

# Agricultural Credit and Economic Growth Nexus. Evidence from Nigeria

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**Abstract** *The significant role of agricultural sector cannot be underestimated in any nation. It has been the source of feeding of the populace and income generation for other developmental activities. As a result, various governments have been making concerted efforts to improve economic growth and agricultural productivity through agricultural credit but rarely one can see any improvement in the sector. It is in line with these its fundamental role that this study makes a giant stride to examine the relationship between agricultural credit and economic growth in Nigeria. The study employed time series data from Central Bank of Nigeria, Statistical Bulletin and National Bureau of Statistics which spanned from 1986-2014. This study carried out Auto-Regressive Distributed Lag (ARDL) approach to investigate the variables. The findings showed that short and long run relationship existed between agricultural credit and economic growth in both short and long run respectively. Moreover, real exchange rate and private domestic investment as control variables had direct effect on economic growth whereas inflation rate revealed an inverse relationship in the model. The study concluded that economic growth is influenced by dynamic variables such as credit to agricultural sector, real exchange rate, real interest rate, private domestic investment and inflation rate in Nigeria. The study therefore suggested that concerted efforts should be made by policy makers to increase the level of productivity of agricultural sector in Nigeria through adequate credit to the sector so as to boost the growth of the economy.*

**Key words** Agricultural credit, agricultural sector, autoregressive distributed lag, economic growth

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## 1. Introduction

Agriculture holds the potential in accelerating the pace of economic growth and development of several countries of the world. It is the largest single employer and contributor to GDP in most of African countries (IFAD, 2001). In Nigeria, during the pre and immediate post Independence era, the economy was predicated on agriculture. Agriculture contributed 90% of the Nation's GDP and foreign exchange before oil boom was discovered in Nigeria in early 1970s in commercial quantity and also provides subsistence for two third (2/3) of Nigerians who are low income earners in the economy.

Agriculture credit is essentially a development strategy in a variety of ways. It promotes agricultural investment and adoption of technology necessary to spur economic growth. Although, agriculture finance is only one of the growth factors, it is one of the more important factors in attaining the objectives for development. Mallik (2008) identified three gaps as problems to growth of agriculture in most African economies. The gaps are (i) savings gap, (ii) trade balance gap and (iii) fiscal gap. In general, most African countries (Nigeria inclusive) have inadequate levels of domestic savings, which could be directed to investment.

Apart from employing about 51.3% of labour force in Nigeria and accounting for 70% of GDP of the non oil sector (Bureau of Statistics, 2010). It also contributed more than ¾ of export earnings (Linda, 2001). Nigeria is still endowed with huge expanse of fertile agricultural lands, as well as, other resources that can be harnessed to transform the economy. In spite of these potentials reported that the sector is still construed by low productivity. For instance, its contribution to GDP averaged 12% in the 1970s, which

resulted in rising import bills leading to huge deficit in the balance of payment. Accordingly, fulfilling its traditional role of food provision, employment and foreign exchange generation has been constrained by various socio-economic and financial related problems among which are: poor funding, inadequate credit to local farmers and agro-firm's owners, as well as, unstable macroeconomic policies. In support, Alabi and Chime (2008) have attributed the present economic problem in Nigeria to the poor performance of the agricultural sector. Apart from oil discovery and the oil boom of the early 1970s which resulted in the negligence of the agricultural sector, Iwayemi (1994) and Ijaiya (2000) likened the dismal performance of agricultural sector to the effect of global economic crisis of the 1980s and the continuous decline in government finance to the sector.

In Africa, government spending on agriculture and health was particularly strong in promoting economic growth. Asia's investments in agriculture, education, and defence had positive growth-promoting effects. However, all types of government spending except health were statistically insignificant. They also showed that growth in agricultural production is most crucial for poverty alleviation in rural areas. Agricultural spending, irrigation, education and roads all contributed strongly to this growth. Disaggregating total agricultural expenditures into research and non-research spending revealed that research had a much larger impact on productivity than non-research spending. There are also some studies which attempted to link government spending to agricultural growth and poverty reduction.

In recognition of the role of agricultural sector, successive government have formulated and implemented several financial programmes all aimed at ensuring availability of funds to agricultural sector in order to boost real sectors thereby lead to economic growth and development. Among the arrays of such financial Schemes include: the establishment of the Nigerian agricultural Cooperative bank (NACB) in 1973, establishment of the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977, introduction of the mandatory sectoral allocation to agriculture in 1972, launching of the rural banking Scheme in 1977, setting up of the Commercial Agriculture credit Scheme in 2009, launching of the Agricultural Credit Support Scheme (ACSS), as well as, the merging of NACB, People's bank and the Family Economic Advancement Programme (FEAP) to form the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) in 2000.

