The Role of Commercial Banks on Agricultural Development in Nigeria: (1980-2015) – Hac - Consistent Covariance OLS Estimation Method

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Abstract

This study examined the role of commercial banks on agricultural development in Nigeria for the period 1980 to 2015 using time series data obtained from the statistical bulletin and annual reports of the Central Bank of Nigeria, 2015. Augmented Dickey-Fuller unit root test and the Newey-West, HAC ordinary least square method were employed as analytical tools in the study. Real agricultural gross domestic product, the proxy for economic development, was explained by commercial bank loans to the agricultural sector, real interest rate, government recurrent expenditure on agriculture and government capital expenditure on economic services. Regression results showed that commercial bank loans to agriculture had a positive but insignificant impact on real agricultural gross domestic product while real interest rate and government recurrent expenditure on agriculture had significant negative impact on real agricultural product. The value of the coefficient of determination (R^2) of 0.98 showed that the exogenous variables in the regression equation explain over 98% of the systematic variations in real agricultural gross domestic product. The study concluded that the insignificant positive impact of commercial bank loans on agricultural development may have been due to the small portion of total bank credit received by the agricultural sector. It was therefore recommended that commercial banks should be encouraged to recognize the importance of the agricultural sector and grant more loans to agriculture. The government on its own part should pass an act of parliament mandating commercial banks to grant more loans to farmers without unnecessary prerequisites and at low interest rate, while government expenditure on agriculture should be increased and its utilization highly monitored.

Keywords: Commercial banks, agricultural development, unit root test, HAC-consistent covariance estimator, autocorrelation

1.0 Introduction

Agriculture involves the cultivation of land, raising and rearing of animals for the provision of raw materials for industries. It involves cropping, livestock, forestry, and fishing, processing and marketing of these agricultural products (Anyanwu, Oaikhenan, Oyefusi and Dimowo, 1997). Food is man`s most important basic need before those of clothing and shelter. Its provision therefore, has been the major concern of man from the beginning of time since it is both an essential condition and sine-quanon to life. Agriculture being the provider of food can then be concluded as the life wire of any nation and thus its importance cannot be overemphasized.

Agriculture represents one of the most important sectors of the Nigerian economy. It is particularly important with regards to its employment generation and contribution to gross domestic product (GDP) and export revenue earnings. Despite its rich agricultural resource endowment, however, the agricultural sector in Nigeria has recorded very low growth rate. Less than 50% of the country's cultivable agricultural land is under cultivation (ANAP, 2005).

In addition to this, smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land (Manyong, et. al., 2005). The smallholder farmers are limited by various constraints among which is poor access to credit which is a major militating factor against agricultural production and development in Nigeria. Credit delivery to the agricultural sector has been recognized as a major input in the growth of the sector in Nigeria (Olomola, 1990). The decline in the contribution of the sector to the Nigerian economy has been blamed on the lack of a formal national credit

policy and paucity of credit institutions, which can be beneficial to farmers and small and new business operators engaged in agriculture and agro-allied businesses (Rahji and Adeoti, 2010).

The federal government of Nigeria has severally instituted various agricultural financing policies through schemes, programmes and institutions, aimed at improving agricultural production capabilities, to alleviate the standard of living and place the sector in the forefront of government's development strategy. Eze (2010) opined that the objective of these policies in Nigeria is to establish an effective system of sustainable agricultural financing schemes, programmes and institutions that could provide micro and macro credit facilities for the micro, small, medium and large scale producers, processors and marketers. The Central Bank of Nigeria (CBN) on its part has shown interest in the development of the nation's agricultural sector which is dominated by smallholder farmers who share the funding problems that the sector is confronted with. Limited access to credit facilities has been one of the factors hindering the growth and productivity of the agricultural sector (Ammani, Alamu, and Kudi, 2010). Credit allows farmers and others involved in agro-allied businesses to utilize to their benefit inputs and factors of production by granting them additional access to resources through the removal of financial constraints. The provision of credit will reduce the costs of capital intensive technology and assets relative to family labour. Thus, instead of growing low yielding local crops, for example, access to credit may allow an increased use of improved seeds and fertilizers leading to higher crop output per unit of labour and land (Ammani, et. al., 2010). Iqbal, Ahmed, and Abbas (2003) are of the opinion that boosting credit distribution could lead to efficient resource allocation, increased food production and farmers' income because as the demand for credit increases, farmers output and wellbeing are also enhanced.

Increase in agricultural productivity can also result in agricultural growth which can help alleviate poverty in poor and developing nations where a great portion of the populace are employed in agriculture based activities (World Bank,1998). As farmers become more productive, the income of farm workers appreciates in addition to reduction in food prices and increased stability in food supplies.

