Agricultural Credit and Economic Growth in Nigeria

Joseph Yemisi, Adediji O. Anna

Department of Accountancy, Kogi State Polytechnic, Lokoja, Kogi State, Nigeria

Abstract - This study examines agricultural credit as a policy target for economic growth in Nigeria. As such it formulated a casual but time series relationship between credit to cash crop (CCC), livestock (Cls), and food crops (CFs), against gross domestic product at constant basis price. The study covers a thirty nine years period(1981-2020) from data collected from Central Bank of Nigeria statistical bulletin. The persistent rise of food inflation imfore the use of the current basis price. Also, CCC is a combination of government credit guaranteed provision to oil palm, rubber, cocoa, cotton and groundnut. That of Cls, is a combination of agricultural credit guaranteed provision to poultry, cattle, sheep and other livestock. That of CFs is a combination of grains, roots and tubers, beans and soya beans and vegetable. Analysis following a three-stage level. First, the visual movement of credit to nominated product is produced. Likewise, the normality distribution of the variables is checked using the descriptive statistic. In this way, the skewness, kurtosis and jaque-Bera information are confirmed. Also, the Argumented Dickey Fuller (ADF) stationarity test is confirmed. The I(0) and I(1) outcome led to the use of the autoregressive distributed lag (ARDL) and that of the error correction mechanism-ECM. Findings confirmed significant long-run relationship between agricultural credit and economic growth. Sustaining funding provision for optimal outcome is one of the recommendations proffer.

Keywords - Agriculture, credit, GDP, ARDL, ECM

1.0 Introduction

Critical discussion among African stakeholders in the past and present decade has been that of moving the continent beyond mere geographical expression (Ruzengwe, 2019, Okunlola, 2019a). Unequivocally, Africa growth and development are key. The less than two percent overall growth in 2018 according to Africa Development Bank (ADfB) (2018, 2020) leaves the region far behind global projection. Likewise, food shortage and poverty rate are at its alarming rate compared to that of other emerging economies (Osabohien, Adeleye & De Alwis, 2020).

One of the sectors expected to act as a catalyst in catapulting the continent to desired growth state is agriculture (Fakun & Evbuomwan, 2017). Indeed, the continent had floated series of agricultural development path, one of which is the Comprehensive Africa Agricultural Development Programme – CAADP agreement (). The CAADP agreement initiation was formalized in Maputo, Mozambique in 2003 by Africa Union and, it birthed other agricultural cum economic growth paths (Osabohien, et al, 2020; Okunlola, et al 2019a ). The programme prescribed a 10 percent agricultural financing provision by member states on a year-on-year basis to realize its overall goal. This goal also falls within the ambit of the United Nations sustainable economic growth (Fakun & Evbuomwan, 2017)

Nigeria, being popularly referred to as one of the giants in the continent in terms of population and economic growth potentials, is also a signatory to the CAADP agreement (Fakun & Evbuomwan, 2017). The country, in a bid to also stem the tide of widening hunger, poverty and increase food production, had in place series of government backed agricultural credit...
programmes, one of such is the agricultural credit guaranteed scheme fund (Okunlola et al, 2019; Adetiloye, 2012). The scheme, initiated decades ago, is to provide credit for agricultural production purposes. Thus, agricultural credit is made available to cash crops which include: oil palm, rubber, cocoa, cotton and groundnut/ginger (Central Bank of Nigeria CBN, 2020). Also, credit is made available to livestock such as: poultry, cattle, sheep and other livestock. Agricultural guaranteed credit is also made available to food crops such as: grains, roots and tubers, beans and soya beans, and other mixed agricultural produce (CBN, 2020).

Record shows that agricultural credit guaranteed scheme has provided over four hundred million of Naira to cash crop alone in the year 2020. More than seven hundred million provision for livestock in the same year while, food crops gulped over two billion naira for the same period (CBN, 2020). In fact, agricultural total credit for the 2020 across aforementioned production stood at #4,321,663.85 billion (CBN, 2020).

In spite of huge credit support to agriculture to alleviate poverty, reduce hunger and, ultimately, contribute both local and foreign income through external and intra-trade agricultural trade as Oguniyi, Okunlola & Alatise (2021) opined, the overall performance of Nigeria economic growth depicts an inverse report.