A number of government policies and programmes have been designed to facilitate the flow of these credit to farmers' in order to mechanize and improve agricultural activities which ultimately should enhance food sufficiency, increase farmers' income, provide essential raw- materials for the local agro-based industries and to reduce importation of agricultural products in the economy. To achieve these, CBN has given directives to commercial banks which are part of the financial Institutions saddled with the responsibility of mobilizing credit to agricultural sector. Despite the existence of several financial institutions, credit requirements of farmers are often not met. In most cases where funds are given by banks, delay in disbursement of loans approved by government constitutes an impediment (Aku, 1995). Most times, these loans get to the farmer after the planting season thereby resulting to diversion and subsequent default. With the high rate of loan default that characterized developing countries, Commercial banks seldom approve loans to farmers and often times do so at higher interest rates with other stringent conditions such as the provision of collateral (Bassey *et al.*, 2014a). In support, Shekhar and Shekhar (2005) reported that commercial banks are discouraged from devoting their attention to agricultural sector because of the economic nature of land holdings, the poor resources of agriculturists and lack of securities acceptable by banks. The extent and the magnitude of this credit have actually affected the farmers and undermined over the years.

Currently in Nigeria, a large percentage of farmers especially the rural farmers are poor and the level of poverty has been exacerbated by the decline in agrarian productivity and astronomically increases income inequality. The inequality income coefficient is 0.49 in the rural areas and 0.54 in the urban areas respectively (MDG's Report, 2005). Also, the rapid growth in importation of some agrarian products which hitherto formed the bulk of the agricultural exports produced mainly by small holder farmers is rising despite the credit facilities. In 2003 alone, Nigeria imported over 183,000 mt tons of palm of oil, 95,000 mt tons of cotton, 431,000 tons of maize and until the ban on rice importation; Nigeria has been spending an average of 60 million USD in importation of rice annually (Bernard, 2007).

All efforts put in place to achieve economic growth through the agricultural credit over the years prove abortive, coupled with the agricultural credit policies/ programmes initiated to improve the sector in

such a way that other real sector would be in advantageous in providing the raw materials. It is expected that at the end of all these, economic growth, increase in food production, per capita income, reduction in poverty and income inequality could be achieved in Nigeria. Hardly one can achieve any of these parameters in Nigerian economy over the years. Essentially, it is not uncommon to see most of agro industries with low records and also closure of the few industries who cannot cope with the unavailability of essential raw materials needed for production. It is obvious that agricultural production especially food is an economic and political issue in Nigeria today. The current problem associated with high cost of food cannot be separated from the general health of the economy because of its adverse effects. These problems are of interest not to the government alone, who will prefer a moderate increase in food prices but they are also of great concern to the consumers whose earnings are being eroded by the high prices of food. Therefore, it has become imperative to investigate the factors that might have been responsible for this and also, any economy that cannot provide sufficient foods for her nationals as well as, agro industries becomes very uncertain to enhance economic growth and development. Thus, this study seek to examine the relationship between agricultural credit and economic growth in Nigeria between 1986 and 2014 using stationary, co-integration test and modified ordinary least square (FMOLS) approach. Several questions have been raised and these include what are the significant effects of agrarian credit on economic growth in Nigeria? What are the sources of agriculture finance in Nigeria? How does agriculture credit affect the economic growth in Nigeria? What is the relevance of agriculture sector on economic growth, the cause of agricultural backwardness and how the present state of Nigeria agricultural productivity will be improved? In doing this, the paper is organized into five sections. Following this introduction is section two, that contains the review of related literature, section three discusses econometric methodology, section four presents empirical results and analysis and, section five presents conclusion with policy implications.

