiling, believed to have caused imperfections in the operations of the financial market (Akingunola, et al., 2013).

Essentially, private domestic investment has been identified to be one of the engines of economic growth that requires concerted efforts by various governments via monetary authority through the interest rate liberalization in Nigeria. All efforts channeled to reduce the interest rate liberalization to improve private domestic investment remain abortive over the years. Furthermore, other studies such as Baliamoune-Lutz (2007) and Demir (2008) found that increasing rates of return gap and uncertainty have an economically and statistically significant fixed investment reducing effect while the opposite is true with respect to financial investments. In contrast, Fowowe (2011), econometric estimations results show that financial sector reforms (measured by the index) have had a positive effect on private investment in the selected countries, thus offering support to the financial liberalization hypothesis. Again, Kalu and James (2012) results show that manufacturing output significantly responds to the contemporaneous perturbation in the values of nominal exchange rate, policy lending rate and the corporate income tax. These series also show a high tendency of recovery
from the deviation from their equilibrium values in subsequent periods. However, the theoretical and empirical arguments on the relationship between interest rate liberalization, otherwise known as financial liberalization and private investment are still inconclusive. Hence, this study stands a chance to settle the controversy among the scholars.

To this end, the objective of the study is to determine the effects of interest rate, private domestic investment, inflation rate, real exchange rate, money supply on private domestic investment in Nigeria. Specifically, this study will examine the relationship between explanatory and response variables in the model. The paper is divided into five sections. Section one is the introduction. Section two is a review of related literature. Section three presents our methodology. Section four contains the empirical analysis while section five shows our conclusion and recommendation.

LITERATURE REVIEW

Adebiyi (2002) defines interest rate as the return or yield on equity or opportunity cost of deferring current consumption into the future. Some examples of interest rate include the saving rate, lending rate, and the discount rate. Professor Lerner, in Jhingan (2003), defines interest as the price which equates the supply of ‘Credit’ or savings plus the net increase in the amount of money in the period, to the demand for credit or investment plus net ‘hoarding’ in the period. This definition implies that an interest rate is the price of credit which like other price is determined by the forces of demand and supply; in this case, the demand and supply of loadable funds. Interest rate on the other hand is the price paid for the use of money. It is the opportunity cost of borrowing money from a lender to finance investment project. 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, and market imperfections in an economy, among others.

Studies on financial sector reforms and private investment outcomes have become a prominent feature of recent empirical endeavors (Guzici 2007; Fowoye 2011 and Asare 2013). The seminal works of McKinnon (1973) and Shaw (1973) actually gave birth to the modern economic analysis of financial liberalization and financial policy in developing countries as we have it today. As opined by Williamson (1998), both authors drew attention to the widespread "financial repression" in developing countries. Agenor and Montiel (1996) argue that financial repression describes an environment where the financial system is repressed or marginalized by series of government interventions that have the effect of keeping interest rates that domestic banks offer to savers very low and sometimes negative. This low interest rate discourages savings, makes investment unattainable and economic growth becomes elusive. Shane (2013) and Achy (2005) equally contend under the financial repression regime, the monetary authorities impose high reserve requirements, bank-specific credit ceilings and selective credit allocation, mandatory holding of treasury bills and bonds issued by the government, and finally a non-competitive and segmented financial system. Since financial repression has been most commonly associated with government fixing of interest rates and its adverse consequences on the financial sector as well as on the economy, financial liberalization, in turn, has come to be most commonly associated with freeing of interest rates. This approach to financial liberalization is pretty much the old view. We now understand financial liberalization as a process involving a much broader set of measures geared toward the elimination of various restrictions on the financial sector, such as the removal of portfolio restrictions on the banking sector, the reform of the external sector, as well as changes in the institutional framework of monetary policy (Murat, 1998).