In a bid to provide insightful clarification, of whether or not guaranteed agricultural credit impacts economic growth in Nigeria, a critical empirical examination of the fact is needed. To this end, the study seeks a validation proof.

2. Literature Review.

Across Africa, including Nigeria, agriculture has been seen as a potential economic growth nexus. This is further affirmed in the birth of the CAADP policy in 2003/2004 which became the pillar that escalated the mantra across countries. Ever since the signing of this agreement, every government has dedicated policies to drive this path.

In Nigeria for instance, governance has evolved more than fourteen times, so also is the agricultural policy (Okunlola et al, 2019a, Ogunbivi, Okunlola & Oshi, 2010). In 1985 through to 1993, the country had the directorate for foods, roads and rural infrastructure policy targeted at array of issues such as enhancement of farmers earnings, to the development of agricultural land in the country (Okunlola, et al 2019b) This later merged with the federal ministry of water resources in 1993. In 1999, there was the vision 20:20:20 by the Obasanjo led administration aimed at promoting increased food production of certain commodities with a view to attract political intervention. Agricultural transformation agenda was the led programme of the Goodluck administration in 2012 – 2015. The green alternative agricultural policy is championed by the current administration. Among other agricultural and economic growth programmes include the anchor borrowers programme, economic recovering growth plan among others (Okunlola, et al 2019b).

Similarly, economic growth as describe by gross domestic product at current basic price in the study, has maintained continued rise for the period in review. In spite of this steady growth rate, economic growth reality is different. (Okunlola, et al 2019b). More importantly is the recently overcome of economic recession.

Graphical Trends in Agricultural credit in Nigeria

![Graph 1: Total Agro-credit (Crops)](image1)

![Graph 2: Total Agro-credit (Livestock)](image2)
Likewise, spending as equally oscillated throughout the period in review across agricultural credit provision line (Central Bank of Nigeria CBN 2020). For instance, total credit to crop showed that it maintained a relatively low value from the early period in review. Steady rise was however recorded around 2005, 2009, 2011-12 respectively. This rise was maintained for the better part of 2015 through to 2020 (CBN 2020). Likewise, total credit to livestock recorded a oscillatory trend throughout the period in review. Essentially total credit to livestock maintained a relatively low trend for the better time of the period in review. Specifically, between 1980 through to 2004, available agro-credit to this unit showed that it is low. However, slight increase was visible thereafter till reaching its peak around 2015 (CBN, 2020).

Further, agro-credit to food crop also recorded similar growth pattern as of others. Across 1980 through to 2000, this unit recorded minimal credit until around 2003-2004 when visible rise was recorded. Also, credit to food crop reached its peak around 2005 but declined thereafter, oscillating through the rest of the period in review (CBN, 2020). However, gross domestic product at current basis prices showed that prices had maintained a somewhat linearize form of trend throughout the period in review. This is as depicted in Figure 4 (CBN, 2020).

2.1 Theoretical Review

Most economic growth fundamentals are often anchored on a predetermined niche expected to act as a catalyst to the realisation of increase in basic productivity. In essence, situating economic growth path is to, often, reduce cost and increase production. This study is not an exception. It situates its theoretical underpinning in series of inter-linked economic growth paths especially, that of interest rate and investment-finance. For instance, the postulation in Harrod-Domar hypothesis, Kaldor growth model and that of Keynes interest rate theory are very relevant. However, the study theoretical viewpoint is underpinned on the latter – the Keynes theory of interest rate.