Nigeria's agriculture is faced with a major problem of inadequate funding by the government budget and the private sector, and about 65% of Nigeria's economically active population lack access to formal financial services (CBN, 2007). This has led to various efforts by government at all levels to address the issue. There is need to put in place an effective financing approach in the agricultural sector which can help achieve increased productivity, growth and sustainability. Adequate credit delivery to the agricultural sector of a developing economy like Nigeria could have positive effects on the gross domestic product (GDP) growth, and as well improve the economy. An evaluation of the impact of commercial banks loan to agriculture in financing agricultural production is very essential in emphasizing the need for continuous finance in agricultural sector. In order to find out whether the credit provided by the commercial banks has been effective in enhancing agriculture in Nigeria, the interest of this research work is to examine the role of commercial banks in Nigeria's agricultural development.

According to Udih (2014) Bank credit is expected to impact positively on the investible sectors of the economy through improved agricultural production of goods and services. He opined that sufficient financing of agricultural projects will not only promote food security, but also enhance the entrepreneurship performance of our young investors. Concluding that, this is borne out of the expectation that a good match between adequate bank credit and agricultural entrepreneurship will ensure massive agricultural productivity.

Qureshi, Akhtar and Shan (1996), in their contribution argued that Banks credit has the capacity to remove the financial constraints faced by farmers, as it provides incentives to enable farmers to switch quickly to new technologies which can enhance the achievement of rapid productivity and growth. Ijere (1986) viewed banks' credit as a catalyst that can activates the engine of growth enabling it to mobilize its inherent potentials and to advance in the planned or expected direction. In support of the same view, Umoh (2003) maintained that banks' credit constitutes the

power or key to unlock latent talents, abilities, visions and opportunities, which in turn act as the mover of economic development. Banks' credit has a significant contribution to economic development by enhancing production and productivity and thus higher income and better quality of life to the people. (Well, 1974).

However, from available statistics of commercial banks total sectoral credit distribution in Nigeria, the allocation to the agricultural sector, given the importance of the sector, is insignificant. For instance, credit allocation to the sector fluctuated between 6.98% and10.66% in 1981 to 1985; between 10.66% and 16.15% in 1985 to 1990; between 16.15% and 17.5% in 1990 to 1995. It declined sharply to 8.07% in 2000, 2.46% in 2005, 1.67% in 2010, and fluctuated between 1.67% and 3.44% in 2010 to 2013 (Source: CBN Statistical Bulletin, 2013)

2.0 Review of Related Literature
2.1 The Concept of Agricultural Finance
Agricultural financing has suffered a great set back in Nigeria. Perhaps this is due to the fact that agricultural lending is considered to be more risky, problematic and unprofitable relative to other sectors (Enyim and Okoro, 2013). To this end, the commercial banks which are the major conventional financial institutions have not shown keen interest in agricultural finance (Obilor, 2013). In the days of sectoral allocation, the agricultural sector was favoured and banks complied because of the penalties involved of which some of the banks even preferred to pay than to comply (Gurdenson, 2003).

Thus, the Nigerian agricultural sector which is significantly made up of peasant farmers relies more on the informal sources of fund for credit supply. These include: cooperatives, community development associations, thrift associations, family, friends and money lenders (Akinleye, Akanni and Oladoja, 2003). Nwankwo (2013) opined that the informal sources cannot meet the credit needs of the farmers adequately. Consequently, in order to enhance credit flow to the sector, the government established in 1973 the Nigerian Agricultural Cooperative Bank (NACB) which was later known as the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) (Nwankwo, 2013).

However, with the establishment of the NACRDB the challenge of poor credit supply to the agricultural sector remained unabated. This is an indication amongst others that the budgetary allocation of NACRDB was insufficient for the credit needs of the agricultural sector (Akinleye and Oladoja, 2003). According to Zakaree (2014), in an attempt to address this issue, the government established the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977 to encourage commercial banks to increase credit supply to the agricultural sector by providing guarantees against inherent risk in agricultural lending.

Akinleye and Oladoja (2013), assert that despite several years of the establishment of the Agricultural Credit Guarantee Scheme (ACGS), the level of commercial bank involvement in credit distribution to the agricultural sector was minimal. Nigeria as a country with highly diversified agro-ecological endowment still rely on massive importation of basic food items and industrial raw materials, it is ironical.

2.1.1 Agricultural Development
Agricultural development is most desirable in almost every nation of the world, whatever the stage of the economy of the nation. According to Todaro (1977) agricultural development occurs when substantial productive capacity and high output per worker permits a very small number of farmers to feed the entire nation. Tomori (1979) asserts that the physical requirements for agricultural development may generally be considered to be improved farming techniques with proper and adequate use of such inputs as fertilizers, pesticides, improved seeds, water storage facilities, marketing and transportation.

However, the adoption of these innovations techniques and inputs used by large number of farmers depends on their willingness and ability to do so. Therefore, it could be said that for agricultural development to take place, support is needed from other sectors of the economy since it needs improve seeds, improved varieties of livestock, fisheries etc. inputs like fertilizers, pesticides, machinery and equipment and implements all of which are produced outside agriculture.