## 2. Literature review

Finance plays an important role in the process of agricultural development, and having access to credit facilities for farming purposes is an incentive for increasing the agricultural sector's performance. It is important that financial resources be made available to create access for farmers to contribute to agricultural development. Olagunju and Ajiboye (2010) analyzed that the lack of a formal national credit policy and the inadequate number of credit institutions in Nigeria is a major cause for the decline in the contributions of agriculture to the economy. Agricultural credit can be defined as the mobilisation of resources at all levels in order to increase production and productivity in agriculture and to enhance the productive capacity. Agriculture credit in an emerging world could have positive effects on the growth of gross domestic products, which translates to the entire economy's wellbeing. Agriculture credit/finance brings about growth and it solves the problems militating against the agriculture sector's productivity. It plays the role of an effective engine for growth for most agriculture-based countries (ADB, 2000). Also at the instance of high population growth rates, there is a pressure on low input/ output agricultural systems to accelerate increase in food production through finance. Estimates show that GDP growth originating in agriculture is at least twice as effective in reducing poverty as GDP growth originating outside agriculture (WDR, 2008). The study by Adesina (2006) stated that agriculture finance provides an increased productivity, economic sustainability, poverty reduction, business opportunities, institutional changes, innovation incentives and improvement of economic growth in Nigeria.

Shreiner and Yaron (2001) define agriculture credit refers to (public or private) resources (in form of equity, gift or loan) for improving social welfare through development of agricultural sector. It encompasses not only government funds but also funds of non-governmental organizations that use matching grants to attempt to promote community and sector development, income equality and local empowerment. Public funds are subsidized funds and private funds regardless of their price, are not subsidized, unless a contribution is tax free or the market price is affected by an explicit or implicit state guarantee of the liabilities of a development finance institution. The agricultural credit/finance can be divided into the non-debt (non-leverage) and debt (leverage) categories. Thirlwall (1976) analyzed that debt represents fund with fixed contractual financial obligations, to which the resources of a nation might be pledged as collateral. To cope adequately, in the long-run, a nation's debt-servicing capacity must grow at a rate not less than the growth rate of its debt burden (Ariyo, 1999). Non-debt funds on the other hand, do

not impose fixed or compulsory servicing obligations on the nation. The regularity and magnitude of non-debt resource flows, however, depend on perceived country risk, relative investment yield and enabling factors such as the quality of governance in Nigeria.

The study by Zavatta and Douette (2010), a credit guarantee is a commitment by a credit guarantee scheme (CGS) (the guarantor) regarding the repayment of a loan received by an enterprise (the borrower) from a commercial bank (the lender). Credit guarantee places insurance or a cover on debtors in favour of the issuing credit institution (banks). In order to lessen the financing constraints faced by small businesses, governments, NGOs and the private sector have developed initiatives such as credit guarantee schemes (OECD, 2009). Credit guarantee is a powerful business tool that enables banks to offer extensive credit facilities on more favourable terms due to the fact that debtors are credit insured. It also gives confidence to the debtor to explore new business opportunities without the fear of customer's insolvency or payment default refers to annual increase in productivity which is often measured by gross domestic product (GDP).

On the other hand, economic refers to annual increase in productivity which is often measured over a given period of time. It also implies that economic growth is synonymous with a sustained rise in national output, provision of wide range of economic goods, presence of improved technology and institutional, attitudinal and ideological adjustments. The role of financial capital as a factor of production to facilitate economic growth and development as well as the need to appropriately channel credit to rural areas for economic development of the poor rural farmers cannot be over emphasized. As Rahji (2008) put it, credit (capital) is viewed as more than just another resource such as labour, land, equipment and raw materials. In the same way, Shepherd (2002) stated that credit determines access to all of the resources on which farmers depend. Consequently, provision of appropriate macroeconomic policies and enabling institutional finance for agricultural development is capable of facilitating agricultural development with a view to enhancing the contribution of the sector in the generation of employment, income and foreign exchange (Olomola, 1997). Also, higher level of investment (gross capital formation) should stimulate growth while agricultural productivity is expected to have a positive effect on aggregate economic growth. Similar to Hwa (1988), export expansion is expected to have a positive effect on growth while macroeconomic instability, captured by high inflation rates, should have a negative effect on economic growth. It has been noticed by Enoma (2010) that countries at the early stages of development depend almost fully on agricultural growth for employment, foreign exchange, government revenue and food supply to the teemed population. In this sense, agricultural growth is the key impetus to the growth of underdeveloped and developing countries.