Accordingly, Harrod-Domar growth assumptions are summed up in dual character of investment - income and capital stock Jhingan (2012, 2007). Thus, since investments (finance) generates income on the one hand and increases productive capacity on the other hand, then, at what rate should investment increase in order to make the increase in income equal to the increase in productive capacity or in income (Ajide & Eregha, 2015). According to this theory, investment is a link between aggregate supply and demand. This is represented thus: \( GC = s \), where \( G = \) is the rate of growth of output in a given period of time and can be expressed as \( \Delta Y/Y \); \( C \) is the net addition to capital and is defined as the ratio of investment to the increase in income, i.e., \( I/\Delta Y \) and \( s = \) is the average propensity to save, i.e. \( S/Y \) (Jhigan, 2007)

Unlike Harrod-Domar, Kaldor models attempt to vary the savings-income assumption in the growth process (Jhigan, 2007). His assumption corroborates the classical thinking where savings is seen to equals the rate of profit of national income. Kaldor built his model on the following assumptions:

i. That there is a state of full employment so that total output or income is given.
ii. That national income or output consists of wages (\( w \)) and profit (\( p \)) only.
iii. The marginal propensity to consume of a worker is greater than that of the capitalists whereby the marginal propensity to save of the workers – \( sw \) is small in relation to those of capitalist \( sp \), i.e. \( sp > sw \)
iv. The investment-output ratio (\( I/Y \)) is an independent variable
v. Element of imperfect competition or monopoly power exist
In Keynes proposition, he tried to justify the potency of liquid money as a means for growing the economy. Accordingly, the rate at which money is available depends on economic growth target or policy the government and or the monetary authority intend to fulfill. Thus, if there is a need to have economic expansion, the base-line will be to trigger a reduction in access to money. With this, economic growth activities will be stimulated for further expansion. Likewise, when there is a perception of excess money in the economy, which may result in inflation, the government jack-up the interest rate to discourage borrowing (Keynes, 1933).

Keynes modified earlier quantity theory of money into a dynamic economic pattern where economic size is determined based on consumption and investment (i.e., \( Y = C + I \)) and the interaction of the finite and financial markets and labour (Cohn, 2015; Onoh, 2007). Where, liquidity demanded is a function described as: 

\[
g = f(i, c, \rho, m), \text{ where } g = \text{liquidity demanded, } i = \text{income (national), } \rho = \text{price, } m = \text{market. (Onoh, 2007)}.
\]

This study rest on the assumption of Keynes proposition in such that, access to credit especially for agricultural production can be stimulated to the inter-play of interest rate instrument for the ultimate benefits of the economy.

### 2.2 Empirical Review

Studies linking economic growth and agriculture are abound in the literature. Most of these studies are situated on queries which best suit the reason for its purpose. Likewise, different agricultural dimensions and models were constructed across these studies with results varying to a large extent. Essentially, Osabohien, et al. (2020), Gero & Egendonwe (2020); Okunlola et al. (2019a,b), Nobre, Daveport, Bischiniotis, Veldkamp, Jongman, Funk, Husak, Ward & Aerts (2019), Yan-yuan, Guangwei & Jin-tao (2019), Naftaly (2019), Fakun & Evbuomwan (2017); Varga & Sipiczki, (2015), Adetiloye (2012) and more, have examined agricultural cum economic growth studies differently.

For instance, Osabohien et al. (2020) did a canonical cointegration estimation study on agro-financing and food production study in Nigeria to ascertain the existence or absence of a long-run cointegration relationship. Their findings indicated the presence of long-run cointegration relationship between the variables especially when rate of financing is low.

Gero & Egendonwe (2020) study was centred on Republic of Benin. Their aim was to check the impact of macroeconomic effects on the region’s subsistence farming and productivity. Based on the social accounting matrix data used, the dynamic computable general equilibrium model was specified for the study. Again, findings showed that agricultural productivity growth impacts economic growth.

Beltran-Pena, Rosa & D’Odorico (2020) presented sufficient debate regarding food self-sufficiency across one hundred and sixty-five (165) globally. Using an integrated assessment factors such as: sustainability, middle-of-the-road and business-as-usual scenarios in relations to diet, population, agricultural intensification and climate; it was concluded that under both scenarios, the world food self-sufficiency will decline in spite of food production. Accordingly, Africa may be worse hit in this regard.

Okunlola, et al. (2019a) performed an auto regressive distributed lag estimation on agricultural finance and economic growth in Nigeria using a thirty-seven years data. Conversely, their result showed that agricultural finance is statistically insignificant both at the short and long-run in explaining economic growth in the country. Accordingly, similar study by Okunlola et al. (2020b) but with a different estimation tool – stepwise regression analysis, also confirmed the existence of an insignificant outcome of the relationship between agricultural finance and economic growth. It, however, from the stepwise estimation, suggested funding provision based on commodity credit prioritization.