Obasanjo (1976) summarized in four ways how greater productivity and output contribute to an economy`s development which include by: i) Supplying food stuff and raw materials to other

expanding sectors of the economy ii) Providing an investible surplus of saving and taxes to support investment in another expanding sector. iii) Selling for cash a marketable surplus that will raise the demand for rural population for products of the expanding sector and iv) Relaxing the foreign exchange constraint by earning foreign exchange through exports or by saving foreign exchange through sub situation.

2.1.2 Government Efforts towards Agricultural Financing.

In Nigeria like other West Africa countries, a lot of policy measures and programmes have been adopted since independence aimed mainly at elevating agriculture from its pitiable position of subsistence level to market-oriented level. Some of these policy measures and programmes include:

The National Accelerated Food Production Project (NAFPP) established in 1973, aimed at accelerating the production of major stable crops. The programme which had three components of research, extension and agro-services used improved practices in place of traditional ones and also provided facilities like credit, marketing, storage and processing facilities to farmers.

The River Basin Development Authorities (RBDA): The Federal Government in 1976 established eleven River Basin Development authorities under Act No. 25. The RBDAS were aimed at development of land and water resources for general development of agriculture in Nigeria.

Operation Feed the Nation (OFN) launched in 1976 by the Obasanjo military administration was aimed at mobilizing Nigerians to take active part in growing their own food which would lead to increase in food production in the country thereby leading to self-sufficiency in food production.

The Nigerian Agricultural and Co-operative Bank Ltd. (NACB): The Nigerian Agricultural and Co-operative Bank Ltd. (NACB) as a development financial institution was incorporated on March 6, 1973 with an initial paid up capital of N12 million. The bank gave loans directly to individual farmers, organizations and established institutions.

The Commodity Boards: The federal government established seven commodity boards in 1977 under Act No. 29 mainly to encourage the increase in production and marketing of the various commodities, conduct research into production and encourage the processing of the commodities assigned to the various boards. The seven marketing boards replaced the dissolved regional boards. The seven boards took care of cocoa, rubber, cotton, groundnut, grains, root crops (cassava, yam and cocoa yam) and palm produce (palm oil and palm kernel).

Land Use Act: The land use Act was promulgated in 1978 and incorporated into the 1979 constitution. The Act was aimed at reforming the land tenure system which had constituted a bottleneck to large scale farming in Nigeria. The decree gave a boost to agriculture by making land readily available for large scale agricultural activities. Under the Act, all lands were vested in the hands of state governments that held them in trust for the federal government.

Green Revolution: The civilian, second republic administration under Shehu Shagari in an effort to curb shortage of food in the country and increase food production launched the Green Revolution in 1980. The programme mainly aimed at boosting increase in agricultural production in order to meet the food need of the country and reduce the drain on the country`s foreign reserves through food exportation.

Agricultural Credit Guarantee Scheme Fund (ACGSF): The ACGSF as a policy instrument of the federal government of Nigeria was established to provide a guarantee on loans granted by commercial banks to farmers for agricultural production and agro-allied processing. The scheme was established by Act No. 20 of 1977 but started effectively in 1978. The ACGSF was exclusively managed by a board set up under the supervision of the CBN (management agent). The fund was set up with the sole purpose of providing guarantee in respect of loans granted by any bank for agricultural purposes (CBN, 1990). Nwosu, Oguoma, Ben-Chendo, and Henri-Ukoha (2010), assert that the ACGSF was formed exclusively with the aim of encouraging financial institutions to lend funds to those engaged in agricultural production and agro-processing activities with a view to enhancing export capacity of the nation as well as for local consumption in order to solve the problem of shortage of primary production credit in the

agricultural sector which was a major cause for declining agricultural production in Nigeria.

The ACGSF does not only subsidize interest for farmers, it also considers critical issues in diversifying appropriate development strategies capable of providing the required finance for farmers and small and medium enterprises in Nigeria (CBN, 2009). The ACGSF provides guarantee in respect of loans to farmers and operate as an intermediary credit guarantee scheme. (Udoh, 2008).

The National Fadama Development Project: Fadama, the Hausa name for irrigable land is flood plains and low-lying area underlined by shallow aquifer sand found along Nigeria's river system (Ingawa, Oredipe, Idefor, and Okafor 2004). Fadama also refers to a seasonally flooded area used for farming during the dry season. It is defined as alluvial, low land formed by erosion and depositional actions of the rivers and streams (Qureshi, 1989). They encompass land and water resources that could easily be developed for irrigation agriculture (World Bank, 1992).The National Fadama Development Project (NFDP) was established to ensure all year round production of shallow aquifers and surface water potentials in each state using table well, wash bore and petrol driven pumps technology (World Bank 1992, BSADP, 1994). This was the era of Fadama I which many adjudged successful both nationally and internationally and culminated in Federal Government of Nigeria requesting the World Bank for the preparation of a follow up project bank (World Bank 2003; Blanch and Ingawa, 2004).

Fadama II was borne out of the need to ensure all year round agricultural production using available Fadama Resources in Nigeria and also a follow up to Fadama I that was adjusted successful. Its approach was Community Driven Development (CDD) with emphasis on social inclusiveness and empowerment of the rural people focused on increasing sustainable income of Fadama users via empowerment in terms of capacity building, advisory service, acquisition of productive assets and rural infrastructure development. A recent effort towards boosting production and enhancing farmer's welfare was the introduction of second National Fadama Development Project (Nkonya et. al, 2008).