Finance for agricultural development has an increasing role in contemporary times. According to Nzotta and Okereke (2009), finance affects economic growth, stagnation or even decline in any economic system. The Nigerian government recognises that finance is an essential tool for promoting agricultural development because the agriculture sector is one of its main sources of sustainability. Access to finance for agriculture is an incentive for increasing the agricultural sector's performance; it stimulates productive growth, and supports the survival of small and new enterprises. Adams and Mortimore (1997) noted that access to finance increases the average inputs of labour and capital which has positive effects on production output. Irrespective of the benefits that can be derived from financing agriculture, there is an inherent risk of loan defaults amongst farmers, which discourages banks from lending to farmers.

Beck and Demirguc-Kunt (2006), specific financing tools can be useful in facilitating greater access to finance. The government of Nigeria, being fully aware of the need of progressive policies has introduced various initiatives and policies to attract finance to enhance agriculture productions dating back to the 1970s. Such policies have mainly been in the form of specialised agriculture lending, the supply of credit finance by the commercial banks in favour of the agriculture sector and through various programmes. While some of these efforts have failed, the operation of the remaining leaves one to wonder if they are actually achieving their intended objectives as rural poverty is on the increase and yet a large portion of the population is engaged in agricultural activities (Iheancho *et al.*, 2006).

The role of agricultural credit in enhancing agricultural growth and development cannot be overemphasised. According to Olomola (1997), the agricultural credit guarantee system is often considered as an effective policy instrument for improving the production and distribution of agricultural commodities. Rahji (2010) affirmed that credit finance is more than just another resource such as labour, land, equipment and raw materials. Under the agricultural credit guarantee scheme (ACGS), the government guarantees

credit finance given to farmers from the commercial banks while it is supposed to achieve agricultural growth through increased production.

The low volume of business in the rural areas where poverty is most prevalent cannot guarantee sustainable business activities to encourage the establishment of commercial banks to provide the needed finance for agricultural production. Moreover, the cost implication of processing agricultural loans in the rural economy makes it unattractive for conventional banks to channel their resources to farming. Although, the commercial banks finance agricultural activities but their credits are urban based and so small that their impact cannot be felt in the rural areas where farming actually takes place. Lack of priority attention to rural population in credit delivery by commercial and other banks in the economy contributed to the depressed economic conditions in the rural economy, and this situation also affects the overall economic growth and development of the nation (Bamsisele, 2006).

Classical theorists led by Arthur Levis' in 1950s viewed economic development as a growth process of relocating factors of production, especially labour from an agricultural sector characterized by low productivity and the use of traditional technology to a modern industrial sector with higher productivity. The continuation of agriculture to development was passive and such that agriculture acted more as a source of food and labour than a source of growth. Although passive, agricultural development was seen as necessary for successful economic transformation for two reasons: (i). to ensure the supply of food and prevent rising food prices and real wages from undermining industrial development and (ii). to utilize land as an additional "free" source of growth that would not compete with resources for industrial growth. The contribution of agriculture to aggregate economic growth could be modelled via its effects on total factor productivity or as an intermediate input in the industrial production sector (Ruttan, 2000). Early development theories viewed agriculture as an important source of resources to finance the development of the industrial sector. Thus, agricultural production growth serves as an engine of growth for the overall economy. As Hwa (1988) affirmed that agriculture is an engine of growth and added agriculture to the standard Solow-Swan growth equation as a measure of linkages between the rural and industrial sector of the economy.

There has been extensive empirical studies examined the relationship between agricultural credit and economic growth across the global. Rhaji (2008) considered the impact of agriculture on Nigerian economy used OLS. He found out that, the lack of adequate, accessible, and affordable credit is among major factors responsible for the systemic decline in the contribution of agriculture to Nigerian economy. Ayoola and Oboh (2006) examined the effect of agricultural production on the growth of the economy. They found out that every segment of agricultural production requires the availability of adequate capital since capital determines access to all other resources on which farmers depend. The finding showed that agricultural credit if well applied, encourages capital formation and diversified agriculture, increases resource productivity, size of farm operations, innovations in farming, marketing efficiency, value added and net farm incomes and thereby leads to economic growth. In the same direction, Oboh (2008) carried out farmers' allocative behaviour in credit utilization in Benue State used error correction model approach. The study revealed that the usefulness of any agricultural credit programme does not only depend on its availability, accessibility and affordability, but also on its proper and efficient allocation and utilization for intended uses by beneficiaries. In spite of the importance of credit in agricultural production, its acquisition, management and repayment are replete with a number of problems.

In contrary, Awoke (2004) examined the factors affecting loan acquisition and repayment patterns of small holder farmers in Nigeria. The study revealed that high rate of default arising from poor management procedures loan diversion and unwillingness to repay loans have been threatening the sustainability of most public agricultural credit schemes in Nigeria.