In a study of East Africa countries, Naftaly (2019) examined factors impeding on agricultural growth plan of the government. The variables examined are capital, labour, total productivity of capital and labour through research and development for fourteen years. From the Panel estimation technique used, the random effect estimation was most appropriate. In order words research and development was find out to impact agricultural development hence, more funds is advised to be spent on it.

China farmers using insurance and cooperatives to manage agricultural related risk was the point of focus in Yan-yuan & Jin-tao (2019) study. Four-hundred and forty-three farmers in the Jiangsu & Henan provinces was used as source of data gathering. Correlation regression was equally used to analysis the data. Result showed that the adoption of insurances and cooperatives by these farmers is statistically significant in explaining risk mitigation.

McArthur & Sachs (2019) study examined agriculture, aid and economic growth in Africa. However, Uganda was used as the point of emphasis. From the specification of plausible parameter models, soil nutrient variation, minimum subsistence
consumption requirements, domestic transport costs, labour mobility and constraints to self-financing were considered as variables of concern. Findings showed that, to a large extent, support for agriculture could generate.

Fakun & Evbuomwan (2017) study evaluated agricultural financing, policies, programmes and initiative for sustainable economic growth in Nigeria. A period of twenty-five (25years) – 1990 to 2014 data was used in the study. From the inference estimation path, findings showed presence of poor commitments to meeting agricultural funding agreement.

A study of the Hungarian agricultural enterprise was the bane of Varga & Sipiczki (2015). According to the study, the dichotomy between medium/large size agricultural companies and micro and small scale enterprise in assessing finance was examined. From the exploratory analysis, they believe that medium/large companies have more influence in dictating loan interest than the micro and small enterprise. Thus, this put the micro and small enterprise into a disadvantage position and this impacts on general economic growth.

3 Methodology

Conventionally, most economic variables are subjected to unit root pre-test to ascertain if estimation will be free of spuriousity. This study did subject used variables to Augmented Dickey Fuller unit root testing. The outcome of this led to the autoregression distributed lag - ARDL estimation path. Also, the error correction mechanism [ECM] was estimated having confirmed the ARDL outcome. Data for the study is sourced from the Central Bank of Nigeria 2021 statistical bulletin. Data sourced is for thirty-nine (39) years from 1981 – 2020. Similarly, the study also checked for the normality distribution of the variables used using the descriptive statistics of skewness, kurtosis and Jarque-Bera.

3.1 Model specification

In the ordinary cause of specifying a pre-test and that of the inference statistics model for the study, Okunlola, et al, (2020); Okunlola, et al (2019a), model was adopted with minor modification. Thus, in its general mathematical form, we have;

\[ Y = f(\Omega_1, \Omega_2, \Omega_3) \]

Where: \( Y \) = dependent variable; \( f \) = function; \( \Omega_1, \Omega_2, \Omega_3 \) independent variables.

If equation 1 is expressed in its econometric form, it becomes

\[ Y = \alpha_0 + \beta_1\Omega_1 + \beta_2\Omega_2 + \beta_3\Omega_3 + \varepsilon_t \]

Where \( \alpha_0 \) = slope of the intercept, \( \beta \) = coefficients of \( \Omega_1, \Omega_2, \Omega_3 \) and \( \varepsilon_t \) = error term

Expressing equation 2 in its variable form, it becomes

\[ \text{GDPpc} = \alpha_o + \beta_1\text{Tcc} + \beta_2\delta\text{Tls} + \beta_3\text{Tfc} + \varepsilon_t \]

Where: \( \text{Tcc} \) = total credit crop; \( \text{Tls} \) = total credit on livestock, \( \text{Tfc} \) = total credit on food crop

3.2 Performing the descriptive estimates, we have;

Skewness: \( \text{Sk} = \frac{\sum (X - \mu)^3}{\sigma^3} \)

Where: \( \text{Sk} \) = Skewness; \( X \) = mean of distribution; \( \mu \) = parameter \( \sigma \) = standard deviation