Also, the term financial liberalization is used to cover a whole set of measures, such as the autonomy of the Central Bank from the government; the complete freedom of finance to move into and out of the economy, which implies the full convertibility of the currency; the abandonment of all "priority sector" lending targets; an end to government-imposed differential interest rate schemes; a freeing of interest rates; the complete freedom of banks to pursue profits unhindered by government directives; the removal of restrictions on the ownership of banks, which means de-nationalization, full freedom for foreign ownership, and an end to "voting caps"; and so on (Patnaik, 2011). In addition, financial liberalization the removal or loosening of restrictions imposed by the government on the
domestic financial market (Sulaiman, Oke and Azeez, 2012; and Agu, Orji and Eigbiremolen, 2014). It encompasses those policies aimed at freeing up financially-repressed economies from the effects of such growth-retarding financial policies like ceilings on interest rates, directed credit to priority sectors, and a small number of banks which are mainly government owned and very inefficient (Fowowe, 2011, Murat 1998). Also, Private Investment on the other hand is an investment made by businesses, institutions or investors rather than the government. In others words, private investment refers all other kinds of investment outside that made by the government.

A number of studies have been conducted to empirically examine the relationship between interest rate liberalization (financial system) and private domestic investment. There seems to be disagreement among the scholars’ across the globe, especially developing countries. Orji, et al (2013) examined the nature of the relationship between financial liberalization and private investment in Nigeria from 1970 to 2012. The regression analysis reveals that financial liberalization; peroxide by real interest rate (RINTR) has a statistically significant positive impact on private investment. Furthermore, the Chow-test result shows that there was a structural break between financial liberalization and private investment in Nigeria within the period under review. This change in relationship can be attributed to the Structural Adjustment Program (SAP) embarked upon by the Nigerian government in 1986 which liberated the financial sector from acute repression. In addition, the Granger causality test shows that although there was dependence between financial liberalization and private investment, none caused the other. This study therefore concludes that private investment which is enhanced by private savings, financial liberalization and other key variables, is fundamental in the achievement of sustainable economic growth and development.

Galindo, et al (2003) in another study, used firm level panel data from twelve developing countries to examine whether financial liberalization improved the efficiency with which investment funds are allocated to competing uses. They developed a summary index of the efficiency of investment allocation that measures whether, and to which extent, investment funds are going to firms with a higher marginal return to capital. They then examine the relationship between this index and various measures of financial liberalization. The results suggest that in the majority of cases financial reform has led to an increase in the efficiency with which investment funds are allocated.

Fowowe (2011) conducted an empirical investigation of financial sector reforms on private investment in selected Sub-Saharan African countries. He developed an index which was used to track the gradual progress made with implementation of the phases of the reforms. The results of econometric estimations show that financial sector reforms (measured by the index) have had a positive effect on private investment in the selected countries, thus offering support to the financial liberalization hypothesis.

Arbeláez and Echavarría (2002) evaluated the degree to which Colombian firms face credit restrictions that alter their investment decisions. The study analyzes whether the evolution of the financial sector during the 1990s, characterized by an intense financial liberalization, an increase in size and a deepening of the activity, reduced the credit restrictions faced by firms and stimulated investment. It also explores whether, on the contrary, financial restrictions intensified during the recent 1998-2000 crisis. The study provides empirical evidence suggesting that Colombian firms are indeed restricted by external resources and are compelled to resort to internal resources. It also demonstrates that financial liberalization and the greater credit availability reduced such restrictions, and that the financial crisis had a strong and negative effect on investment and its financing.

Chetty (2004) showed that the investment demand curve is always a backward-bending function of the interest rate in a model with non-convex adjustment costs and the potential to lend. At low interest rates, an increase in the rate of return raises the cost of lending and increase aggregate investment by enlarging the set of firms for whom the interest rate exceeds the to delay. An increase in interest rate is more likely to stimulate investment when the potential to lend is larger and in short run rather than the long run. De-Long and summers (1993) showed a positive correlation between total factor productivity growth and the ratio of investment in equipment to GDP. However, in spite of all these studies, economic implication of interest rate on determination of domestic investment in Nigeria
has not received much attention. It is a matter of controversy as to whether the economic implication of interest rate on investment is positive or negative.

