REAL INTEREST RATE AND PRIVATE CONSUMPTION EXPENDITURE: EMPIRICAL EVIDENCE FROM SELECTED COUNTRIES IN AFRICA (1980 - 2018)

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Abstract
This study examines the trajectory of consumption series in the five selected countries in Africa and determines the size of the effects of real interest rate on private consumption in the selected countries. The study intends to find out whether macroeconomic variables significantly affect private consumption more than interest rate between the period of 1980 and 2018. The data were sourced from the World Bank development indicators on interest rate, money supply, and banking sector credit to the private sector, etcetera. The Generalized Moment Method was used to examine the effects of interest rate on private consumption expenditure in Africa. Findings from the study revealed that interest rate significantly affects private consumption in Africa and specifically, the results showed that bank credit to private sector has significant negative effect on private consumption expenditure in Africa. Moreover, that bank credit to private sector co-integrates with private consumption expenditure both in the long and short-run in Africa. The study therefore recommends the need for the government to provide enabling environment for the private sector and since credits granted to private sector by the commercial banks enhances the level of consumption, it is necessary for the government to embark on policies that are welfare enhancing for the private sector.

Keywords: Private Consumption, Real Interest Rate, Money Supply, Five Selected African Countries.

Introduction
Interest rate as the name implies is defined according to Iyoha (2017) as the rental payments for the use of the credit by borrowers to lenders of loanable funds for parting with liquidity. In the word of Alimi (2013), interest rate is the price paid for acquiring credit from financial market (lending rate) the return paid to the provider of financial resources (saving rate) for foregoing that funds which could have been utilized for current consumption. Consumption on its own have been acknowledged as an expenditure of households on goods and services such as clothing, food items, entertainment, health services and acquisition of assets among others (see Mauren, Kamau and Kiptui (2018). Originally, consumption function was pioneered and formulated by Keynes (1936) in his psychological law which states that men are disposed on the average to increase but not by much as the increase in their income. This law is regarded as the absolute income
hypothesis. The relationship between interest rate and consumption has been conceived from two strands of Literature vise-visa the Monetarist school of thought and the Keynesian school of thought.

The Monetarist was of the view that a general decrease in money supply leads to a decrease in demand, thereby causing interest to increase. However, a variant opinion was that an expansion of money will lead to excess demand and in turn decrease interest rates. When this happens, consumption will increase as the household tends to decrease their deposits with the financial institutions. The view of Keynes may not be efficient in developing countries like Nigeria due to non-efficient functioning of the money and credit institutions. It is worth to note that the effectiveness of monetary policy always depend on the adjustment response of the Central-Bank short term interest rate on the real interest rate charged by commercial banks and ultimately on macro-economic indicators of investment and consumption in the economy (Ogundipe, 2017).

Indeed, changes in consumption due to non-stationary of interest rate (volatility of exchange rate is precarious in Nigeria owning to wide gap between the lending rate and the saving rate and this has been on the continuous over the years. The significance difference between the lending rate and saving rate is called interest spreads. This has been a constraint to efficient financial intermediation because many depositors are moving away from pairing with liquidity to the banks (Awoyemi, Owuru, & Ibikunle, 2014). Various factors have been influencing interest rate in Africa. These factors include taxes, the risk of investment, inflationary expectations, liquidity preference, market imperfections and a host of others. All these factors affect interest rate and as a result cause instability in the level of consumption. This leads to probability of inter temporal consumption paths in which household postpone consumption in the current period to future time depending on the magnitude of the discount factors (time preferences) and the interest rates that the household expects in the future.

Against this background, this study therefore deviates from the existing Literature that focus more on the linkage between interest rate and investment rather than consumption by attempting to examine the trajectory of consumption series in the five selected countries in Africa and also to determine the size of the effects of real interest on consumption in the selected countries in Africa. The study intends to find out whether macroeconomic variables significantly affect private consumption more than interest rate in the selected countries in Africa.

The rest of this paper is structured as follows. Following the introduction is the selected existing literature in section two. Section three discusses the stylized facts on the interest rate and private consumption in the selected countries in Africa. Section four presents the data, panel data regression, analysis and interprets the results. Section five of the study summarizes the findings, concludes and gives recommendations and policy implications as well as suggestions for further studies.