Despite government efforts towards promoting agricultural growth and development, Nigerian agriculture has in recent years not been able to meet the food needs of the country. Rather, food production per capital has been declining. To supplement the low domestically produced food supply, there has been a substantial rise in food imports. These have taken substantial portions of the much needed foreign exchange for importing capital for development purpose. A strong and efficient agricultural sector has the potential to enable a country feed its growing population, generate employment, earn foreign exchange and provide raw materials for industries.

2.2 Theoretical Review
2.2.1 The Financial Liberalization Theory
This theory was the original work by McKinnon and Shaw (1973). Under this theory, the consideration is central on the part played by government intervention in the financial markets as a critical setback to growth, investment and savings mobilization. The role of government in interest rate control and credit allocation to the productive economic sectors in developing countries hinders the mobilization of savings and discourages financial assets holding, economic growth and capital formation. Interest rate ceiling on deposit indirectly inhibited financial saving which resulted in excess liquidity outside the banking industry. Government pervasive intervention and financial system involvement through the supervisory and regulatory framework, especially interest rate control and credit allocation tends to facilitate financial market distortions. As such, the intervention of government is adversely affecting the market players' decision regarding investment and savings and resulted in financial mediation fragmentation. The resultant effect of this scenario is an economy that is financially repressed. According to McKinnon and Shaw (1973), the central position is that credit allocation should be determined by the free market and financial markets should also be liberalized. Hence, there will be adjustment in the real interest rate to the equilibrium level and the elimination of projects with low yields. This will result in improvement in the overall savings and investment efficiency and increased supply of total real credit. In return, this would induce increased volume of investment that will engender the growth of the economy.

2.2.2 The Commercial Loan Theory

Commercial loan theory also referred to as the Real Bills Doctrine states that a commercial bank should advance only short term self-liquidating productive loans to business firms. Self-liquidating loans are those loans which are meant to finance the production and movement of goods though the successive stages of production; storage, transportation and distributions. When such goods are ultimately sold, the loans are considered to liquidate themselves automatically, (Jhingan, 2009). Under this theory, the ideal assets of commercial banks should consist of short term business loans made to business firms for the management of their working capital. A bank finances the working capital of a firm; it expects funds for repayment to come from the management of working capital itself (Mbat, 2001). The theory posits that when commercial banks make only short term liquidating productive loans, the central bank, in turn, should lend to the banks only on the security of such short term loans. This principle would ensure the proper degree of liquidity for each bank and the proper money supply for the whole economy.

Considering this theory as it relates to the agricultural sector, Commercial Banks are expected to grant short term self-liquidating loans to farmers for financing their working capital needs. These loans are expected to be used basically for farming activities and the loan repayment should come from the farm proceed.

2.3 Empirical Literature Review

Numerous studies have been conducted to reveal the impact of agricultural finance on agricultural production in both developed and developing economies. Majority of these studies seem to suggest that bank credit has a positive effect on economic growth and development.

Izhar and Tariq (2009) assessed the impact of institutional credit on agricultural production by estimating Cobb Douglas agricultural production function from 1992-2005 using time series data. The result of the study shows that institutional credit is not a significant determinant of agricultural production.

Nafisat (2009) examined the impact of the expenditure of Nigerian government on agricultural output using the ordinary least square (OLS) estimation technique for the period 1977-2006. The results show that agricultural output does not respond significantly to government expenditure on agriculture, which suggests that the government contribution to agriculture is not enough for its development. The study therefore recommended that the unique role of agriculture is recognized so that the sector can obtain its right share of government expenditure.

According to Afolabi (2010), the intervention of government in form of sectoral credit allocation, oligopolistic tendencies, interest rate ceilings and highly concentrated market structure that resulted in monopoly as well as promoting other inefficiencies that are responsible for economic distortions. On the empirical ground, there are several studies investigating the effect of interest rate on agricultural productivity.

Amassoma and Ofere (2011) examined the nexus of lending rate, deregulation of interest rate and agricultural productivity in Nigeria using annual data spanning from 1986 to 2009.The authors used ordinary least squares (OLS) econometric estimation technique and co-integration and ECM. Long run relationship was revealed among the variables from the co-integration test, while the error correction modeling revealed a significant and positive relationship between interest rate deregulation and agricultural productivity. The study recommends that, interest rate should be market determined so as to serve as a catalyst for improved agricultural productivity, and that government should make it possible for the financial sector to carry out the policies that will guarantee available credit to the preferred sector.

Idoko, and Sheri (2012) used data from 1975 to 2010 to examine the effect of government expenditure on the Nigerian agricultural output. The variables of the study include foreign direct investment on agricultural sector, annual rainfall, government expenditure on agricultural sector, agricultural credit guarantee scheme fund, and commercial bank loans and advances to the agricultural sector. The result of the estimated OLS model revealed that, the relationship that existed between government expenditure on agriculture and Nigerian agricultural sector output was found to

significant and positive during the evaluation period.