In a study by Guimraes and Untererberdoester (2006) examined the relationship between real output, growth and investment is analyzed particularly in Malays after an unprecedented fall in the wake of Asian crises. The study found out that the impact of real growth on investment is positive and highly significant in the long run indicating that a one percent increase in real growth will bring about on the average two to four percent increase in investment. Apart from growth, the results do not clearly support that real interest rate has a negative short run impact on the growth of private investment. Also, Bazoumana (2004) analyzed the determinants of private investment in general. He found a significant relationship between private investment and its explanatory variables. Public infrastructure investment was found to be positively related with private investment GDP, credit to the private sectors and terms of trade has a significant negative impact on private investment.

Furthermore, Khat and Bathia (1993) used non-parametric method in his study of the relationship between interest rate and other macro-economic variables, including savings and investment. In his study, he grouped sixty-four (64) countries including Nigeria into three based on their level of interest rate. He then computed economic rate among which were gross savings, income and investment for countries. Applying the Mann-Whitney test, he found that the impact of real interest rate was not significant for the three groups. However, his study was criticized by Balassa (1999) that a relationship has been established by the use of regression analysis.

Obamuyi (2009) investigated the relationship between interest rate and economic growth in Nigeria. The study employed co-integration and error correction modeling techniques and revealed that lending rate has significant effect on economic growth. The study then postulated that investment friendly interest rate policies necessary for promoting economic growth needs to be formulated and properly implemented. In addition, Osterbaan (2010) examined the relationship between the annual economic growth rate and real rate of interest. The study employed the Ordinary Least Square method of econometric analysis. The finding revealed that the relationship between the real rate of interest and economic growth might be an inverted U-curve. Also, Ritteinbury (1991) found that too high interest rates were detrimental to investment and growth. The virtues of low interest rates are: it will increase borrowing; reduce inflation; increase job opportunities and stimulate national economy. Furthermore, Albu (2008) examined trends in 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, the study found that behavior of the national economic system and interest rate investment relationship trend to converge to those demonstrated in the normal market economy.

The empirical correlation between investment and growth has been explored in some depth: Lerine and Renet (1992) investigated investment and economic growth using regression analysis and found that investment has significant effect on economic growth. In addition, the study by Kalu and James (2012) analyzed the determinants of private Investment in Nigeria's manufacturing sector for 1970-2010. The study adopted the Vector Error Correction Model approach, estimated using the Ordinary Least Square estimator. The results show that manufacturing output significantly responds to the contemporaneous perturbation in the values of nominal exchange rate, policy lending rate and the corporate income tax. These series also show a high tendency of recovery from the deviation from their equilibrium values in subsequent periods.

Ugwuegbe, et al (2013) investigated the impact of investment on economic growth in Nigeria using the ordinary least square method. Their result was in line with the findings of Bakare (2011), Orji and Mba (2010) that high inflation rate and interest rate has a negative impact on economic growth in Nigeria. The result further showed a long run relationship between economic growth and private investment in Nigeria.

A number of studies have been conducted to empirically investigate the relationship between interest rate and private domestic investment across the globe. There seems to be a controversy among the scholars especially in developing countries. Shane (2013) and Achy (2005) contend that financial repression (fixing of interest) by the government on the financial sector always give adverse consequences on the economy. Meanwhile, financial liberalization in turn, has come to be most
commonly associated with freeing of interest rates. Others studies (Fowowe, 2011, Galindo, et al 2003, Orji, et al, 2013, Guimraes and Unterberdoester, 2006) found that interest rate liberalization positively impacts private domestic investment, while Arbelaez and Echavarria, 2002; Chetty, 2004 stated that an inverse relationship existed. Moreso, Bakare, 2011; Ugwuegbe, et al 2013; Orji and Mba 2010 foundd that high interest rate has an inverse relationship on economic growth, though, private domestic investment not included in the variable studied. Whereas, the study of Demir (2008) shown an inconclusive results. In spite of all these studies, economic implication of interest rate on private domestic investment in Nigeria has not received much attention. However, it is a matter of controversy as to whether the economic implication of interest rate on investment is positive or negative. Hence, this study fills this gap and provides clearer understanding about the subject matter.