**Literature Review**

The level of consumption may be interpreted as the result of a decision-making process of households over the time structure of the allocation of their income. Consumption expenditures are often discussed or analyzed within two areas, namely; (a) Consumption expenditures made by the final household- that is, purchases made of goods and services made by end user and (b) Consumption expenditures made by firms (or production unit), that is, expenditures made by producers on basic inputs which are turned around (manufactured) and offer for sale to final consumers or intermediate users. The classical economists were the first to point out the relation between interest rate and consumption. They held that the rate of interest is an important factor influencing the consumption and saving. This view is based on the observation that people prefer present goods to future goods. People save for future only when they have high prospects for future consumption. It is the rate of interest earned on savings which determines the prospects of future income and consumption: the higher the rate of interest, the higher the future income and consumption.
prospects, prices remaining stable at equilibrium. Therefore, at high rates of interest, the households tend to save more and consume less. This forms the basis of the classical theory of interest.

Keynes (1936) thought that income is the primary determinant of consumption and that interest rate does not have important role. This conjecture stood in stark contrast to the beliefs of the classical economists who preceded him who believed that high interest rates encourages savings and discourages consumption. The detailed empirical evidence has been provided on the linkage between investment and consumption but less on the linkage between interest rate and consumption in Africa. Notable among those studies are (Mankow, 2014, Mishri, 2011, Gusai, 2014, Apere, 2014, Alice, 2013) among others. However, the linkage between interest rate and consumption remained under explored in the literature. In a study conducted by Kweka and Morrisey (2016) on the impact of economic growth on consumption expenditure using Granger causality test on time series data but found no evidence on the impact of growth on consumption expenditure. In another study conducted by Forgha, (2018) in Cameroun on formulation of econometric model of consumption and savings function from the period 1970 to 2007 by using a co-integration error correction method.

The study discovered that the disposable income, the general price level, expected inflation, interest rate and dependency ratio impacted positively on private consumption expenditure and that interest- inflation rate differential has a negative impact on savings. The speed of adjustment was found to 48.2% and that savings was 36.2%. A similar study was conducted Alice (2017), on the relationship between total consumption expenditure and total income of a household from the period 1992 to 2011. Using Keynes absolute income hypothesis with the method of the ordinary least square, it was discovered that consumption is positively influenced by the total income of the household which conform with the Keynes absolute income hypothesis. Mishra (2015) examined the linkage between consumption expenditure and economic growth in Nigeria from the period of 1950 to 2008 by adopting a co-integration test and error correction model. It was discovered that there exists a uni-directional causality relationship from per-capita expenditure to economic growth in the long run but found no causality in the short run.

Sakib (2018) investigated his linkage between consumption expenditure and economic growth for Bangladesh from the period 1976 to 2009. He used Johansen and Autoregressive Distributed Lag model of co-integration tests. It was discovered that there is no co-integration tests between consumption expenditure and economic growth in the long run.

In another study by Guisan (2014) in Mexico from the period 1980 to 2012, modified Granger causality was adopted but the results revealed the presence of causality relationship between real consumption and real GDP. Similar study conducted by Uwiyaren (2017) in Nigeria from 1981 to 2010 on the determinants of consumption. It was discovered that consumption is a function of current and permanent income. This corroborates Friedman’s Permanent Income Hypothesis. Akekere and Youso (2010) examined the impact of change in Gross expenditure in Nigeria on consumption. It was discovered that the Gross domestic product impacted positively on private consumption from the period 1981 to 2014. Chioma (2016) examined the linkage between gross domestic product and personal consumption expenditure using ordinary least square in Nigeria from 1994 to 2007. It was discovered that an increase in gross domestic product has no significant influence on private consumption expenditure in Nigeria during the period of the study. Having reviewed the literature so far, it was discovered that the existing literature concentrates more on the linkage between consumption expenditure and economic growth but ignore the linkage that might have existed between interest rate and private consumption expenditure. This study is to fill the gap.