Omojimite (2012) carried out a study on the relationship between the growth of the Nigerian agricultural sector, macroeconomic policy and institutions and found significant indication in sustenance of the hypothesis that institutions are more critical in economic growth particularly the Nigerian agricultural sector growth. The study recommended that, interest rate should be liberalized to the agricultural sector and institutional supports should be strengthened basically in the areas such as extension services to farmers and subsidized inputs.

Uger (2013) studied the effect of government expenditure on agricultural sector using annual time series data from 1991 to 2010. Employing the OLS model, findings of the study revealed that, a positive but insignificant relationship existed between agricultural financing (expenditure) and its output in Nigeria.

Kolawole (2013) empirically investigated the effect of interest rate and some macroeconomic variables on the performance of the Nigerian agricultural sector using time series annual data from 1980 2011. The study employed the ECM model within the framework of OLS regression estimation. A long run relationship was revealed among the variables and the ECM model found out that there was an inverse relation between interest rate and agricultural productivity. There was also a negative relationship between exchange rate and agricultural productivity. This means that assuming the interest rate spread levels and exchange rate is increased, there would be a decline in the degree of agricultural value added in the country.

Udoka, Mbat and Duke (2016) examine the effect of commercial bank credit on agricultural production from 1970-2014using ordinary least squares method. It was found out that there was a positive and significant relationship between commercial banks credit to the agricultural sector and agricultural production in Nigeria. There was also a negative relationship between interest rate and agricultural production. The study recommends that more credit should be allocated to the agricultural sector and the rate of interest should be reduced.

3.0 Research Methodology
3.1 Data Collection and Data Source
Secondary data used for the research were obtained from the Central Bank of Nigeria (CBN) statistical bulletin, 2015 version spanning the period 1980-2015.

3.2 Model Specification
The variables used are real agricultural gross domestic product as the dependent variable while, commercial bank loans to agriculture, real interest rate, government recurrent expenditure on agriculture, government capital expenditure on economic services as the independent variables.

3.2.1 Econometric Presentation of the Model
Economic relationship is not assumed to be exact. Other variables apart from the ones used for the research may also influence the dependent variable but are omitted in the model. These factors omitted in the model are considered by introducing the error term or random variable (disturbance term) into the model to capture all kinds of disturbances that might distort the structure of the model.

The model can be written thus:

$$RAGDP = \beta_0 + \beta_1 CBLA + \beta_2 RIR + \beta_3 GREA + \beta_4 GCEES + \mu_t \quad \text{......................} \text{(i)}$$

Where:

RAGDP = Real agricultural gross domestic product.

β_0 = Constant term

β_1-β_4 = Coefficients of the explanatory variables

CBLA = Commercial Banks loan to agriculture

RIR = Real interest rate

GREA = Government recurrent expenditure on agriculture

GCEES = Government capital expenditure on economic services

μ_t = Error term

The dependent variable was lagged to (t-1), where, t-1 indicates one year lagging, and it was included as one of the independent variables. The lagged value of a dependent variable is often included in a model as one of the independent variables when it is expected that its current level is heavily determined by its past level. This helps reduce the existence of autocorrelation in the model (Kelle and Kelly, 2005).

Other independent variables were also lagged to t-1, indicating that the time series data were lagged one year. This is because the impact of an economic action such is not instantaneous but dependent on the previous period's

economic action. Moreover, lagging explanatory variables contributes significantly to minimize or eliminate the problem of heteroscedasticity and autocorrelation (Gujirati 2004). Furthermore, All the explanatory variables were in logged values which contributes directly in reducing or solving the problem of heteroskedasticity and autocorrelation (Gujirati, 2004) Logarithmic transformations are also a convenient means of transforming a highly skewed variable into one that is more approximately normal (Kenneth 2011).

The modified version of the model adopted for this study therefore takes the form;

$$RAGDP = \beta_0 + \beta_1 logRAGDP_{t-1} + \beta_2 logCBLA_{t-1} + \beta_3 logRIR_{t-1} + \beta_4 logGREA_{t-1} + \beta_5 logGCEES_{t-1} + \mu_t \dots\dots (ii)$$

Where:

RAGDP= Real Agricultural Gross Domestic Product

β_0= Constant

β_1-β_5= coefficients of the explanatory variables

$logRAGDP_{t-1}$= Logged value of Real Agricultural Gross Domestic Product, lagged one year

$logCBLA_{t-1}$= Logged value of Commercial Bank loan to Agriculture, lagged one year

$logRIR_{t-1}$=Logged value of Real Exchange Rate, lagged one year

$logGREA_{t-1}$= Logged value of Government Recurrent Expenditure on Agriculture, lagged one year

$logGCEES_{t-1}$= Logged value of Government Capital Expenditure on Economic Services, lagged one year

