Financial Deepening and Economic Growth in Nigeria: an Application of Cointegration and Causality Analysis

Torruam, J.T., Chiawa, M.A. and Abur, C.C.

Abstract—The study investigates the impact of financial deepening on economic growth in Nigeria. The study examines the causal relationship between financial deepening and Economic Growth in Nigeria for the period 1990-2011. The stationarity properties of the data and the order of integration of the data were tested using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test. The variables tested stationary at first differences. The Johansen approach of cointegration was applied to test for the long-run relationship among the variables. The result indicated four (4) cointegrating relations between the variables; the Granger-causality suggests that there is unidirectional causality running from economic growth to financial deepening in Nigeria. The study concludes that financial deepening has an impact on economic growth in Nigeria. This implies that developing the financial sector in Nigeria, improves financial structures and ensures efficient delivery of financial services to the private sector to invest to attract more private sector participation for increase output. The study recommends that policy makers should design the policies which will promote the financial and capital markets by removing obstacles that impede their growth and strengthen for healthy and competitive financial system.

Keywords—Causality Analysis, Cointegration, Economic Growth, Financial Deepening.

I. INTRODUCTION

Financial deepening is to improve economic performance through increased competitive efficiency within financial markets thereby indirectly benefiting non-financial sectors of the economy. The Nigerian financial system is broadly divided into two sub-sectors, the informal and formal sectors.

The informal sector has no formalized institutional framework, no formal structure of rates and comprises the local money lenders, thrifts, savings and loans associations and all forms of associations. This informal sector is poorly developed and not integrated into the formal financial system. Its exact size and effect on the economy remain unknown and a matter of speculation.

The Nigerian banking sector has remained largely uncompetitive, as such fewer large banks control the greater segment of the market in terms of total assets, total liabilities and total credit in the banking system which fails to induce economic growth.

Financial deepening implies the level of development and innovation of traditional and non-traditional financial services (Valverde et al, 2004). While Nzotta and Okereke (2009) ascertain that financial deepening is the ability of financial institutions in an economy to effectively mobilize savings for investment purposes. The financial deepening vigorously attracts the reservoir of savings and idle funds and allocates same to entrepreneurs, businesses, households and government for investments projects and other purposes with a view of returns which forms the basis for economic development. Despite this, Nigerian financial deepening has failed to experience impressive performance such as attraction of foreign investment or halt capital flight. Inspite of various reforms in the Nigerian banking sector, the sector still have not addressed the financial gaps in the system. This is because neither domestic savings nor investments in country have appreciably increased since the introduction of the reforms as the sector still remained largely oligopolistic and uncompetitive, as few large banks control the greater segment of the market in terms of total assets, total liabilities and total credit in the banking system.

The objective of this study is to contribute to the body of knowledge that exists in the area of financial deepening and economic growth, by reviewing empirical studies based on econometric studies. Specifically, the paper identifies the various arguments in the literature to determine which one is supported by data. The questions underlying the review are; what is the relationship between financial deepening and growth and why? What is the direction of causality between financial deepening and growth and why? The assumption is that financial sector matters for economic growth in both short and long run.

The assumption and the questions are answered through the use of secondary information obtained from journals, conference papers, and reports through archival studies from internet, companies’ files and libraries. The material review is also limited only to studies based on time series econometric analysis so as to avoid the review of bias spurious results.
II. THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

Most literature focus on two main diverging theoretical paradigm namely the “supply leading hypothesis” and “demand following hypothesis” in line with Patrick (1966) which postulates a feedback relationship between economic growth and financial development. While, the “supply-leading” hypothesis posits a unidirectional causation that runs from financial deepening to economic growth implying that new functional financial markets and institutions will increase the supply of financial services. This will definitely lead to high but sustainable real economic growth. This hypothesis performs two roles namely to transfer resources from low growth sectors to high growth sectors and to promote entrepreneurial response in the later sector.