Decision Criterion: \( \text{Sk} \) = 

\[
\begin{align*}
(0) & = \text{symmetric (+)} = \text{long right tail};
(-) & = \text{long left tail}
\end{align*}
\]

Kurtosis = \( \text{Kurtosis} = \frac{\sum (X - \mu)^4}{\sigma^4} \)

Decision Criterion: \[
[3 = \text{Mesokurtic}; >3 = \text{Peak (Leptokurtic)}; <3 = \text{flat (Platykurtic)}]
\]

\[
\text{Jarque – Bera Stats} = JB = n \left[ \frac{(b_1b_1)^2}{6} + \frac{(b_2-3)^2}{24} \right]
\]

Decision Criterion: where: \( b_1 \) = sample skewness coefficient, \( b_2 \) = kurtosis coefficient
3.3 Performing the Augmented Dickey Fuller (ADF) estimate, we derive

In determining the order of integration of the individual series, the variables undergone the stationarity characteristics check. The estimation equation is as given below:

\[ \Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \Sigma \alpha_i \Delta Y_{t-1} + \xi_t \]

Where: \( \xi_t = \) a residual time; \( Y_t = \) is the relevant time series; \( \xi_t = \) random error term

3.4 The ARDL Model

Thus, transforming equation 3 to its general form ARDL process \((p, q_1…q_n)\), the model is re-specified as;

\[ \Delta \Psi_t = \beta_0 + \Sigma \beta_i \Delta \delta t - 1 + \Sigma \lambda i \Delta \chi_{t-1} - i + \Omega_i \delta t_{-1} + \Omega_m \chi_{t-1} + \mu_i \]

Where: \( \beta_1…\lambda_i = \) are the short-run coefficients of the model; while \( \Omega_i, \Omega_m = \) are the ARDL long-run coefficients and \( \mu_i = \) white noise term. This is in place with the study of Nkoro & Uko (2016) and Pesaran, Shin, & Smith (1999)

4 Result and Analysis

Table 4.1: Descriptive Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>TCC</th>
<th>TLS</th>
<th>TFC</th>
<th>GDPCBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>123102.2</td>
<td>498244.4</td>
<td>2109453.3</td>
<td>34087.63</td>
</tr>
<tr>
<td>Median</td>
<td>13122.50</td>
<td>44902.00</td>
<td>454601.5</td>
<td>7648.500</td>
</tr>
<tr>
<td>Maximum</td>
<td>520425.0</td>
<td>2342247.</td>
<td>8039640.</td>
<td>154252.0</td>
</tr>
<tr>
<td>Minimum</td>
<td>280.0000</td>
<td>4447.000</td>
<td>3606.000</td>
<td>139.0000</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>180414.8</td>
<td>691209.9</td>
<td>2583785.0</td>
<td>139.0000</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.213668</td>
<td>1.221116</td>
<td>0.876057</td>
<td>1.265733</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.771014</td>
<td>3.172519</td>
<td>2.262077</td>
<td>3.351873</td>
</tr>
<tr>
<td>Probability</td>
<td>0.007058</td>
<td>0.006770</td>
<td>0.049192</td>
<td>0.004325</td>
</tr>
<tr>
<td>Sum</td>
<td>4924086.</td>
<td>19929774</td>
<td>84378120</td>
<td>1363505.</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>1.27E+12</td>
<td>1.86E+13</td>
<td>2.60E+14</td>
<td>8.21E+10</td>
</tr>
<tr>
<td>Observations</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Starting from the normality distribution test as mention in the methodology, the descriptive statistic is performed. This is to ascertain the normality distribution of the variables used in the study. Again, relevant of this to this study are the skewness, kurtosis and the Jacque-Bera and decision criterion are as mentioned earlier. From the result, it is evident that all variables are normally skewed having showed that they are positive and equals to 1. As such, TCC is showed that it is a long right-tailed series. Likewise, that of Tls and GDPcbp are equally long right-tailed. However, that of Tfc showed that it is asymmetrical around its mean. Going forward, the outcome of the kurtosis also showed that they are of mixed outcome. While, Tls and GDPcbp show that they are mesokurtic variables having being = 3, that of Tcc and Tfc did not, rather they showed that they are of platykurtic series having being < 3. In all, the outcome of the Jacque-bera statistics demonstrated that the series are normally distributed from their associated probabilities.