Stylized Fact on Real Interest Rate and Consumption Expenditure in Five Selected Countries in Africa

In figure 1, the movement of real interest rates in Nigeria indicates swings. Recording a negative between 1980-1983, 1985-1986, it experienced highest peaks in years 1989, 2000, and 2006 between 2013 to 2018, it has been stable. As for Egypt, it has been ups and downwards swings in real interest rates in Egypt.
With highest value of about 18.00 in 1981, the rates hoofed around 5 and 12 per cent between 1992-2006 and thereafter it took a nose-dive instability. In Mali real interest rates has been consistently on the rise between 1980-2005. Thereafter, the rates fell and somehow stabilized between 2010-2018

However, Cameroun experienced stable real interest rates from 1993 till 2018 hoofing around 3 to 6 per cent. This was against the sporadic movement she experienced between 1980 and 1992

Finally, Algeria witnessed unstable rates throughout the 1980-2018. The highest been in 1981, 8.25%. From 2011 till 2018, the rates have been falling steadily.

**Figure 1: Comparism real interest rates in selected five African countries**

![Chart showing real interest rates comparison](image)

**Source: Authors’ compilation, 2020**

Comparatively, Nigeria experienced the most turbulent and unstable real interest rates, followed by Mali, Egypt, Cameroun and Algeria during the period under review

**Consumption Growth in the selected countries, 1980-2018**

In Figure 2 below, the consumption Growth patterns in Nigeria was seemingly stable in 2014-2018 period. Also, consumption Growth in Egypt exhibited some level of stability during the years under consideration and it also indicates a high level of stability in consumption expenditure in Mali especially in 1987-2018 period. In Cameroun, after the instability in consumption Growth from 1980-1993, the economy witnessed stability in consumption from 1993-2018. There was high level of unstable consumption Growth in Algeria from 1980-2011. It however took in downward trends from 2012 to 2018.
Figure 2: Consumption Growth in selected five African countries

Source: Authors’ Representation from WDI, 2018
In figure 2 above, Nigeria recorded the most unstable and high level of consumption Growth. The other four countries clustered around each other especially from 1993 to 2018.

Theoretical Framework
In view of various theoretical cruxes on consumption determinants as reviewed earlier, this present study adopts the Life Cycle Hypothesis of Franco Modigliani (1954) where a consumer’s life time can be segmented into three periods: The young age when little or no income is earned, a relatively long year of working life when income tends to rise with experience and seniority in the place of work, and a period between retirement and death when income drops to near zero. Although Modigliani theory can be criticized on the ground that interest rates are not stable and household inherit wealth. Drawing from this framework, and by taking into cognizance of reality of life in Nigeria, inter temporal consumption function which is interest rate dependent is derived as the basis for the empirical estimations in this study.

Model Specification
In this model, the consumption function is derived from inter temporal choice model in which a representative consumer faces the following utility function:

$$U = U(C_0, C_1, C_2, ..., C_T)$$

Equation (1) implies that the utility function of a typical household is made up of consumption bundles of different goods. By assuming a logarithmic utility function, at time T, consumption will be:

$$U(C) = \ln C_0 + \frac{1}{1+p} \ln C_1 + \frac{1}{1+p} \ln C_2 + ... + \frac{1}{1+p} \ln C_T$$

(2)
The weight attached to future consumption is represented by \(\frac{1}{1+p}\), and is the discount factor depending on the movement of interest rate, \(p\). Equation (2) can be shortened as:

\[
U(C) = \ln C_0 + \frac{\ln C_1}{1+p} + \ldots + \frac{\ln C_T}{1+p}
\]

By implication, the consumption of the consumer at any time is weighted on the discount factor, which determines the level of preference between current and future consumption. This discount factor is basically a function of the expected changes in interest rate. Also, given a level of income in each period, and by expressing \(i=\rho\), the budget constraint (BC) of the consumer becomes

\[
C_0 + \frac{C_1}{(1+i)^1} + \ldots + \frac{C_T}{(1+i)^T} \leq Y_0 + \frac{Y_1}{(1+i)^1} + \ldots + \frac{Y_T}{(1+i)^T}
\]

The BC in equation (4) is re-specified in equation (5), and it implies that the difference between income and consumption weighted on the prevailing interest rate.

\[
Y_0 + \frac{Y_1}{(1+i)^1} + \ldots + \frac{Y_T}{(1+i)^T} - C_0 - \frac{C_1}{(1+i)^1} - \ldots - \frac{C_T}{(1+i)^T} = 0
\]

To satisfy the BC with equality, the compact form of equation (4) and (5) is stated as:

\[
\sum_{t=0}^{T} \frac{Y_t}{(1+i)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+i)^t} = 0
\]