Previous studies that support the supply leading hypothesis are (Calderon and Liu, 2002); King and Levine (1993a, b); Neusser and Kugler (1998) and Levine, Beck and Loayza (2000). The ‘demand-following’ hypothesis posits a unidirectional causation from economic growth to financial development. This implies financial system passive response to economic growth meaning that the increasing demand for financial services might lead to the aggressive expansion of the financial system as the real sector of the economy grows. Previous studies that support this hypothesis include Gurley and Shaw (1955, 1967), Goldsmith (1969) and Jung (1986). In addition, Patrick (1966) suggests a third hypothesis known as the “stage of development hypothesis” which posits that the supply-leading financial development can induce real investment in the early stages of economic development.

Most studies review the link between finance and economic growth. For example, Johannes et al. (2011) using Johansen cointegration established positive relationships between financial development and economic growth in the long run and short run for Cameroon for the period 1970-2005 for Cameroon at 5% level of significance. The result agreed that financial sector development cause economic growth in the long run and the short run. Economic growth is as a result of financial sector development.

Azege (2004) examines the empirical relationship between the level of development by financial intermediaries and growth. The study employed data on aggregate deposit money bank credit over time and gross domestic product to establish that a moderate positive relationship exist between financial deepening and economic growth. He concludes that the development of financial intermediary institutions in Nigeria is fundamental for overall economic growth.

Wadud (2005) examines the long-run causal relationship between financial development and economic growth for 3 South Asian countries namely India, Pakistan and Bangladesh. The study employed a cointegrated vector autoregressive model to assess the long-run relationship between financial development and economic growth. The results indicate causality between financial development and economic growth but running from financial development to economic growth.

Odhiambho (2004) investigates the role of financial development on economic growth in South Africa. The study uses three proxies of financial development namely; the ratio of M2 to GDP, the ratio of currency to narrow money and the ratio of bank claims on the private sector to GDP against economic growth proxied by real GDP per capita. He employed the Johansen-Juselius cointegration approach and vector error correction model to empirically reveal overwhelming demand-following response between financial development and economic growth. The study totally rejects the supply leading hypothesis.

Waqabaca (2004) examines the causal relationship between financial development and growth in Fiji using low frequency data from 1970 to 2000. The study employed unit root test and cointegration technique within a bivariate VAR framework. Empirical results suggest a positive relationship between financial development and economic growth for Fiji with causality running from economic growth to financial development. He posits that this outcome is common with countries that have less sophisticated financial systems.

Unalms (2002) investigates the direction of causality between financial development and economic growth in Turkey using Granger non-causality in the context of VEC model. The study finds that in the long run, there exists bidirectional causality between financial deepening and economic growth. Adam (2011) examines how efficient the financial intermediation process has been in Nigeria’s growth performance. The study employed the 2SLS approach. The empirical results show that financial intermediation process is sub-optimal and caused by high lending rate, high inflation rate, low per capita income, and poor branch networking.

III. METHODOLOGY

A. Data sources, description and method of analysis

This study employed secondary data obtained from the Central Bank of Nigeria Statistical Bulletin, Nigerian Stock Exchange Fact book, Securities and Exchange Commission database and from the relevant literatures (books, journals, previous research papers and electronic sites). The time series data cover the period 1990-2011. In an attempt to investigate the impact of the financial deepening on economic growth, which has the ultimate aim of increasing the standard of living of the average Nigerian by improving their income, we applied co-integration and error correction modeling to the data obtained. We indeed ascertained the link between financial deepening and economic growth indices. Thus, the economic growth was proxied using the constant value of Gross Domestic Product (GDP) while the financial deepening variables were proxied using the Stock of money supply (SMS), Domestic Real Credit (DRC), Foreign Real Credit (FRC), Inflation (INF) and Real Exchange Rate (RER). Since most of the time series data are non-stationary, we decided to carry out the unit root tests for stationarity. According to Granger and Newbold (1974), and Engle and Granger (1987), the application of OLS to non-stationary data would result in spurious regression. For valid estimation and inference to be made, a set of non-stationary variables must be cointegrated.