4.2 ADF Stationarity Estimates

Table 4.2: Augmented Dickey Fuller Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Critical Values</th>
<th>ADF Test statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>D(GDPcbp)</td>
<td>-2.625606</td>
<td>-1.949609</td>
</tr>
<tr>
<td>D(Tcc)</td>
<td>-2.644302</td>
<td>-1.952473</td>
</tr>
<tr>
<td>D(Tls)</td>
<td>-2.627238</td>
<td>-1.949856</td>
</tr>
<tr>
<td>D(Tfc)</td>
<td>-2.627238</td>
<td>-1.949856</td>
</tr>
</tbody>
</table>

Source: Author’s compilation
Having ascertained the normality distribution of the series, the study proceeded to determine the order of the stationarity test of the variables. Essentially, economic data are necessarily made to undergo the stationary test to ascertain whether or not they become stationary prior subjecting them to further analysis test. With this, spurious regression, which may be counter-productive to economic prediction is avoided. And, as of rule, the outcome of stationarity test of any variables informs the path of estimation therein.

From the result, the ADF outcome showed that series displayed different order of stationarity. For instance, GDPcbp, having undergone a first order test became stationary. As such, it is concluded that this variable is integrated of order (I(0)), or, simply, it is a level series. Conversely, other variables: D(Tcc), D(Tls) and D(Tfc) demonstrated similar stationarity outcome. Thus, these series are integrated of order, having being tested at level before they become stationary. With this outcome, estimation path suggests a test of autoregressive distributed lag of the variables to ascertain whether or not a significant relationship exists between these variables in the short and long-run.

### 4.3 Autoregressive Distributed Lag Estimate

To determine the short-run and long-run relationship of the variables using the autoregressive distributed lag model, it is in place to specify the level of lag for the estimation (Okunlola, et al, 2020; Nkoro & Uko, 2016; Pesaran, et al 1999). Again, this is performed in the vector autoregressive (Var) environment through to the lag selection path, which could either be done automatically or manually. For the purpose of the study, lag-selection is automatically performed.

#### 4.4 Lag Selection

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-2018.995</td>
<td>NA</td>
<td>3.64e+42</td>
<td>109.3511</td>
<td>109.5252</td>
<td>109.4125</td>
</tr>
<tr>
<td>1</td>
<td>-1862.250</td>
<td>271.1264</td>
<td>1.82e+39</td>
<td>101.7432</td>
<td>102.6140</td>
<td>102.0502</td>
</tr>
<tr>
<td>2</td>
<td>-1837.221</td>
<td>37.88197</td>
<td>1.15e+39</td>
<td>101.2552</td>
<td>102.8225</td>
<td>101.8077</td>
</tr>
<tr>
<td>3</td>
<td>-1776.779</td>
<td>78.41057*</td>
<td>1.14e+38*</td>
<td>98.85293*</td>
<td>101.1169*</td>
<td>99.65109*</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

In determining lag-selection, it is in place to know the various lag selection criteria that can be selected. From the outcome as shown in the table, there is the sequential modified LR test statistic (LR), the Final predictor error (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). To determine appropriate lag length, it is expected that lag selection must agree across these different criteria. Thus, from the result, and because selection is performed automatically, the lag selection is 3. However, determination of lag selection criteria is judged based on the symbol *, which denote the appropriate lag. With this outcome, lag-3 is selected having showed that it is common across lag criteria.
Table 4.4: Table ARDL - Short-Run Estimates