In Nigeria, Oboh and Ekpebu (2010) used ordinary least square to examine the determinants of formal agricultural credit allocation to the farm sector. The study found out that there is the need to critically assess factors affecting the rate of credit allocation by beneficiaries of NACRDB. A detailed understanding of these factors may provide necessary information towards designing a more effective and sustainable credit system that can serve poor farmers better. Akintola (2004) used autocorrelation to carry out a study on the role of banking industry in financing agriculture. He identified banks' traditional roles to include financing of agriculture, manufacturing and syndicating of credit to productive sectors of the economy. More so, Adekanye (2005) used panel data threshold to analyze the role of banks on the growth

of Nigerian economy. The study observed that in making credit available, banks are rendering a great social service, because through their actions, production is increased, capital investment are expanded and a higher standard of living is realized. Again, Udoh (2011) examined the relationship between public expenditure, private investment and agricultural sector growth in Nigeria over the period 1970-2008 using the bounds test and autoregressive distributed lag model and error correction model. He found that an increase in public expenditure has a positive influence on the growth of the agricultural output. However, foreign investment has insignificant impact in the short run on agricultural output.

Using social accounting matrices, Vogel (1994) examined the strength of agriculture as a factor of growth for 27 countries. He discovered that agriculture through its linkages leads to positive integration of the sector with the broader economy and in all 27 countries, agriculture served as a great source of economic growth in the early stages of development and its significance begins to diminish as the countries started advancing industrially. In line with Collin and Duffy (2002) showed the importance of agriculture in the early stages of development. Analyzing data for 62 countries for the period of 1960 to 1990, the authors found that growth in agricultural productivity was quantitatively important in understanding growth in GDP per worker. Both the cross-section and panel data analysis showed that countries experiencing increase in agricultural productivity were able to release labor from agriculture into other sectors of the economy.

In China, using data from 1985, Fan, Chan-Kang and Mukherjee (2005) estimated an econometric model to compare the relative contributions of rural and urban agricultural growth to poverty reduction in those areas. The authors discovered that higher growth in agriculture reduced both rural and urban poverty. Based on data from a broad sample of developing countries in the early 1970 and mid 1980s, Bourguignon and Morison (1998), using cross-country regressions for each time period separately and there for the pooled data observed that increasing agricultural productivity was the most effective path for many countries to reduce poverty and income inequality.

In Ghana, Nketia-Amphonsah (2009) considered aggregated government expenditure retarded economic growth, and found that expenditures on health and infrastructure promoted economic growth whereas expenditure on education had no significant impact in the short run. Similar result by Kweka and Morrissey (2000) in Tanzania found that increased productive expenditure (physical investment) has a negative impact on growth but consumption expenditure has a positive impact. The expenditure on human capital investment was insignificant while aid appears to have a positive impact on growth in Tanzania.

Oshikoya (2002) employed a macro-sectoral model while analyzing the impacts of expanded domestic spending of externally borrowed funds directed towards increasing the productivity of a specific sector of the Nigerian economy. The results of model simulation suggested that the important policy priority is to increase the share of agricultural sector's public investment expenditure financed through concessional foreign borrowing as higher investment are required for research, high yielding varieties and anti-diversification programme.

Sohail, Caki and Brooks (1991) studied the relationship between agric credits and agricultural output in Pakistan using Vector Auto-Regression. They found that a statistical significant relationship existed between agricultural credits and purchase of agricultural inputs. These inputs significantly correlated to productive growth of agricultural output.

Other studies in Nigeria, Raji and Fakayode (2009) identified the determinants influencing commercial banks' decision to ration credit in Western Nigeria. Data analyzed were from agriculture credit transaction banks in Nigeria. Evidence from the Multinomial Model estimated shows that borrowers are heterogeneous. Also, Ibrahim (2009) examined the effects of loan utilization on the output of youth rice farmers in Niger State. In analyzing the data, simple descriptive statistics and t-test was used to compare the mean output of credit beneficiaries and non-beneficiaries. The study revealed a significance difference in the mean output of rice farmers who utilized loan (1, 375 kg/h) with those without credit which was (275kg/ha). Furthermore, using the time series simple linear forecasting model, Muftan (2002) examined the trend of commercial banks credits to the agricultural sector and made a forecast of the amount of commercial banks' credit that would be needed to boost the contribution of the agricultural sector to the nation's agric output in the next 10 years (i.e. from 2003-2012). If policy measures such as low exchange rate and interest rate regimes are put in place. Isijola (2002) using Pearson Correlation Coefficient revealed a significant relationship between credit supply and agricultural output in Nigeria. He identified commercial

banks' loans and advances, Agricultural Credit Guarantee Scheme as the determinant of agricultural credit supply in Nigeria.