This means that a linear combination of these variables that is stationary must exist. To determine if the time series data are stationary, we carried out unit root test, which resulted in linear combination of series called the cointegration equation. This, however, may be interpreted as a stable long-run (equilibrium) relationship among the non-stationary time
series variable. It also ignores the short run dynamics that might cause the relationship not to hold in the short run.

B. Unit Root Test

Augmented Dickey-Fuller (ADF) unit root test was employed to determine the order of integration of the series. The test is as follows:

$$\Delta x_t = \beta_0 + \alpha x_{t-1} + \sum_{i=1}^{k} \beta_i \Delta x_{t-i} + \epsilon_t$$  \hspace{1cm} (1)

Where \( \Delta \) is the first difference operator, \( \beta \) is the coefficient of the preceding observation, \( x_{t-1} \) is the immediate prior observation, \( \Delta x_{t-i} \) is the differenced lagged term, \( k \) is the number of lags, \( \beta_i \) is the parameter to be determined and \( \epsilon_t \) is the disturbance term.

The role of the lagged dependent variables in the augmented Dickey Fuller test equation (1) is to ensure that \( \epsilon_t \) is white noise. Therefore, appropriate lag length \( k \) needed to be chosen. The optimal lag length (\( k \)) is determined by the Schwarz Information Criterion (SIC). Schwert (1987, 1989) the lag length was set equal to the integer portion of two values of \( \ell \), that is, \( \ell_4=\text{int} \{4(T/100)^{1/4} \} \) and \( \ell_{12}=\text{int} \{4(T/100)^{1/4} \} \), and \( T \) is the number of observations. The null hypothesis, \( H_0: x_t \sim I(1) \), that is, a unit root is rejected in favour of \( I(0) \). If \( \alpha \) is found to be negative and statistically significantly different from zero. The computed t-statistic on parameter \( \alpha \), is compared to the critical value tabulated in MacKinnon (1991). When \( k = 0 \), we have the standard Dickey-Fuller test.

The unit root tests for the first-difference of the variables is carried using the following regression equation

$$\Delta x_t = \beta_0 + \alpha \Delta x_{t-1} + \sum_{i=1}^{k} \beta_i \Delta^2 x_{t-i} + \epsilon_t$$  \hspace{1cm} (2)

Where the null hypothesis is \( H_0: X_t \sim I(1) \), that is, a unit root is rejected in favour of \( I(1) \). If \( \alpha \) is found to be negative and statistically significantly different from zero.

C. The Phillips-Perron (PP) Test

Phillips and Perron (1988) propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation (1), and modifies the -ratio of the coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. The PP test is based on the statistic:

$$\tilde{t}_a = \frac{t_a (\beta_0 - f_0 \beta_0 \sqrt{\frac{2}{f_0^2 s^2}})}{s^2}$$

Where \( \alpha \) is the estimate, and \( t_a \) is the t-ratio of \( \alpha \), \( s^2 \) is the coefficient of the standard error, and \( s \) is the standard error of the test regression. In addition, \( \beta_0 \) is a consistent estimate of the error variance in (1) calculated as \( \frac{(T-k)^2}{T} \), where \( k \) is the number of regressors. The remaining term, \( f_0 \), is an estimator of the residual spectrum at frequency zero. There are two choices to make when performing the PP test. First, you must choose whether to include a constant, a constant and a linear time trend, or neither, in the test regression. Second, you will have to choose a method for estimating.