<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>1029.389</td>
<td>487.8509</td>
<td>2.110049</td>
<td>0.0443</td>
</tr>
<tr>
<td>D(GDPCBP(-3))</td>
<td>-0.661208</td>
<td>0.267678</td>
<td>-2.470162</td>
<td>0.0201</td>
</tr>
<tr>
<td>D(TCC(-3))</td>
<td>0.008051</td>
<td>0.008341</td>
<td>0.965176</td>
<td>0.3430</td>
</tr>
<tr>
<td>D(TLS(-3))</td>
<td>0.001600</td>
<td>0.002325</td>
<td>0.688391</td>
<td>0.4971</td>
</tr>
<tr>
<td>D(TFC(-3))</td>
<td>-0.000361</td>
<td>0.000427</td>
<td>-0.843401</td>
<td>0.4064</td>
</tr>
<tr>
<td>GDPBP(-3)</td>
<td>0.233407</td>
<td>0.064554</td>
<td>3.615682</td>
<td>0.0012</td>
</tr>
<tr>
<td>TCC(-3)</td>
<td>-0.021038</td>
<td>0.012218</td>
<td>-1.721913</td>
<td>0.0965</td>
</tr>
<tr>
<td>TLS(-3)</td>
<td>-0.003372</td>
<td>0.001610</td>
<td>-2.094606</td>
<td>0.0457</td>
</tr>
<tr>
<td>TFC(-3)</td>
<td>0.001358</td>
<td>0.000455</td>
<td>2.984150</td>
<td>0.0060</td>
</tr>
</tbody>
</table>

R-squared          | 0.831253    | Mean dependent var | 4280.167   |
Adjusted R-squared | 0.781254    | S.D. dependent var  | 4619.727   |
S.E. of regression | 2160.661    | Akaike info criterion | 18.40653 |
Sum squared resid  | 1.26E+08    | Schwarz criterion    | 18.80241   |
Log likelihood     | -322.3176   | Hannan-Quinn criter. | 18.54471 |
F-statistic        | 16.62534    | Durbin-Watson stat   | 1.386159   |
Prob(F-statistic)  | 0.000000    |                        |            |

Having determined the lag selection criteria, the study proceeded to estimates the short-run relationship existing between the dependent and independent variable. Again lag-3 is used as automatically selected by the system. As show, nine coefficients are reported plus the constant. Four short-run estimates: \( D(GDPCBP(-3)) \), \( D(TCC(-3)) \), \( D(TLS(-3)) \), \( D(TFC(-3)) \); and four long-run estimates: GDPBP(-3), TCC(-3), TLS(-3) and TFC(-3), with their associated coefficients values and their corresponding probabilities. As a criterion, this is reported individually. As such, out of the nine coefficients, five showed that they are statistically significant in the short-run.

4.5 Serial Correlation – Residual Diagnostic

Table 4.5: Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th></th>
<th>F-statistic</th>
<th>Prob. F(2.25)</th>
<th>Obs*R-squared</th>
<th>Prob. Chi-Square(2)</th>
<th>0.0806</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.033312</td>
<td>0.1520</td>
<td>5.036652</td>
<td>0.0806</td>
<td></td>
</tr>
</tbody>
</table>

Again, to check for the presence of serial correlation in the study, the Breusch-Godfrey serial correlation LM test was performed. The essence of this is to ascertain whether or not the variables conform to the basic assumption of classical regression analysis. As of a rule, the \( H_0 \), \( H_a \) is checked against the 0.05 percent level of significance. Thus, from the result, it shows that the corresponding probability value of the F-statistic, which is 0.15, indicate that it is higher than 0.05 percent. In this wise, the null hypothesis of no serial correlation in the model is not rejected. It is thus, evident that the variables as no serial correlation.
Since the variable indicate that it conformed to the basic classic regression model assumption, the study went further to examine the model stability. The essence of this is to ascertain whether or not our model is reliable and whether this can be used for prediction purpose. To do this, the recursive estimate is checked. Basically, the rule is to ascertain the position of the blue-trend line presence in-between the red-line trend within a box-like sharpe. Thus, if this line falls within the red-line box-like sharpe, it is believed that the model is stable. However, when this blue-line wonder away either above or below the red-line trend, it is believed that a significant relationship does not exist. From the result, since the blue-line did not wonder either way, it is said that a significant relationship exists. Thus, it is concluded that the model is largely stable.