Shanggen, Peter and Sukw (1998) employed the OLS method in their empirical analysis on government spending, growth and poverty and supported the view that government spending enhances the growth in agricultural productivity. His managerial analysis also shows that additional government expenditures on agricultural research and extension have the largest impact on agricultural productivity and output. The study of Chilonda, Zhikhali and Musaba (2010) is in agreement with Shanggen, *et al.* (1998) found that government spending contributed to agricultural production growth and poverty reduction.

Njoku and Odii (1991) examined credit repayment performance. Employing the OLS method of regression they reported repayment performance of 27 percent in South East and attributed this to low enterprise returns, diversion of loans to non agricultural enterprises and political consideration in loan approval. In South West, they recorded a loan recovery rate of 67 percent concluding that enterprise profitability and loan percentage given in kind were significantly and positively correlated to percentage of loan recovered.

Oguamanam (1996) examined the impact of commercial bank agricultural credit to agricultural sector in Nigeria used ordinary least square method. He found that commercial banks' loans and advances has positive relationship with the level of agricultural output, Federal government capital expenditure contributed positively to the growth of agricultural output in Nigeria. In the same vein, Enoma (2010) investigated the impact of agricultural credit and economic growth using ordinary least square approach in Nigeria. The result showed that agricultural credit and exchange rate have positive impact on economic growth over the years.

Other recent studies in Africa on economic growth and public expenditure have been done mostly in Nigeria (Akpan, 2005; Maku, 2009; Udoh, 2011; and Loto, 2011) and a few other countries including Ghana (Nketia-Amphosah, 2000); and Tanzania (Kweka and Morrissey, 2000). Their findings from these various African studies are equally mixed results. As noted by the World Bank (2000) agricultural and rural sector had suffered neglect and under investment in the last twenty years. The World Bank in its report called for greater investment in agriculture in developing countries. They warn that the sector must be placed at the centre of development agenda of the countries, if the goals to reduce poverty and hunger by 2015 are to be realized. In nutshell, there is no consensus on the actual relationship between agricultural credit and economic growth nexus; conclusions of these studies are different, some found positive, negative and little or no relationship due to different economies, different methodologies and different period of covered in different studies. The earlier studies are limited in scope and to make this work different from the previous studies, to add to existing body of knowledge and literature in Nigeria. Thus, the main aim of this study is to re-investigate the relationship between agricultural credit and economic growth using ARDL approach in Nigeria.

### **3. Methodology of research**

This study used annual time series data which include credit to agricultural sector, exchange rate, interest rate, private domestic investment inflation rate and economic growth in Nigeria. The data were sourced from the Development World Index and Central Bank of Nigeria statistical bulletin between 1986 and 2014 using ARDL in the model. The ARDL is applied to estimate both the short and long run coefficients and it is standard least squares regression which entail lags of both response and independent variables as regressors in the model. One major merits of ARDL over other estimation methods is that OLS estimation yields consistent estimates of the parameters when the variables are all 1(0) or 1(1) or when some are 1(0) and 1(1) and this simply implies that long run relationship exists between the variables (Pesaran and Shin, 1998). In the same vein, Pesaran and Smith (1995) revealed that standard inference can be examined on the short and long run parameters if it is not known *a-priori* proposition which variables are 1(0) and 1(1) in the estimation.

#### **3.1. Model specification**

This study adopts Enoma (2010) model with little modification. According to this model, economic growth is a function of credit to agriculture and exchange rate. This is written below:

$$\text{ECONOG} = F(\text{CRTA}, \text{REER}) \quad (1)$$

Where:

ECONOG is the economic growth, CRTA is the credit to agricultural sector, REER is the exchange rate.