Since the principle of tranversality condition where the household does not have existing assets overlapping to another generation, all income would be used for consumption purpose(s); hence, the path of consumption of the household weighted on interest rate is equal to the income paths weighted on the interest rate as shown in equation (7).

\[
C_t + \frac{C_{t+1}}{(1+i)} = Y_t + \frac{Y_{t+1}}{(1+i)}
\]

The inter temporal problem of the private sector (household in this case) is how to maximize total consumption subject to the BC as expressed in equation (8).

\[
\sum_{t=0}^{T} \frac{\ln C_t}{(1+p)^t} \text{ Subject to } \sum_{t=0}^{T} \frac{Y_t}{(1+i)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+i)^t} = 0
\]

To address this, we form a Lagrangian multiplier expression as:

\[
L = \sum_{t=0}^{T} \frac{\ln C_t}{(1+p)^t} + \lambda \left[ \sum_{t=0}^{T} \frac{Y_t}{(1+i)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+i)^t} \right]
\]

Noting that \(\frac{C_t}{(1+p)^t} = \frac{C_0}{(1+p)^0} + \frac{C_1}{(1+p)^1} + \ldots + \frac{C_{T-1}}{(1+p)^{T-1}}\), the first-order conditions for optimization are obtained as follows:

\[
\frac{\partial L}{\partial C_0} = \frac{1}{C_0} - \lambda = 0
\]
For the consumption in the current and the future times, say period t and period t+1, we can solve for from the first two equations to obtain:

\[ \frac{\partial L}{\partial C_t} = \frac{1}{1+p} \left( \frac{1}{1+i} \right) = 0 \]  
\[ \frac{\partial L}{\partial C_{t-1}} = \frac{1}{(1+p)^{t-1}} \left( \frac{1}{1+i} \right)^t = 0 \]  
\[ \frac{\partial L}{\partial \lambda_t} = \sum_{0}^{T} \frac{Y_t}{(1+i)^T} - \sum_{0}^{T} \frac{C_t}{(1+i)^T} \]  

For the consumption in the current and the future times, say period t and period t+1, we can solve for from the first two equations to obtain:

\[ \frac{C_{t+1}}{C_t} = \left( \frac{1+i}{1+p} \right) \text{ or } C_{t+1} = \left( \frac{1+i}{1+p} \right) C_t \]  

If i=\(\rho\), then \(C_{t+1} = C_t\)

This equation says that present consumption is purely a function of immediate past consumption, as shown by Friedman (1957). Combining this result with the budget constraint in equation (7) yields:

\[ C_{t-1} = C_t \left( \frac{1+i}{2+i} \right) Y_t + \frac{1}{2+i} Y_{t+1} \]  

This can be generalized as:

\[ c = f(y, i, z) \]  

Where y refers to current and future incomes, i is the interest rate and z is the vector of other factors that affect or determine the level of consumption. Following equation (17) above, the implicit functional form of the model for this study is specified as:

\[ \text{PCEXP} = f(\text{IR, MS, PCGDP, BSCPS}) \]  

PCEXP= Private consumption expenditure  IR=Real Interest Rate;  
MS=Money supply  PCGDP=per capital Gross Domestic Product  
BSCPS=Banking sector credit to the private sector

Further, equation (18) can be put in an econometric model as:

\[ \Delta \text{PCEXP}_t = \alpha_0 + \alpha_1 \Delta \text{PCEXP}_{t-1} + \alpha_2 \Delta \text{IR} + \alpha_3 \Delta R + \alpha_4 \Delta MS_{t-1} + \alpha_5 \Delta MS_{t-1} + \alpha_6 \Delta \text{PCGDP}_{t-1} \]  

Where \(\alpha_0=\text{Intercept}\), \(\alpha_1-\alpha_4\) are the coefficients of the regress of the model. It is theoretically expected that the magnitude of the impact of interest rate, \(\alpha_1\) will signed negatively with the dependent variable PCEXP. But we expect the theoretical signs of \(\alpha_1-\alpha_4\) to be positive.