### 4.7 Long-Run Estimates

#### Table 4.6: Wald Test

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
<th>df</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>10.68024</td>
<td>(4, 27)</td>
<td>0.0000</td>
</tr>
<tr>
<td>Chi-square</td>
<td>42.72098</td>
<td>4</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Null Hypothesis: C(6)=C(7)=C(8)=C(9)=0

Null Hypothesis Summary:

<table>
<thead>
<tr>
<th>Normalized Restriction (= 0)</th>
<th>Value</th>
<th>Std. Err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(6)</td>
<td>0.233407</td>
<td>0.064554</td>
</tr>
<tr>
<td>C(7)</td>
<td>-0.021038</td>
<td>0.012218</td>
</tr>
<tr>
<td>C(8)</td>
<td>-0.003372</td>
<td>0.001610</td>
</tr>
<tr>
<td>C(9)</td>
<td>0.001358</td>
<td>0.000455</td>
</tr>
</tbody>
</table>

Restrictions are linear in coefficients.

Further, the long-run cointegrating relationship between agro-credit and economic growth is determined. This is ascertained through the use of Wald test. This imply the testing of the coefficients of the series and ascertain whether they are equal to (0) or not. Thus, the long-run coefficients of : c(6)=c(7)=c(8)=c(9)=0 is checked. Again, the outcome of this is determined on the basis of the preferred 0.05 percent level of significance. Worthy of note is the fact that, the corresponding probability produced by the F-statistic is used as a criterion. Thus, from the result, the corresponding probability of the F-statistics rejects the null at 0.000 percent. By implication, a long-run cointegrating relationship exists between agro-credit and gross domestic product. Impliedly, the study proceeded by checking for the speed of adjustment using the error correction mechanism.
4.8 Error Correction Term

Table 4.7: ECT Result

<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>-58.53184</td>
<td>551.0693</td>
<td>-0.106215</td>
<td>0.9161</td>
</tr>
<tr>
<td>D(GDPCBP(-1))</td>
<td>1.089804</td>
<td>0.109930</td>
<td>9.913601</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(TCC(-1))</td>
<td>-0.023209</td>
<td>0.008332</td>
<td>-2.785382</td>
<td>0.0089</td>
</tr>
<tr>
<td>D(TLS(-1))</td>
<td>0.002257</td>
<td>0.001997</td>
<td>1.130470</td>
<td>0.2667</td>
</tr>
<tr>
<td>D(TFC(-1))</td>
<td>0.000155</td>
<td>0.000364</td>
<td>0.424703</td>
<td>0.6739</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.163053</td>
<td>0.051243</td>
<td>-3.181931</td>
<td>0.0032</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.788662</td>
<td></td>
<td></td>
<td>4055.342</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.755640</td>
<td></td>
<td></td>
<td>4595.942</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>2271.902</td>
<td></td>
<td></td>
<td>18.43856</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>1.65E+08</td>
<td></td>
<td></td>
<td>18.69713</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-344.3327</td>
<td></td>
<td></td>
<td>18.53056</td>
</tr>
<tr>
<td>F-statistic</td>
<td>23.88320</td>
<td></td>
<td></td>
<td>2.417346</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Having confirmed a significant relationship in the long-run, the study went further to ascertain whether the series converge eventually in the long-run or not using the error correction term. As a rule, the ECT term is expectedly to be negatively signed while, the corresponding probability should also be statistically significant. With this, it will indicate that the model is fit and that, indeed, a long-run relationship exists.

From the outcome of the estimation, the result showed that the ECT term conform to the rule of thumb having showed that it is negatively signed. Likewise, its corresponding probability showed that the series are statistically significant. In order words, the study concluded that agro-credit is statistically significant in explain gross economic growth in Nigeria.

Conclusion

Having examined the link between agro-credit and economic growth in Nigeria, it is evident that, from the series captured by the study: total credit to cash-crop (which include: oil palm, rubber, cocoa, cotton and groundnut), total credit to livestock (poultry, cattle, sheep, and other livestock), total credit to food crop (grains, roots and tubbers, beans and soya beans, and vegetable) and gross domestic product have a long-run statistically significant relationship. The study, thus, concluded that, agro-credit is significant in explaining economic growth in Nigeria for the period in review.

Recommendation

From the conclusion of the study, it is recommended that authorities continue to sustain (and or increase) the tempo of available credit provision to the agricultural sector for optimal economic benefits. Likewise, they are equally advised to ascertain credit provision with the most contributory impact on economic growth.

References


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