METHODOLOGY
This section addresses the issues that relate to the methodology of the study with emphasis being laid on the choice of the research design, population of the study, types and sources of data collected the data processing and the parameters to be estimated. This section also specifies the model designed to test hypothesis of the study, as well as, a-priori proposition of the estimated model.

Research Design and Strategy
Research design is the structure and strategy for examining the relationship between the variables of the study. The research design adopted for this study is the experimental research design. The main reason is that experimental research design combines the theoretical consideration with empirical observation. It enables us therefore to examine the effects of independent variables on the response variable.

Population of the Study
This study covered the years 1980–2014 which is a period of thirty-four (34) years. This period is believed to be long enough to capture the both short and long-run relationship between interest rate liberalization and private domestic investment in Nigeria.

Types and Source of Data Collection
The data to be used for the study are entirely time series secondary data. The data would be derived from various issues of publications from Central Bank of Nigeria, and National Bureau of Statistics (NBS).

The Model
To examine the empirical analysis of interest rate liberalization on private domestic investment in Nigeria. This study adopted Orji, et al (2013) model with little modification. According to them, private domestic investment is influenced by real interest rate, private domestic savings and inflation rate and this is mathematically written as:

\[ PDI = F (RINTR, PDS, INF) \]  \hspace{1cm} (1)

Where, RINTR, PDS and INF represent real interest rate, private domestic savings and inflation rate respectively.

In order to have deep insight of interest rate liberalization and private domestic investment in Nigeria; the model is modified in order to grasp the relevance of this specification to the objective proposed in this study, we incorporate exchange rate and money supply that influenced private domestic investment. In support, Ajide and Lawanson (2012) result showed that exchange rate, money supply and real interest rate have significant effect on domestic private investment in Nigeria. Thus, this model is modified and written as:

\[ PDI = F (RINTR, PDS, INF, REER, MSR) \]  \hspace{1cm} (2)

The equation (2) is econometrically demonstrated below:

\[ \ln PDI = a_0 + a_1 \ln RINTR + a_2 \ln PDS + a_3 \ln INF + a_4 \ln REER + a_5 \ln MSR + U \]  \hspace{1cm} (3)

Equation (3) is estimated in the course of this paper thus:

Where:

- \( \ln PDI \) = private domestic investment in log
- \( \ln RINTR \) = real interest rate in log
- \( \ln PDS \) = private domestic savings in log
A priori economic model is about the sign and the size of the parameters of the function. This gives us the theoretical criteria that form the basis for which the results of the OLS regressions models can be evaluated. Thus, the parameters are expected to appear as respectively: 
\( \alpha_1 < 0; \alpha_2 > 0; \alpha_3 < 0; \alpha_4 > 0 \) and \( \alpha_5 > 0 \)

**A-priori Expectation and Proposition of the Estimated Model**

Holding other things equal, interest rate liberalization is the efficiency parameter that to a large extent; theoretically determine private domestic investment in the model. Thus, interest rate liberalization is expected to have an inverse effect on private domestic investment.

Again, economic theory suggests an increase in private domestic savings is expected to result in a greater amount of private domestic investment to be undertaken, thus a direct relationship is hypothesized. More so, the inflation which acts as a surrogate for macroeconomic instability is expected to bear a negative relationship with private domestic investment. High and volatile inflationary trends tend to increase uncertainty level thus adversely affect private investment. Hence, negative relationship is expected in the model. Furthermore, the effect of real exchange rate is ambiguous from the theoretical point of view; direct relationship is expected between private domestic investment and real exchange rate in the model. Finally, it is also expected to have positive relationship between money supply and private domestic investment in the model. For example, an increase in money supply through the monetary authority (CBN) expected to improve economic activities thereby lead to increase in private domestic investment cetera paribus in the model.