However, for the purpose of this research work, the Enoma (2010) model is modified as:

$$\text{ECONOG} = F(\text{CRTA}, \text{REER}, \text{INTR}, \text{PDI}, \text{INFR}) \quad (2)$$

Where,

Essentially, interest rate, private domestic investment and inflation rate was introduced into the estimated model; this is because agriculture credit influenced other macroeconomics variables aforementioned in the economy. No wonder, agricultural sector was recognized to be the back boned of Nigerian economy before oil boom was discovered. Thus, it becomes imperative to incorporate the variables in order to have better understanding between the variables in Nigeria.

Econometrically, the equation (2) is written as:

$$\ln \text{ECONOG}_t = \beta_0 + \beta_1 \ln \text{CRTA}_t + \beta_2 \ln \text{REER}_t + \beta_3 \ln \text{INTR}_t + \beta_4 \ln \text{PDI}_t + \beta_5 \ln \text{INFR}_t + U_t \quad (3)$$

Where,

$\ln \text{ECONOG}_t$  = log of economic growth,  $\ln \text{CRTA}_t$  = log of credit to agricultural sector,  $\ln \text{REER}_t$  = log of exchange rate,  $\ln \text{INTR}_t$  = log of interest rate,  $\ln \text{PDI}_t$  = log of private domestic investment,  $\ln \text{INFR}_t$  = log of inflation rate,  $U_t$  = random error and  $t$  = time period respectively.

In ARDL approach therefore involves estimating both the short and long run relationship between the variables in the model, the equation (3) is specified as follows:

$$\text{ECONOG}_t = \beta_0 \sum_{i=1}^p \beta_1 \text{ECONOG}_{t-1} + \sum_{i=1}^p \beta_2 \text{CERTA}_{t-1} + \sum_{i=0}^p \beta_3 \text{INTR}_{t-1} + \sum_{i=1}^p \beta_4 \text{Zit}_{t-1} + \gamma_1 \text{ECONOG}_{t-1} + \gamma_2 \text{CERTA}_{t-1} + \gamma_3 \text{INTR}_{t-1} + \gamma_4 \text{Zit}_{t-1} + \mu_1 \quad (4)$$

Where  $\beta_0$  is the drift component;  $\sum_{k=0}^n$  is the summation signs represent the error correction; assumed to dynamics with for the first part of the equation corresponds the short run relationship whereas the second part of the equation with  $\gamma$  represent the long run relationship respectively.

ECONOG is the economic growth, CERTA is the credit to agricultural sector and INTR is the real interest rate as the key variables whereas Z = private domestic investment (PDI), inflation rate (INFR) and real exchange rate (REER) as control variables in the model. Based on the literatures, agricultural credit is expected to have positive sign with economic growth since an increase in agricultural have the tendency to boost agricultural output thereby lead to economic growth. Also, real interest rate is theoretically expected to have negative relationship with economic growth in the model. Furthermore, exchange rate theoretically needs to be a positive sign. More so, positive relationship is expected to exist between private domestic investment and economic growth in the estimated model. Finally, the inflation rate creates a negative effect in every economy. Thus, it is expected that the coefficient of inflation rate in the model should be negatively related with that of economic growth in Nigeria.

### 3.2. Analysis of empirical results and interpretation

The Autoregressive Distributed Lag (ARDL) bound testing approach does not demand for pre-testing of stationary-unit root test and co-integration for the determination of short and long run irrespective of their order integration (Pesaran, Shin, and Smith, 2001). Using ARDL approach captured both the short and long run within the estimated model. In most cases, the critical value of the ARDL Bound testing is a



function of selected lag length: for the purpose of this study, the optimal lag (p) is determined empirically employed Akaike’s information Critical (AIC). The results of ARDL summarized below.

Table 1. The Empirical Result of ARDL Bound Test

F-statistics	5.865182	
% critical levels	Critical value for Bound test	
Significance	1(0) Bound	1(1) Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Researcher’s Computation, 2016.

Table 1 reported the computed F statistic value in the ARDL estimated model and it was that the value of F\*\* is greater than the upper critical value bound test. The findings revealed that credit to agricultural sector (CRTA), real interest rate (INTR), private domestic investment (PDI), consumer price index (INFR) and real exchange rate (REER) significantly influenced economic growth in Nigeria between the period of investigation. However, given the above results, ARDL test revealed sufficient results that null hypothesis (H<sub>0</sub>) should be rejected and accept alternative hypothesis (H<sub>1</sub>) that there is statistically significance between credit to agriculture and economic growth. This finding agreed that long run relationship existed between the variables in the model in Nigeria.