μ_t=Error term

3.3 Method of Data Analysis
3.3.1 Unit Root Test (Augmented Dickey Fuller Test)
The test is used to determine the order of integration of a variable; that is, how many times it has to be differenced or not to become stationary. It is to check for the presence of unit roots in the variable i.e. whether the variable is stationary or not. This test is carried out using the Augmented Dickey Fuller (ADF) technique of estimation. A series is said to be integrated of order d denoted by I(d), if it becomes stationary after differencing d times and thus contains d unit roots (Gujarati,2004). According to Greene (2003), the Augmented Dickey Fuller (ADF) test is employed to test for

unit root based on an equation of the following form:

Ho: = 0, ρ = 1 (presence of unit root, the data is non-stationary)

H1: < 0, $\rho \neq 1$ (the data is stationary and does not need to be differenced) …………….(iii)

Thus, the ADF unit root test posits a null hypothesis = 0 versus an alternative hypothesis <0, where the ADF statistics was compared with the observed Mackinnon critical values.

Decision Rule:
If the ADF test statistics value is greater than the critical value in absolute terms at 5% level of significance, we reject Ho and accept H1. This means that there is no unit root and the data is stationary.

3.3.2 Newey-West, Heteroscedasticity and Autocorrelation Consistent Covariance OLS Method (HAC, Consistent Covariance Estimator)

In estimating the parameters of the model, unit root test was conducted as a prerequisite for utilization of a time series data; along with the test of the assumptions of the classical regression using the Newey-West HAC, Consistent Covariance, ordinary least squares (OLS) estimation method.

The Newey-West method under the OLS estimate produces Newey–Weststandard errors for coefficients estimated by OLS regression. The error structure is assumed to be heteroskedastic and possibly autocorrelated up to some lag. The Newey-West standard error correction is the best tool that takes care of heteroscedasticity and autocorrelation. The formula for the Newey-West covariance matrix estimator can be found in Greene (2000). The Newey-West estimator corresponds to the Bartlett kernel with bandwidth parameter L+1, where L is the maximum lag length.

To specify the Newey-West kernel with lag length L, specify KERNEL = (BART, L+1, 0), which produces bandwidth parameter

$$l(n) = (L+1)n0 = L+1 \dots\dots\dots\dots\dots(iv)$$

The methodology to compute what are often termed heteroskedasticity and autocorrelation consistent (HAC) standard errors was developed by Newey and West; thus they are often referred to as Newey-West standard errors. Unlike the White standard errors, which require no judgment, the Newey-West standard errors must be calculated conditional on a

choice of maximum lag. They are calculated from a distributed lag of the OLS residuals, and one must specify the longest lag at which autocovariances are to be computed.

Normally a lag length exceeding the periodicity of the data will suffice; e.g. at least four (4) for quarterly data, twelve (12) for monthly data, etc. Since the Newey-West formula involves an expression in the squares of the residuals which is identical to White's formula (as well as a second term in the cross-products of the residuals), these robust estimates subsume White's correction. Newey-West standard errors in a time series context are robust to both arbitrary autocorrelation (up to the order of the chosen lag) as well as arbitrary heteroskedasticity.

3.3.3 Economic Apriori Expectation
The economic apriori expectation involves an examination of the sign and magnitude of the estimated parameters to determine their conformity with theoretical expectation. We find out if the relationship of the dependent and independent variables meet the a priori expectation of signs (i.e. positive or negative relationship).In our regression, RAGDP(-1), CBLA(-1), GREA(-1), GCEES(-1) were expected to have a positive relationship with RAGDP while RIR(-1) was expected to have a negative relationship with RAGDP.

3.3.4 Statistical Criteria
The statistical criteria are determined by statistical theory as stated below and are aimed at evaluating parameters of the model.

Coefficient of determination (R^2): It measures the proportion of the total variation in the dependent variable that is jointly explained by the linear influence of the explanatory variable. The value of R^2 lies between zero and one, that is, $0 < R^2 < 1$.

Adjusted Coefficient of Determination: The adjusted R^2 is required because it gives a better measure of the goodness of fit having been adjusted for loss of degree of freedom as more explanatory values are added. It lies between zero and one and the closer it is to one the better the goodness of fit.

The p-value: It is used to determine the statistical significance of the parameters in the model. They will be tested at 1%, 5% and 10% levels of significance. The rule of thumb states that if the p-value is greater than the critical value then it is statistically insignificant. Any value below this is significant.

F-statistic: It is meant to test the overall significance of the entire model as regards the dependent variable. It checks the joint variance of the explanatory variables. The level of significance to be used is 1%. Hence, if the probability is ≤ 0.01, the explanatory variables' parameter estimates will be jointly statistically significant. Any value greater than 1% makes them jointly statistically insignificant.

3.3.5 Econometric Criteria
The econometric criteria determine the reliability of the statistical criteria, and in particular the standard errors of the parameter estimates. Econometric tests were used for empirical verification of the model. These include testing for autocorrelation, normality and heteroscedasticity.