**Analytical Technique**

In this paper, our empirical study comprises of three main steps. First, the Phillips-Perron (PP) tests of stationarity (1988). Second, the Johansen test of co-integration (1991) and third, the ordinary least square approach is used to examine the variables. The empirical study uses a simulation approach to determine the theoretical relationship between interest rate liberalization and private domestic investment of the Nigerian economy. The secondary data were processed using E-view for windows econometric packages. The E-view is preferred to SSPS because it helps us to correct the serial correlation in the data estimated. The study employs Error Correction Mechanism (ECM) to overcome the problem of spurious regression. The ECM reveals that the change on a variable, at times, is not only dependent on the variable, but also on its own lagged changes. This helps us to induce flexibility by explaining the short run and long run dynamics in a unified manner in the estimated model for the period of 1980-2014 in Nigeria.

**DATA ANALYSIS, RESULTS AND DISCUSSIONS**

**4.1 Stationarity and co integration Test Approach**

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF Test Statistic</th>
<th>5% Critical Value</th>
<th>Order of integration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>InPDI</td>
<td>-3.232202</td>
<td>-2.9527</td>
<td>1(0)</td>
<td>S</td>
</tr>
<tr>
<td>InRINTR</td>
<td>-5.423817</td>
<td>-2.9558</td>
<td>1(1)</td>
<td>S</td>
</tr>
<tr>
<td>InPDS</td>
<td>-3.425098</td>
<td>-2.9527</td>
<td>1(0)</td>
<td>S</td>
</tr>
<tr>
<td>InINF</td>
<td>-3.144135</td>
<td>-2.9527</td>
<td>1(0)</td>
<td>S</td>
</tr>
<tr>
<td>InREER</td>
<td>-4.912801</td>
<td>-2.9558</td>
<td>1(1)</td>
<td>S</td>
</tr>
<tr>
<td>InMSR</td>
<td>-3.819143</td>
<td>-2.9527</td>
<td>1(0)</td>
<td>S</td>
</tr>
</tbody>
</table>

**Source:** Researcher’s Computation, 2015.

The unit root test approach in the Table 4.1 showed that some the variables considered were stationary at levels; i.e. 1(0) at significance. For instance, the unit root test confirmed that private domestic
investment, private domestic saving, inflation rate and money supply were found to be stationary at level whereas only real interest rate and real exchange rate were stationary at 1\textsuperscript{st} difference, i.e. 1 (1) at 5\% significance level. This can be seen by comparing the test statistics (in absolute terms) of both the ADF test statistics with the critical values (also in absolute terms) at the 5\% level of significance. This implies that the estimated variables established short run equilibrium relationship in the model and such; they are good variables in analyzed private domestic investment in short run in Nigeria.

**Co-integration Test**

The Johansen co-integration test is applied to examine whether the regression residual are co-integrated. That is, to test whether a long run relationship exists among the variables in the model. Johansen Co-integration test will be conducted through Likelihood Ratio statistic by comparing their values with the critical values at 5\% level. If the values of the Likelihood Ratio are greater than the critical values, then, we conclude that there is a long run equilibrium relationship; otherwise, the regression residual are not co-integrated.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Likelihood Ratio</th>
<th>5% Critical Value</th>
<th>Hypothesized no of CE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>InPDI</td>
<td>15.5200</td>
<td>94.15</td>
<td>None **</td>
</tr>
<tr>
<td>InRINTR</td>
<td>60.97892</td>
<td>68.52</td>
<td>At most 1 **</td>
</tr>
<tr>
<td>InPDS</td>
<td>53.73747</td>
<td>47.21</td>
<td>At most 2 **</td>
</tr>
<tr>
<td>InINF</td>
<td>12.99975</td>
<td>29.68</td>
<td>At most 3</td>
</tr>
<tr>
<td>InREER</td>
<td>17.613471</td>
<td>15.41</td>
<td>At most 4 **</td>
</tr>
<tr>
<td>InMSR</td>
<td>5.242779</td>
<td>3.76</td>
<td>At most 5 **</td>
</tr>
</tbody>
</table>


*(***) denotes rejection of the hypothesis at 5 percent (\%) significance level. Long run (L.R) test indicates 4 co-integrating equation(s) at 5\% significance level. The Johansen co-integration test provides evidence to conclude that there is long run equilibrium relationship between the variables in the model in Nigeria; since the some of the values of likelihood ratio were greater than some of the critical values at 5\% level of significance. Hence, the variables were co-integrated in the model. This simply implied that the explanatory variables have significant effect on private domestic investment in the model for the period of 1980-2014 in Nigeria. See Table 4.2.