D. Cointegration Test

Engle-Granger two-step procedure is to apply the Johansen’s (1991) cointegration test to determine whether the linear combination of the series possesses a long-run equilibrium relationship. The numbers of significant cointegrating vectors in non-stationary time series are tested by using the maximum likelihood based λtrace and λmax statistics introduced by Johansen and Juselius (1990). The advantage of this test is that, it is a superior test as it deals with two or more variables that may be more than one cointegrating vector in the system. However, the Johansen-Juselius technique is provided below. We begin by defining a k-lag vector autoregressive (VAR) representation

$$x_t = \alpha + \Pi_1 x_{t-1} + \Pi_2 x_{t-2} + \cdots + \Pi_n x_{t-n} + \epsilon_t, \hspace{1cm} (t=1,2,\ldots, T)$$  \hspace{1cm} (3)

Where \( x_t \) is a \( n \times 1 \) vector of non-stationary \( I(1) \) variables, \( \alpha \) is a \( n \times 1 \) vector of constant terms, \( \Pi_1, \Pi_2 \cdots \Pi_n \) are \( n \times k \) coefficient matrices and \( \epsilon_t \) is a \( n \times 1 \) vector of white Gaussian noises with mean zero and finite variance. Equation (3) can be rewritten as:

$$\Delta x_t = \alpha + \Gamma_1 \Delta x_{t-1} + \Gamma_2 \Delta x_{t-2} + \cdots + \Gamma_n \Delta x_{t-n+1} + \Pi_n x_{t-n} + \epsilon_t$$  \hspace{1cm} (4)

Where \( \Gamma_j = f - \Pi_1 \Pi_2 \cdots \Pi_j \) \( (j=1,2,\ldots, n-1) \) and \( \Pi \) is defined as

$$\Pi = \Pi_1 + \Pi_2 + \cdots + \Pi_n$$  \hspace{1cm} (5)

Johansen (1988) shows the coefficient matrix \( \Pi_n \) contains the essential information about the cointegrating or equilibrium relationship between the variables in the data set. Specifically, the rank of the matrix \( \Pi_n \) indicates the number of cointegrating relationships existing between the variables in \( x_t \). In this study, for a two case variables, \( x_t = (\text{Financial Deepening and Economic Growth}) \) and so \( n=2 \). Therefore, then the hypothesis of cointegration between Financial Deepening and Economic Growth is equivalent to the hypothesis that the rank of \( \Pi_n=1 \). In other words, the rank \( r \) must be at most equal to \( n-1 \), so that \( r \leq n-1 \), and there are \( n-r \) common stochastic trends. If the \( r=0 \), then there are no cointegrating vectors and there are \( n \) stochastic trends.

The Johansen-Juselius procedure begins with the following least square estimating regressions:

$$\Delta x_t = \alpha_1 + \sum_{j=1}^{n-1} \Gamma_j \Delta x_{t-j} + \epsilon_{1t}$$  \hspace{1cm} (6)

$$x_{t-n} = \alpha_2 + \sum_{j=1}^{n-1} \Gamma_j \Delta x_{t-j} + \epsilon_{2t}$$

Define the product moment matrices of the residuals as \( S_{ij} = \sum_{t=1}^{T} \epsilon_{it} \epsilon_{jt} \) (for \( i, j=1,2 \)). Johansen (1988) shows that the likelihood ratio test statistic for the hypothesis of at most \( r \) equilibrium relationships is given by

$$-2 \ln Q_r = -n \sum_{t=1}^{n} \ln (1 - \lambda_t)$$  \hspace{1cm} (8)

Where \( \lambda_1 > \lambda_2 > \cdots > \lambda_n \) are the eigenvalues that solve the following equation

$$|\lambda \Sigma_{22} - \epsilon_{21} \Sigma_{11} \epsilon_{12} | = 0$$  \hspace{1cm} (9)

The eigenvalue are also called the squared canonical correlations of \( \epsilon_{21} \) with respect to \( \epsilon_{1t} \). The limiting distribution of the \( -2 \ln Q_r \) statistic is given in terms of a \( n-r \) dimensional Brownian motion process, and the quantiles of the distribution are tabulated in Johansen and Juselius (1990) for \( n-r=1, \ldots, 5 \) and in Osterwald-Lenum (1992) for \( n-r=1, \ldots, 10 \).