Autocorrelation: The classical linear regression model assumes that autocorrelation does not exist among the disturbance terms. In order to find out where the error terms are correlated in the regression, we will use the Breusch-Godfrey Statistics. The Breusch-Godfrey serial correlation LM test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no autocorrelation of any order up to p. The test is applicable in a case where there is lagged dependent variable on the right-hand side of the regression.

Heteroscedasticity Test: Heteroscedasticity occurs when the variance of the error is not constant. One of the assumptions of the classical linear regression model is that there is no heteroscedasticity. Breaking this assumption means that the Gauss–Markov theorem does not apply, meaning that OLS estimators are not the Best Linear Unbiased Estimators (BLUE) and their variance is not the lowest of all other unbiased estimators. Heteroscedasticity does not cause ordinary least squares coefficient estimates to be biased, although it can cause ordinary least squares estimates of the variance (and, thus, standard errors) of the coefficients to be biased, possibly above or below the true or population variance. Thus, regression analysis using heteroskedastic data will still provide an unbiased estimate for the relationship between the predictor variable and the outcome, but standard errors and therefore inferences obtained from data analysis are suspect. Biased

standard errors lead to biased inference, so results of hypothesis tests are possibly wrong.
Normality Test: This test was conducted to determine whether the error terms were normally distributed with zero mean and constant variance. The Jarque-Bera test was employed to test for the normality in the time series variables used.

4.0 Data Presentation and Analysis
4.1 Unit Root Test
Non-stationary data produces spurious regression; hence the result may be misleading. Therefore, it was cognizant to establish the stationarity of data. The variables were verified for stationarity by subjecting them to unit root test using Augmented Dickey-Fuller test. The results of the unit root test are presented on table 4.1 below

Table 4.1 Unit Root Test

Variables	Order of Integration	Augmented Dickey-Fuller Test Critical values			ADF Statistics	Prob.
		1%	5%	10%		
ΔRAGDP	I(1)	-3.639407 -2.951125			-4.581707	0.0008
CBLA	I(0)	-2.614300 -3.689194 –			-3.876035	0.0064
ΔRIR	I(1)	2.971853 -2.625121			-5.810209	0.0000
ΔGREA	I(1)	-3.646342 -2.954021 -2.615817 -3.639407 -2.951125 -2.614300			-9.251819	0.0000
ΔGCEES	I(1)	-3.639407 -2.951125 -2.614300			-7.689416	0.0000

Δ=Difference operator
I(d)= number of times of integration
Level= 1%, 5% and 10% level of significance
From table 4.1 above, it can be seen that all the variables but one were stationary at 1st difference and at all level of significance (i.e 1%, 5% and 10%); Only CBLA) was stationary at level. The decision was arrived by comparing

the absolute values against the respective ADF statistics as conventionally done.
4.2 Estimation Result
The model adopted was estimated via the HAC consistent covariance OLS estimator.The Least squares regression result is presented on table 4.2 below.

Table 4.2 Least Squares Regression Result

Variables	Coefficients	Std. Error	t-Statistics	P-value
C	-57861.29	5583.232	-10.36340	0.0000
LRAGDP(-1)	7746.036	704.0252	11.00250	0.0000***
LCBLA(-1)	272.2591	276.8171	0.983534	0.3335
LRIR(-1)	-95.34492	35.54900	-2.682070	0.0120**
LGREA(-1)	-205.3889	101.6409	-2.020730	0.0526*
LGCEES(-1)	-207.6257	174.5306	-1.189623	0.2438

R-squared = 0.98
F-statistic = 285.1398
Adjusted R-squared = 0.97
Prob (F-statistic) = 0.0000

NOTE: ***, ** and ***** denote1%**,** 5% and 10% level of significance respectively.
From our regression result, it can be seen that there is a significant and positive relationship between the lagged value of the Real

Agricultural Gross Domestic Product and Real Agricultural Gross Domestic Product (RAGDP). The coefficient of RAGDP(-1) is 7746.036. This implies that a unit change in RAGDP(-1) will lead to a 7746.036 unit increase in RAGDP.

There is also a positive but insignificant relationship between Commercial Bank Loan to Agriculture (CBLA) and the Real Agricultural Gross Domestic Product (RAGDP).The coefficient of CBLA(-1) is 272.2591 implying that a unit change in CBLA(-1) will lead to a change in RAGDP by 272.2591.

A significant but negative relationship exists between the Real Interest Rate (RIR) and Real Agricultural Gross Domestic Product. The coefficient of RIR(-1) is -95.34492 which implies that a percentage change in RIR(-1) will cause the RAGDP to decrease by 95.34492.

However, a significant but negative relationship exists between Government Recurrent Expenditure on Agriculture and the Real Agricultural Gross Domestic Product and Real Agricultural Gross Domestic Product (RAGDP). The coefficient of GREA(-1) is -205.3889 which indicates that GREA impacts negatively on RAGDP implying that a unit change in GREA(-1) will cause -205.3889 unit change in RAGDP.

The government Capital Expenditure on Economic Service (GCEES) is found to have negative impact on Real Agricultural Gross Domestic Product (RAGDP). The coefficient of GCEES(-1) is -207.6257which implies that a unit change in GCEES(-1) will lead to -207.6257unit change in RAGDP.