**Table 4.3: Empirical Result of OLS Method**

Dependent Variable: InPDI
Method: Least Squares
Sample(adjusted): 1982 2014
Included observations: 33 after adjusting endpoints
Convergence achieved after 38 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>37.95363</td>
<td>4.513264</td>
<td>8.409352</td>
<td>0.0000</td>
</tr>
<tr>
<td>InRINTR</td>
<td>-0.734097</td>
<td>0.158268</td>
<td>-4.638316</td>
<td>0.0002</td>
</tr>
<tr>
<td>InRINTR(-1)</td>
<td>-1.830699</td>
<td>1.722144</td>
<td>-1.063034</td>
<td>0.4472</td>
</tr>
<tr>
<td>InPDS</td>
<td>0.312758</td>
<td>0.083831</td>
<td>3.730815</td>
<td>0.0065</td>
</tr>
<tr>
<td>InINF</td>
<td>-0.643673</td>
<td>0.531985</td>
<td>-1.209946</td>
<td>0.2381</td>
</tr>
<tr>
<td>InREER</td>
<td>0.881008</td>
<td>0.190561</td>
<td>4.623234</td>
<td>0.0070</td>
</tr>
<tr>
<td>InMSR</td>
<td>-0.654892</td>
<td>0.228699</td>
<td>-2.863554</td>
<td>0.0335</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.124378</td>
<td>0.082341</td>
<td>-1.510523</td>
<td>0.6635</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.680594</td>
<td>0.264291</td>
<td>2.575169</td>
<td>0.0815</td>
</tr>
</tbody>
</table>

R-squared 0.884421 Mean dependent var 33.84182
Adjusted R-squared 0.865895 S.D. dependent var 37.86400
S.E. of regression 36.98490 Akaike info criterion 10.28590
Sum squared resid 32.82919 Schwarz criterion 10.69404
Log likelihood -160.7173 F-statistic 11.92412
Table 4.3 shows that, the coefficient of InRINTR reveals an inverse (-0.734097) on InPDI in the short run and it is statistically significant in the model. This simply implies that a unit per cent increases in InRINTR will bring about 73% decrease in InPDI; this result is consistent with our a-priori proposition and corroborates with Anyanwu (1997) which stated that there is negative relationship between RINTR and PDI; and also maintained negative sign when lagged once. Similarly, holding other variables constant, positive relationship exists between InPDS and InPDI in the model and it is statistically significant at 5% level. This implies that a unit % increase in InPDS will bring about 31%. This result is in agreement with expectation and Orji, et al (2013), Fowowe (2011), Galindo et al (2003) and Bazoumana (2004) found that interest rate liberalization and private domestic savings have significant effect on private domestic investment. Furthermore, the coefficient of inflation rate is negative in the estimated model. This means that there exists a negative relationship between InINF and InPDI in Nigeria. It shows that a unit percent increase in InINF leads to about 64% decrease in PDI in Nigeria. The finding is in agreement with Bakare (2011), Orji and Mba (2010) that inflation rate and interest rate has an inverse impact on economic growth. In the same vein, the finding shows that direct relationship exists between REER and PDI and it is significant in the model. The result reveals that a unit present increase in REER lead to about 88% increase in PDI in the estimated. This is result is in consonant with Ajide and Lawanson (2012) found that exchange rate, public investment, real GDP, real interest rate, credit to the private sector, terms of trade and external debts are the key long run determinants of domestic private investment in Nigeria. Conclusively, the coefficient of InMSR reveals negative sign (-0.654892) on InPDI. The empirical result shows that a unit % increase in InMSR will bring about 65% decrease in PDI in the model. However, if all the explanatory variables are excluded from the model, the value of the constant value is at 37.95363 positive. This implies that, the intercept value (b0) is still positive in the model.