Equation (8) is usually referred to as the trace test statistic which is rewritten as follows:

$$L_{trace} = -T \sum_{r=1}^{n} \ln (1 - \lambda_r)$$  \hspace{1cm} (10)

Where \( \lambda_{r-1}, \lambda_p \) are the \( n-r \) smallest squared canonical correlation or eigenvalue. The null hypothesis is at most \( r \)
follows: to develop a model to justify the relationship that exists between Deepening and Economic Growth in Nigeria, it is ideal to test the causality in the Granger sense that financial deepening Granger causes economic growth in the first equation, null hypothesis will be rejected if there is a presence of cointegrating vectors. The other test for cointegration is the maximal eigenvalue test based on the following statistic

\[ L_{\text{max}} = -T \ln (1 - \lambda_{r+1}) \]  

(11)

Where \( \lambda_{r+1} \) is the \((r + 1)\)th largest squared canonical correlation or eigenvalue. The null hypothesis is \( r \) cointegrating vectors, against the alternative of \( r + 1 \) cointegrating vectors.

**E. Toda-Yamamoto Causality**

Toda and Yamamoto (1995) proposed causality test which is robust for cointegration and stationarity properties. They levered criticism on VECM based causality test that its results may not be correct because preliminary tests biases of cointegration and first difference stationarity can be a possible source of wrong inferences regarding causality. Following system of equations is proposed to check causality inferences under Toda-Yamamoto causality test and SUR (seemingly unrelated regression) technique is utilized to estimate the model because due to SUR estimation Wald test experiences efficiency Rambaldi and Doran (1996).

\[
\begin{align*}
\text{GDP}_t &= \alpha_1 + \sum_{i=1}^{k+d_{\text{max}}} \beta_{1i} \text{GDP}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \delta_{1i} \text{SMS}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \lambda_{1i} \text{RER}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \mu_{1i} \epsilon_{1t} + \epsilon_{1t} \\
\text{SMS}_t &= \alpha_2 + \sum_{i=1}^{k+d_{\text{max}}} \beta_{2i} \text{GDP}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \delta_{2i} \text{SMS}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \lambda_{2i} \text{DRC}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \mu_{2i} \epsilon_{2t} + \epsilon_{2t} \\
\text{DRC}_t &= \alpha_3 + \sum_{i=1}^{k+d_{\text{max}}} \beta_{3i} \text{GDP}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \delta_{3i} \text{SMS}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \lambda_{3i} \text{DRC}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \mu_{3i} \epsilon_{3t} + \epsilon_{3t} \\
\text{INF}_t &= \alpha_4 + \sum_{i=1}^{k+d_{\text{max}}} \beta_{4i} \text{GDP}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \delta_{4i} \text{SMS}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \lambda_{4i} \text{DRC}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \mu_{4i} \epsilon_{4t} + \epsilon_{4t} \\
\text{RER}_t &= \alpha_5 + \sum_{i=1}^{k+d_{\text{max}}} \beta_{5i} \text{GDP}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \delta_{5i} \text{SMS}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \lambda_{5i} \text{DRC}_{t-i} + \sum_{i=1}^{k+d_{\text{max}}} \mu_{5i} \epsilon_{5t} + \epsilon_{5t}
\end{align*}
\]

In order to check that financial deepening does not granger cause economic growth in first equation, null hypothesis will be: \( \delta_{1i} = 0 \forall i \leq k \). If null hypothesis is rejected then we can infer that financial deepening granger causes economic growth. In a similar fashion all other possible causations can be checked.