Table 2. Short Run Relationship of the Variables Employing ARDL Approach

Regressors	Coefficient	probability
CRTA (-1)	4.239859	0.00347
PDI (-1)	0.039507	2.70651
INFR (-1)	-0.143446	0.0000
ECM (-1)	-0.989924	0.0041

Source: Researcher’s Computation, 2016.

Table 2 showed that the run estimate dynamic coefficient for the estimated model over the period of study. The lagged error correction term ECM (-1) included in this model to capture the long run dynamics between the co-integrating series is correctly signed (negative) and statistically significant. The coefficient indicates adjustment of 98% from actual changes in the previous year. This adjustment implies that errors are corrected within one year/lesser than one year. The ECM also revealed a long-run relationship between independent variables (CRTA, REER, INTR PD and INFR) and response variable (EXCH) in this model. The findings confirmed that short run relationship between the variables. Furthermore, direct relationship existed between credit to agriculture and private domestic investment and economic growth while inflation rate showed an inverse relationship in the model.

Table 2. Long Run Relationship of the Variables Employing ARDL Approach

Regressors	Coefficient	probability
CRTA	-2.769689	0.0040
REER	0.067301	0.0131
R <sup>2</sup>	0.922415	
DW*	2.609192	

Source: Researcher’s Computation, 2016.

From the above Table 3, the table revealed long run relationship between some of the variables in the model. From the result, credit to agriculture, real exchange rate and economic growth showed long run

relationship in the model. Moreover, in long run, an inverse relationship existed between credit to agriculture and economic growth. The reason for this could be, excess funding of the agricultural sector after a while may not have any effect on the sector, and such funding may be subject to private use which will not have any effect on economic growth. However, positive relationship existed between real exchange rate and economic growth in long run. This result is in agreement with the *a-priori* expectation in the estimated model. Furthermore, the adjusted R<sup>2</sup> showed the predictor power of a model and it is derived to be 0.922415 in the model. This implied that explanatory variables explained about 92 per cent systematic variation on economic growth over the observed years in Nigeria, while the random or stochastic term accounts for the remaining 8 per cent variation in ECONOG, outside (exogenous) the model. Finally, the Durbin-Watson test is used in detecting the presence of auto-correction. This implied that there is absence of auto-correction in the estimated model.

#### 4. Conclusions and policy implications

This study basically examined the relationship between the agricultural credit and economic growth in Nigeria for period 1986 to 2014 using ARDL approach. Data were generated from the Central Bank of Nigeria Statistical Bulletin and Annual Abstract of Statistics of National Bureau of Statistics (Various- Issues). The findings confirmed short run relationship existed between credit to agriculture, private domestic investment, inflation rate and economic growth in the short run whereas long run relationship also existed between credit to agriculture, real exchange rate and economic growth. Furthermore, the study revealed that agricultural credit acts as the major impetus that drives the economic growth because agrarian sector referred to as an engine of growth in other real sectors in the economy.

In order to enable the agricultural productivity to take full advantage of the various opportunities and cope with challenges, credit to agricultural sector must be adequately make fund and properly put at check at all time. This must be done in relation to appropriate fiscal and monetary policies to ensure other macroeconomic stability. With these results, it is important to highlight that there is a need to implement prudent macroeconomic policies in order for a country to derive maximum benefits from the agricultural sector; care must be taken so that over envisage or under will not distorts other macro objectives. In conclusion, the findings also call for reforms in both fiscal and monetary policies for the effectiveness and efficient use of credit to agricultural sector to play to the fullest advantages in order to improve agricultural output, more income generation, employment opportunities and also boost other sector within and outside the economy. Essentially, an effective management and monitoring of all these key variables will in no doubt boost economic growth in Nigeria.

The study therefore suggested that government should evolve policies toward diversifying the economy and encouraged the campaign for improvements in the non-oil sectors of the economy especially agricultural sector. More so, because of the shortfall in agricultural output as a result of poor credit finance by government as revealed in the study, government should be more proactive in insisting on the private sector, especially, the financial sector to set aside funds annually for agricultural financing to compliment government efforts. Additionally, the study showed that even where funds are available, most of the farmers may lack the knowledge of the existence of such funds. This makes it difficult for such funds to be accessible to farmers to enhance agricultural production. As result, government should make efforts through its agencies to enlighten farmers of the availability of such credit facilities. Finally, there is the need to implement prudent macroeconomic policies in order for the economy to derive maximum benefits from real sector in order to enhance economic growth in Nigeria.

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