**Data Presentation, Analyses and Interpretation of Results**

This section presents data used for the study, analyses it and discusses the results. It must be restated that the major objectives of the study is to examine the relationship between interest rate and private consumption in Africa. The study conducted a descriptive statistics to show the behavior of the data used. The data used for the study are interest rate, private consumption expenditure, money supply, Bank credit to private sector, Consumer price index and Money Supply and GDP. The study period is 1980 -2018 using five African Countries. They are presented in table 1
Descriptive Statistics

Table 1: Results of Descriptive Statistics on the Variables Used for the Study: Gross Domestic Product (GDP), Bank credit to private sector (BCPS), PCE, Consumer price index (CPI), Money Supply (MSS) and interest rate IR, for the Period 1980-2018.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CPI</th>
<th>IR</th>
<th>GDP-GR</th>
<th>PCE</th>
<th>MONEY_SS</th>
<th>BSCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>77.95458</td>
<td>1408744.3</td>
<td>3.856392</td>
<td>7938935.1</td>
<td>1.69E+12</td>
<td>13.97992</td>
</tr>
<tr>
<td>Median</td>
<td>77.73940</td>
<td>499.1484</td>
<td>4.344150</td>
<td>5223347.0</td>
<td>4.50E+11</td>
<td>12.46106</td>
</tr>
<tr>
<td>Maximum</td>
<td>777.9952</td>
<td>91664284.3</td>
<td>33.73580</td>
<td>59566621.0</td>
<td>2.91E+13</td>
<td>103.6323</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.216900</td>
<td>0.003500</td>
<td>-36.70010</td>
<td>402989.0</td>
<td>6.18E+08</td>
<td>0.410356</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>49.99916</td>
<td>10770151.7</td>
<td>5.511861</td>
<td>9324585.0</td>
<td>3.60E+12</td>
<td>9.234183</td>
</tr>
<tr>
<td>Skewness</td>
<td>4.926649</td>
<td>7.582912</td>
<td>-0.942985</td>
<td>3.121733</td>
<td>3.979808</td>
<td>2.341883</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>4.926649</td>
<td>7.582912</td>
<td>-0.942985</td>
<td>3.121733</td>
<td>3.979808</td>
<td>2.341883</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
</tr>
<tr>
<td>Sum</td>
<td>45837.29</td>
<td>8.28E+08</td>
<td>2267.558</td>
<td>4.67E+09</td>
<td>9.92E+14</td>
<td>8220.196</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>1467450.8</td>
<td>6.81E+16</td>
<td>17833.42</td>
<td>5.10E+16</td>
<td>7.63E+27</td>
<td>50022.03</td>
</tr>
</tbody>
</table>

Observations: 588

Source: Field’s Study using E-view Version 8j

The results of the descriptive statistics in table 1 showed that the mean value of Consumer price index for the period under review was 77.95%. This showed that inflation is high in Africa. The minimum Consumer price index for the period under review of 0.22% was recorded in year 1990 in Algeria; while the maximum value of 777.99% was recorded in year 2000 in Nigeria. Similarly, the average Interest rate for the period under review was 14.08744 to a US$. The minimum Interest rate of 0.0035 to a US$ was recorded in year 1990 in Algeria; while the maximum Interest rate of 19.664.284 to a US$ was recorded in year 2017 in Algeria.

Data Analysis

The study examined the effects of interest rate on private consumption expenditure in Africa. The variables were estimated using the Generalized Moment Method. Test for Unit root: This test is conducted to ensure that panel data used is stationary. This is because regression results conducted, where the series is not stationary may be spurious because the estimated parameters would be inconsistent. The researcher therefore, conducted the Unit Root test using Levin Lin and Chu test.

Table 2: Results of the Unit Root Test on Bank credit to private sector (BCPS), PCE. Consumer price index (CPI), Money Supply (MS) and interest rate (IR).

<table>
<thead>
<tr>
<th>Variable</th>
<th>95% Critical value of ADF</th>
<th>LLC Test Statistics</th>
<th>P-Value</th>
<th>Order of Integration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CPI)</td>
<td>164.209</td>
<td>-7.9334*</td>
<td>0.0000</td>
<td>I(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>D(EIR)</td>
<td>184.377</td>
<td>-9.2328*</td>
<td>0.0000</td>
<td>I(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>(GDP)</td>
<td>129.668</td>
<td>-5.4072*</td>
<td>0.0000</td>
<td>I(0)</td>
<td>Stationary</td>
</tr>
<tr>
<td>D(PCE)</td>
<td>59.6404</td>
<td>0.7203***</td>
<td>0.0763</td>
<td>I(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>D(MSS)</td>
<td>50.3167</td>
<td>1.8399***</td>
<td>0.0671</td>
<td>I(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>D(BCPS)</td>
<td>200.602</td>
<td>-13.6136*</td>
<td>0.0000</td>
<td>I(1)</td>
<td>Stationary</td>
</tr>
</tbody>
</table>