The Table VI, when compared half of each coefficient with its standard error, it was found that some of the standard errors are less than half of the values of the coefficients of the variables. Hence, the variable is statistically significant and reliable in influenced the InPDI at 5% significant level while InINF is not statistically significant and reliable using standard error test. This means that the explanatory variables to which these estimates-β1, β2, β3 and β4 relates, that is, InRINTR, InPDS, InREER and InMSR influenced InPDI in the model. For t-test approach, it can be seen that the same conclusion was reached with the t-test. In nutshell, since the estimated t-test value is greater than that of theoretical values of t-test (critical values for the estimated β0, β1, β2, β3 and β4). Then, one can conclude that there is significant relationship between InRINTR, InPDS, InINF, InREER, InMSR and InPDI in the model. But the null hypothesis which states that there is no significant relationship between real interest rate and InPDI is rejected and accept alternative hypothesis in the model.

**Error Correction Model**

The lagged error correction term ECM (-1) included in this model to capture the long run dynamics between the co-integrating series is correctly signed (negative) in the estimated model. The coefficient indicates adjustment of 12% from actual changes in the previous year. This adjustment implies that errors are corrected within one year/lesser than one year. The ECM also reveals a long-run relationship between examined variables in the model in Nigeria. Furthermore, first order autoregressive or AR (1) conducted shows that the variables considered highly influenced private domestic investment in Nigeria.

**Test for the goodness of the model (Coefficient of Determination (R²) using Adjusted R²**

The adjusted R² shows the predictor power of a model and it is derived to be 0.865895. This implies independent variables (InRINTR, InPDS, InINF, InREER and InMSR) explained about 87% systematic variation on response variable (PDI) whereas the random or stochastic term accounts for the remaining 13% variation in InPDI exogenous the model.

**Test for overall significant of the model using F-test**
This shows the overall significance of the regression model estimated. From the OLS result, the calculated value of the F-test is 11.92412, while the theoretical value at 5 per cent level of significance is 2.92. Since the F-statistic exceeds the theoretical value that is, 12 > 2.92. This implied that the estimated model is statistically significant for the period of 1980-2014 in Nigeria.

Test for Autocorrelation Using Durbin-Watson Test

This is used in detecting the presence of auto-correction. Since the Durbin-Watson statistic is approximately close to 2, i.e. 1.768523, then, we conclude that there is absence of auto-correction in the estimated model. To confirm this, we compare the Durbin-Watson statistic from the regression residual with their transforms (\(d_u\)) and (\(-d_u\)). From the Durbin-Watson table, with 5% level of significance, n is 34 observations, and k = 6, i.e. (34-6 = 28). Thus, we compare the calculated (\(d^*\)) with the critical value at 5% level (0.05). This shows that the variables considered influenced private domestic investment in Nigeria.

SUMMARY, CONCLUSION AND POLICY IMPLICATION

This study analyzed the relationship between interest rate liberalization and private domestic investment in Nigeria which spanned from 1980 to 2014. The study employed stationary, co-integration test and ordinary least square method approach. The result reveals that there is short run and long run relationship exists between the considered variables in the model. Furthermore, it was also discovered that there is direct relationship between PSD, REER and PDI; whereas an inverse relationship existed between RINTR, INF, MSR and PDI in the model. Furthermore, the low interest rate market would imply free movement in the economy’s cost of capital and returns on financial investment. This would encourage industrial investments in private domestic investment for economic desirable over time. In conclusion, the study therefore suggested that emerges from the study is the need for Nigerian policy makers to pay more attention to the interest rate reform policy for the improvement of private domestic investment in Nigeria. Nevertheless, monetary authority (CBN) should also implement a well defined policy or conducive policy geared towards stabilization of interest rate that will enhance private domestic investors into the Country. On a more serious note, more emphasis should be placed on the fluctuation of interest rate, as this will facilitate private domestic investment through interest rate liberalization in Nigeria.

REFERENCES