**F. Model Specification**

In an attempt to determine the impact of Financial Deepening and Economic Growth in Nigeria, it is ideal to develop a model to justify the relationship that exists between the variables. Therefore, the growth model is specified as follows:

\[
Y = \delta_0 + \delta_1 X_1 + \delta_2 X_2 + \delta_3 X_3 + \delta_4 X_4 + \delta_5 X_5 + \epsilon_t
\]

Where; \( Y = \) real gross domestic product growth rate; \( X_1 = \) Stock of money supply; \( X_2 = \) Domestic real credit; \( X_3 = \) Foreign real credit; \( X_4 = \) Inflation; \( X_5 = \) Real exchange Rate; \( \delta_0 = \) intercept of the equation;

\( \epsilon_t = \) Stochastic error term.

**IV. RESULTS**

**A. Tests for Stationarity**

The results regarding the order of integration of the series have been determined by Augmented Dickey Fuller (ADF) test. The ADF test was carried out on the levels and first differences of all the variables. The calculated t-values from ADF tests on each variable in levels and in first differences are reported in Table I.

**TABLE I AUGMENTED DICKEY FULLER (ADF)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.90</td>
<td>-17.053424****</td>
</tr>
<tr>
<td>SMS</td>
<td>0.80</td>
<td>-14.321744****</td>
</tr>
<tr>
<td>DRC</td>
<td>1.25</td>
<td>-14.321744****</td>
</tr>
<tr>
<td>FRC</td>
<td>1.25</td>
<td>-14.321744****</td>
</tr>
<tr>
<td>INF</td>
<td>1.25</td>
<td>-14.321744****</td>
</tr>
<tr>
<td>RER</td>
<td>1.25</td>
<td>-14.321744****</td>
</tr>
</tbody>
</table>

*** denote significance 5%.

Before we proceed, it is imperative to first test whether the variables are stationary and to determine their orders of integration. The Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests were used to determined the existence of unit root in each of the time series. The results of both the ADF and PP tests are reported in Table I and Table II respectively. The results in Table I shows that all the variables are not stationary in levels. This can be seen by comparing both the ADF and PP test statistics with the critical values of the test statistics at 5% level of significance. These results provide a strong evidence of non stationarity of the series in Levels. Therefore, the null hypothesis is accepted and it is sufficient to conclude that there is a presence of unit root in the variables at levels. Hence, all the variables are differenced once and both the ADF and PP test were conducted on all the variables. The results is reported in Table II. The results in Table II indicate that all the variables are stationary at first difference. Therefore, the null hypothesis of non-stationarity is rejected. That is, they are stationary in their first differences. This implies that the variables are integrated of order one, i.e. \( I(1) \).

**TABLE II PHILLIPS PERRON (PP)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-7.651443</td>
<td>-37.678777***</td>
</tr>
<tr>
<td>SMS</td>
<td>-4.537643</td>
<td>-12.14952***</td>
</tr>
<tr>
<td>DRC</td>
<td>-1.765342</td>
<td>-10.92723 ***</td>
</tr>
<tr>
<td>FRC</td>
<td>-1.426332</td>
<td>-7.374123 ***</td>
</tr>
<tr>
<td>INF</td>
<td>-1.315842</td>
<td>-6.423174 ***</td>
</tr>
<tr>
<td>RER</td>
<td>-0.834064</td>
<td>-6.422123 ***</td>
</tr>
</tbody>
</table>

*** denote significance 5%
B. Johansen Trace Test

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.567361</td>
<td>69.82778</td>
<td>66.86719</td>
<td>0.0742</td>
</tr>
<tr>
<td>At most 1 *</td>
<td>0.467952</td>
<td>47.76812</td>
<td>38.30130</td>
<td>0.2791</td>
</tr>
<tr>
<td>At most 2 *</td>
<td>0.283713</td>
<td>29.88717</td>
<td>17.54112</td>
<td>0.7000</td>
</tr>
<tr>
<td>At most 3*</td>
<td>0.184951</td>
<td>15.59671</td>
<td>6.667420</td>
<td>0.6165</td>
</tr>
<tr>
<td>At most 4</td>
<td>0.003683</td>
<td>0.348834</td>
<td>3.841466</td>
<td>0.7296</td>
</tr>
<tr>
<td>At most 5</td>
<td>0.037624</td>
<td>0.002756</td>
<td>3.841466</td>
<td>0.9456</td>
</tr>
</tbody>
</table>

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level.