Note: * = significant at 1%, ** = significant at 5%, *** = significant at 10%
The results of the Unit Root test presented in table 2, showed the Levin Lin and Chu Statistics with their corresponding P-values. Result showed that the probability value in reference to each variable is smaller than the alpha value at 10%. Thus, the null hypothesis that the panel contains a unit root is rejected at 10% level of significance. Thus, all the specified variables (that is, CPI, IR, PCE, MSS, BCPS are I (1) variables, while GDP is I(0) variable. Based on the Unit Root test, these variables would yield plausible regression output.

Testing of Hypotheses

The static equation was estimated after testing between the Pooled Regression, Random Effects and Fixed Effects models to arrive at the most adequate among them for each of the formulated equations 2 and 3. This process involved testing the Random Effect model against the Pooled Regression to ascertain the presence of panel effect in the series. Real interest rate does not contribute significantly to private consumption in selected countries in Africa.

\[ \text{GDP}_t = \beta_0 + \beta_1 \text{IR}_t + \beta_2 \text{MS}_t + \beta_3 \text{GDPGr}_t + \beta_4 \text{PCE}_t + \beta_5 \text{CPI}_t + \epsilon_t. \]

The test of Random Effects model against the Pooled Regression was based on the rejection or otherwise of the Null hypothesis for the Breusch and Pagan Lagrangian Multiplier test stated below. The hypothesis for the Breusch and Pagan Lagrangian Multiplier test is stated as: That there is no panel effect, That there is panel effect.

Decision rule for the Breusch and Pagan Lagrangian Multiplier test: If the observed probability value (P value) is less than the critical alpha value at 5%, reject the Null hypothesis otherwise do not reject the Null hypothesis. Table 3 showed the result of the test of Random Effects model against the Pooled Regression model.

Table 3 Random Effects Vs. Pooled Regression in Equations 2

<table>
<thead>
<tr>
<th>IR</th>
<th>U</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.3806</td>
<td>0.7215</td>
<td>25.8648</td>
</tr>
<tr>
<td>5.5118</td>
<td>0.8494</td>
<td>5.0857</td>
</tr>
</tbody>
</table>

\[ X^2(01) = 1.55 \]

\[ P\text{-Value} (X^2) = 0.1069 \]

Note: GDPGr = Gross Domestic Product growth rate, u = the idiosyncratic or specific error term, e = the disturbance term, \( X^2 \) = Chi-square and P-Value = Probability value.


Decision rule based on the P value: The observed P value at 0.1069 is greater than the critical alpha value at 0.05 (that is, 5%). Therefore, the researcher does not reject the null hypothesis which states that there is no Panel effect. This means that the Pooled Regression model is more adequate than the Random Effects model in equation 2.
Table 4. Results of Pooled Regression Model on the Relationship Between bank sector credit and private consumption in Africa Equation 2.

<table>
<thead>
<tr>
<th>Variable (gdpgpr)</th>
<th>Coef</th>
<th>Std Error</th>
<th>Z Stat.</th>
<th>P -Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCP</td>
<td>-0.1331*</td>
<td>0.0279</td>
<td>-4.76</td>
<td>0.0000</td>
</tr>
<tr>
<td>Log PCE</td>
<td>2.9246*</td>
<td>0.7133</td>
<td>4.10</td>
<td>0.0000</td>
</tr>
<tr>
<td>constant</td>
<td>-17.991*</td>
<td>4.6912</td>
<td>-3.83</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R² = 0.1314  
Rho = 0.0271  
Wald X² (4) = 72.88*  


Note: The dependent variable is (PCE growth rate), * = significant at 1%, the independent variables are BSCP = Bank credit to private sector as a ratio of GDP, |= PCE, rho = correlation coefficient between the cross-sectional units, R² = Coefficient of determination.

From the results reported in table 5, the coefficient of interest rate: BSCP and PCE are -0.1331, 0.1667 respectively. This showed that bank credit to private sector has significant inverse relationship with interest rate and PCE have significant positive effects on GDP. However, (direction of movement of the variables within cross-sectional units) is positive at 0.0271; which showed that all the variables across units are positively correlated.