**MacKinnon-Haug-Michelis (1999) p-values

After confirming that the variables are all 1(1), we proceed to examine the issue of cointegration among the variables. When a cointegration relationship is present, it means that financial deepening and economic growth share a common trend and long-run equilibrium. We started the cointegration analysis by employing the Johansen cointegration test. Table III shows the result of the cointegration test. From the result, the trace statistic indicates 4 cointegration at 5 percent level of significance, suggesting that there is cointegrating relationship between GDP, to and the different measures of financial deepening.

C. Error Correction Model (ECM)

Here, the regression results help to explain the impact of government expenditure on economic growth. The ECM results are demonstrated in Table IV below:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-28.9645</td>
<td>0.6123</td>
<td>-47.3044</td>
<td>0.00037</td>
</tr>
<tr>
<td>GDP</td>
<td>19.7581</td>
<td>0.6829</td>
<td>28.9314</td>
<td>0.00178</td>
</tr>
<tr>
<td>SMS</td>
<td>72.5645</td>
<td>4.2074</td>
<td>17.2469</td>
<td>0.00202</td>
</tr>
<tr>
<td>DRC</td>
<td>30.8700</td>
<td>0.6350</td>
<td>48.6142</td>
<td>0.00612</td>
</tr>
<tr>
<td>FRC</td>
<td>27.8814</td>
<td>-2.2550</td>
<td>13.6364</td>
<td>0.00001</td>
</tr>
<tr>
<td>INF</td>
<td>28.9836</td>
<td>0.5126</td>
<td>56.5379</td>
<td>0.31089</td>
</tr>
<tr>
<td>ECM1</td>
<td>-268.54</td>
<td>-23.254</td>
<td>-13.5252</td>
<td>0.00001</td>
</tr>
<tr>
<td>RER</td>
<td>9.8665</td>
<td>8.48150</td>
<td>1.1633</td>
<td>0.00002</td>
</tr>
</tbody>
</table>

Adjusted R-squared: 0.838756
Durbin-Watson: 1.99280
F: 27.01

D. Granger Causality Test

The results of Table IV shows regression results which indicates that the coefficient of SMS, DRC, FRC, INF and RER has positive and statistically significant effect on economic growth in Nigeria. The results of Error Correction Model (ECM) has negative sign and the significance of the Error Correction term (EC) indicated that there exist short run relationship between financial deepening and economic growth and it takes more years to attain equilibrium. Hence, this study examined the short-run dynamics between the variables in the cointegration equation by estimating the error correction model. It is observed from the result that the coefficient of the error correction term (ECM) has the expected negative sign and it lies between zero and one and statistically significant at 5% level. The significance of the error correction mechanism supports cointegration and suggests that there exists long run steady-state equilibrium between the level of real output and the explanatory variables. The ECM indicates a feedback of approximately 75% of the previous year’s disequilibrium from long run elasticity of the explanatory variables. That is, the coefficient of the error correction term measures the speed at which the level of real output adjusts to changes in the explanatory variables in an effort to achieve long run static equilibrium. It can be said therefore that the speed of adjustment is high.

The adjusted $R^2$ is 84 percent. By implication, this shows that 84 percent of the variations in real GDP growth can be explained by the variables taken together. The remaining 16 percent variations can be attributed to other forces outside the model. This suggests that financial deepening has influence on the economic growth. Therefore, the null hypothesis that financial deepening has no significant effect on economic growth in Nigeria is rejected. This implies that financial deepening has significant effect on the economic growth in Nigeria. These results also show a goodness of fit of the regression.

The F-statistics of 27.01 shows that the explanatory variables are important determinants of the GDP growth rate in Nigeria. The Durbin-Watson statistics of 1.99 rules out auto-correlation.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SMS does not Granger Cause GDP</td>
<td>2.26378</td>
<td>0.1257</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>2</td>
<td>GDP does not Granger Cause MS</td>
<td>5.68379</td>
<td>0.0095</td>
<td>Reject H₀</td>
</tr>
<tr>
<td>3</td>
<td>DRC does not Granger Cause GDP</td>
<td>5.28102</td>
<td>0.1758</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>4</td>
<td>GDP does not Granger Cause DRC</td>
<td>9.72374</td>
<td>0.0462</td>
<td>Reject H₀</td>
</tr>
<tr>
<td>5</td>
<td>FRC does not Granger Cause GDP</td>
<td>0.60924</td>
<td>0.5520</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>6</td>
<td>GDP does not Granger Cause FRC</td>
<td>2.08235</td>
<td>0.2420</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>7</td>
<td>INF does not Granger Cause GDP</td>
<td>2.87846</td>
<td>0.5341</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>8</td>
<td>GDP does not Granger Cause INF</td>
<td>3.24359</td>
<td>0.7857</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>9</td>
<td>RER does not Granger Cause GDP</td>
<td>0.68569</td>
<td>0.5133</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>10</td>
<td>GDP does not Granger Cause RER</td>
<td>3.66386</td>
<td>0.3409</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>11</td>
<td>INF does not Granger Cause RER</td>
<td>1.15655</td>
<td>0.2196</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>12</td>
<td>FRC does not Granger Cause DRC</td>
<td>4.65439</td>
<td>0.3315</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>13</td>
<td>DRC does not Granger Cause FRC</td>
<td>10.3162</td>
<td>0.4123</td>
<td>Cannot Reject H₀</td>
</tr>
<tr>
<td>14</td>
<td>GDP does not Granger Cause RER</td>
<td>7.55436</td>
<td>0.2856</td>
<td>Cannot Reject H₀</td>
</tr>
</tbody>
</table>
From the results of Granger causality test based on Toda and Yamamoto (1995) methodology is reported in Table 5. The results suggest that causality is running from GDP to SMS and DRC and no evidence of bi-directional causality is found between these variables. The probability values of F statistics is given, the low P values suggested we can reject null hypothesis. Hence the study found unidirectional causality running from economic growth to financial deepening in Nigeria. No other direction is found in any other variables. The results from the model support the Wagner’s hypothesis. The Wagner’s hypothesis explains that increase in variables. The results from the model support the Wagner’s hypothesis. The Wagner’s hypothesis explains that increase in GDP causes growth in the financial deepening. It rejects the hypothesis that financial deepening amplifies the economic growth at both aggregate and disaggregates levels. This is a clear indication of the positive relative impact the financial deepening played on the economic growth of the country.

V. CONCLUSION AND RECOMMENDATIONS

Financial deepening has an essential role in Nigeria economy. Developing the financial sector means improving financial structures to ensure efficient delivery of financial services to the private sector to invest so as to attract more private sector participation thereby creating jobs and improving the quality of life of the people. Policy makers should design the policies which will promote the financial and capital markets, remove the obstacles that impede their growth and strengthen the healthy and competitiveness of the banking system. They must introduce measures that increase accountability and autonomy of financial institutions as well as restructuring and recapitalization of financial institutions.

The Government must also ensure efficiency in its regulation and supervision of all financial institutions in allowing more private banks and non-bank financial institutions to broaden their financial market to accelerate financial development and improve the financial structure that leads to increase economic growth of Nigeria. The development of the micro finance sector is also very necessary so as to make credit accessible to micro entrepreneurs who are often left out in the formal credit markets. These will boost private sector development and investments which is the engine of growth and development. Also, government should encourage the monetary authority like the central bank of Nigeria to reduce interest rate so that prospective investors can increase their investment and raise the nation’s production capacity. Other measures include sustenance of political stability that country current enjoys; encouragement of inflows of foreign direct investment; and sustenance of the war on corruption.

REFERENCES