On individual basis, a 1% change in bank credit to private sector would lead to a reduction in GDP to the tune of 13.3%. Furthermore, a 1% change in PCE would lead to an increase in GDP to the tune of 16.67% and 292.46% respectively. Overall interest rate indicators jointly contributed 13.14% (R²) to variations in PCE. Furthermore, since the observed P value of Wald (X²) lag 4 at 0.0000 is less than the critical alpha value at 5%, the null hypothesis is rejected. The researcher concludes that bank credit to private sector contributes significantly to economic growth in selected countries in Africa. Findings showed that bank credit to private sector has significant negative effect on economic growth in Africa.

Johansen Cointegration Test

The researcher conducted a co-integration test to examine whether the variables in each equations (that is, equations 2-3) exhibits short-run and/or long-run, co-movement

Table 5. Results of Co-integration Test Based on Johansen-Fishers Approach on Equations 2 & 3.

<table>
<thead>
<tr>
<th>Hypothesized No of CEs</th>
<th>Fisher Stat. (from trace test) P-Value</th>
<th>Fisher Stat. from Max-eigen test P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation 2: PCE IR if</td>
<td>None</td>
<td>203.9* 0.0000 140.7* 0.0000</td>
</tr>
<tr>
<td></td>
<td>At most 1</td>
<td>97.19* 0.0000 70.66* 0.0037</td>
</tr>
<tr>
<td></td>
<td>At most 2</td>
<td>66.48* 0.0094 66.48* 0.0094</td>
</tr>
<tr>
<td></td>
<td>At most 3</td>
<td>58.97* 0.3337 45.36* 0.3337</td>
</tr>
<tr>
<td>Equation 3: gdpgr if</td>
<td>None</td>
<td>172.6* 0.0000 110.1* 0.0000</td>
</tr>
<tr>
<td></td>
<td>At most 1</td>
<td>103.6* 0.0000 87.05* 0.0000</td>
</tr>
<tr>
<td></td>
<td>At most 2</td>
<td>74.91* 0.0013 74.91* 0.0013</td>
</tr>
</tbody>
</table>

Note: * = significant at 1%, ** = significant at 5%.

Source: Field Study, 2019 using E-View 8
The test of Johansen co-integration was conducted under the assumption of no intercept and trend. Result shown in *table 8* is presented according to each equation (that is, equations 2-3). The results showed the trace statistics and the max-Eigen statistics for the various equations as well as their corresponding P values. These statistics in respect of the “none” hypothesis in all equations tested, appears to be asymptotically large with corresponding P values below alpha value at 5% level of significance. This indicates that the null hypothesis of no cointegrating vector/relation is rejected. Thus, all the variables in equations 2–3 cointegrate in the long-run. In other words, Bank credit to private sector, PCE and Money supply cointegrate with GDP in Africa.

**The Vector Error Correction Mechanism Test**

The researcher then conducted the Vector Error Correction mechanism (VECM) for each equation (that is, equations 2–3). The VECM test is conducted to examine whether variables in each equations exhibit both short-run and long-run relationships. This test also showed whether any sudden shock that could cause disequilibrium can be corrected at certain speed within a year. In other words, whether any sudden disequilibrium that forces the long-run relationship from equilibrium state can be corrected within one year. 

*Table 9* shows the results of the Error Correction Mechanism (ECM) test for equations 2-3.

<table>
<thead>
<tr>
<th>Description</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation 2 (gdp BSCP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECM (-1)</td>
<td>-0.7536*</td>
<td>0.0551</td>
<td>-13.6801*</td>
<td>0.0000</td>
</tr>
<tr>
<td>D PCE (-1)</td>
<td>-0.0989**</td>
<td>0.0424</td>
<td>-2.3325**</td>
<td>0.0199</td>
</tr>
<tr>
<td>D BSCP (-1)</td>
<td>-0.0127*</td>
<td>0.0479</td>
<td>-0.2660*</td>
<td>0.0000</td>
</tr>
<tr>
<td>Constant</td>
<td>2.4579*</td>
<td>0.5959</td>
<td>4.1249*</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

| Equation 3 (gdpgr mss) |             |           |              |         |
| ECM (-1)               | -0.7419*    | 0.0543    | -13.6525    | 0.0000  |
| Constant               | 1.1718**    | 0.5794    | 2.0225 0.0434 |        |

*Note:* * = significant at 1%, ** = significant at 5%.

**SOURCE:** Field Study, 2019 using E-View 8

In equation 2, the coefficient of the ECM is -0.7536 with a corresponding P value of 0.0000. Result indicates that the ECM coefficient gives the right a sign and is significant at 1% level of significance. Therefore, the null hypothesis which states that there is no long-run causality flowing from bank credit to private sector (BSCP) to GDP is rejected. Bank credit to private sector has negative impact on GDP in Africa. Thus, result indicates that any sudden shock that could cause disequilibrium can be corrected at the rate of 75.4% within a year. In other words, any sudden disequilibrium that forces the long-run relationship from equilibrium state can be corrected within one year. The coefficient of PCE and BSCP at -0.0989 and -0.0127 with corresponding P value of 0.0199 and 0.0000 respectively show evidence of short-run relationship between both variables. To confirm this result, the short-run dynamic impact, is conducted using the Wald coefficient test and the result is reported in *table 10*.

Similarly, in equation 3; the coefficient of the ECM is -0.7419 and has a corresponding P-value of 0.0000. The ECM coefficient is significant at 1%; thus, rejecting the null hypothesis of no long-run causality flowing from bank liquid liabilities (mss) to GDP in Africa. Result indicates that any sudden shock which could cause disequilibrium can be corrected at the rate of 74.19% within a year. The coefficient of gdp and mss at -0.1009 and -7.6842 with corresponding P value of 0.0157 and 0.0486 respectively show evidence of short-run relationship between both variables. To confirm this result, the short-run dynamic impact is conducted using the Wald coefficient test and the result is reported in *table 7*. 
Discussion of findings, Conclusion and Policy Implications

Findings showed that bank credit to private sector has significant negative effect on economic growth in the selected 5 countries in Africa. The result indicates that bank credit to private sector contributes significantly to low interest rate in selected countries in Africa. Moreover, bank credit to private sector co-integrates with GDP both at the long and short-run in Africa. The implication of this finding is that bank credit to private sector has significant effect on inter-state and private consumption expenditure in Africa.

The study examined the effects of interest rate on private consumption of selected 5 countries in Africa, from 1980 - 2018. Findings from the study revealed that interest rate significantly affects private consumption in Africa.

Specifically, findings showed that bank credit to private sector has significant negative effect on private consumption expenditure in Africa. Moreover, that bank credit to private sector co-integrates with PCE both at the long and short-run in Africa.

From this study sufficient evidence has been provided in support of the crucial role of interest rate on private consumption expenditure in the 5 selected countries in Africa. And, on the side of policy implication, the policy maker in the selected countries should focused more in the choice of appropriate policies to stimulate individual household by lowering interest rate development in the selected countries in Africa. While, the negative effect of credit by banks to private sector in few countries further require urgent attention of the policy that can reduce non-performing assets and strengthen the credit guarantees.

The Concluding Remarks and Policy Implications of the Study

This study examined the impacts of real interest rate on private consumption in Nigeria for the period of 1980 to 2018. It also controlled for other variable such as per capita GDP, money supply, and banking sector credit to the private sector among other which were considered to have relationship with private consumption as revealed from the life-cycle income hypothesis in the framework of inter temporal consumption function. Based on these theoretical underpinnings, a stochastic (econometric) model was specified. The data were sourced from the World Bank development indicators (Tsenkwo, 2011), and after testing for the unit root property of the series, real interest rate and money supply did not have unit root, i.e., these variables were stationary at level, I (0), while the remaining variables were first difference stationary, I (Ponle, 1972), hence an ARDL modelling approach was adopted. The study found the existence of a long-run relationship between the variables considered. The study found private consumption to be responsive to the extent of money stock in the economy and per capita income. These findings imply policy-wise that there is need for the government to provide enabling environment for the private sector to thrive in Nigeria. Since credit granted to private sector by the commercial banks enhances the level of consumption, it is necessary for the government to embark on policies that are welfare enhancing for the private sectors. In this case, the monetary authority should target interest rate by putting a minimal level beyond which interest rate (lending rate) would not rise for investment to increase in the country. We envisage, in this study, based on the empirical findings that long-run balanced growth path of economic growth and development can be achieved if some of these recommendations are strictly employed.

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