The p-values of RAGDP (-1), RIR(-1) at 1% and 5% levels of significance (i.e. 0.00<0.01 and 0.0120<0.05) respectively; and GREA(-1) at 10% level of significant i.e. (0.0526<0.10) have statistically significant impact on RAGDP. While p-values for CBLA(-1) and GCEES(-1) (i.e.0.3335>0.10 and 0.2438>0.10) were not statistically significant in explaining the variation of RAGDP.

The p-value of the F-statistics is less than 1% (i.e. 0.00<0.01) which implies that F-statistics is significant. We therefore conclude that the explanatory variables are jointly significant in influencing the dependent variable (RAGDP).

The R^2 and the adjusted R^2 are 98% and 97% respectively. This means that about 98% of the proportion of total variation in the dependent variable (RAGDP) is explained by the explanatory variables while only about 2% of the variation is caused by the error term in the model.

4.3 Economic Apriori Expectation

The parameter estimates are expected to conform to a priori expectations. The table 4.3 below summarizes the outcome of our model parameters on an apriori ground.

Table 4.3 Results of the apriori expectation

Variables	Expectation	Estimation	Conclusion
LRAGDP (-1)	Positive	Positive	Conform
LCBLA (-1)	Positive	Positive	Conform
LRIR(-1)	Negative	Negative	Conform
LGREA (-1)	Positive	Negative	Not conform
LGCEES (-1)	Positive	Negative	Not conform

From table 4.3 above, the apriori expectations for real agricultural gross domestic product lagged one year, commercial banks loan to agriculture lagged one year and the real interest rate lagged one year conformed to the expected signs. While the apriori expectations for government recurrent expenditure on agriculture lagged one year and government capital expenditure on economic services lagged one year are not satisfied.

4.4 Diagnostic Tests
Diagnostic test examined the model for autocorrelation, heteroscedasticity and skewness. Table 4.4 shows the results of the diagnostic tests.

Table 4.4 Diagnostic Test Results

Type of test	X^2	Probability
Autocorrelation	0.209841	0.6469
Heteroscedasticity	3.537789	0.6177
Normality(Jarque-Bera)	2.265540	0.32214

Based on the result on table 4.4 we fail to reject the null hypothesis because the p-value of F-statistics for test of autocorrelation is greater than 5% (0.6842>0.05) and therefore conclude that there is no autocorrelation.

Also, table 4.4 shows that the p-value of F-statistics for test of heteroskedasticity is 0.6622. Since 0.6622>0.05, we do not reject the null hypothesis and conclude that there is no homoskedasticity.

The normality test result shows that the p-value is greater than 5% (i.e. 0.322140>0.5) thereby implying that the residuals are normally distributed.

4.5 Discussion of Findings
The regression result revealed that first; there is a positive relationship between commercial banks loan to agriculture and real agricultural gross domestic product though the relationship is insignificant. This may be due to small amount of commercial banks' credit allocated to agricultural sector, indicating that an increase in the quantum of credit given to farmers will increase their investment in agricultural activities and hence lead to an increase in the output of agriculture in Nigeria.

The result also unveiled that there exists a significant but negative relationship between real interest rate and agricultural gross domestic product. This could be attributed to the high interest rate charged by commercial banks and the unwillingness on the part of the regulatory authorities to embark on policy reform to reduce the interest rates. This makes cost of borrowing very high and leads to reduction in agricultural investment as farmers find it difficult to borrow at high interest rate. Government recurrent expenditure on agriculture also had a significant but negative impact on real agricultural gross domestic product which may be due to the budgetary allocation of government to agriculture, which is far below what is being recommended by the Food and Agricultural Organization (FAO) which is 25% of budgetary allocation.

Finally, the result shows that there was a negative and insignificant relationship between government capital expenditure on economic services and real agricultural gross domestic product which may be due to low capital expenditure and or misallocation of capital funds allocated.

Based on this research work and the work of Mathew and Mordecai (2016), we therefore reject the alternative hypothesis and accept the null hypothesis that commercial banks do not play an important role in agricultural development.

5.0 Summary, Conclusion and Recommendation.
5.1. Summary
The study examined the role of commercial banks` credit in agricultural development in Nigeria over the period of 1980-2015. The objective of this study is to is to assess the role of the commercial banks in agricultural development in Nigeria from 1980-2015. In examining the impact of commercial banks` credit on agricultural output in Nigeria for the period 1980-2015, we modeled real agricultural gross domestic product (RAGDP) against commercial banks` loan to agriculture (CBLA),

real interest rate (RIR), government recurrent expenditure on agriculture (GREA) and government capital expenditure on economic services (GCEES) and the variables were extracted from CBN statistical bulletin for the period 1980-2015. The Augmented Dickey-Fuller (ADF) test was used to detect the presence of unit root in all the variables. This work employed the Ordinary Least Square (OLS) method of estimation through the use of Newey-West HAC, consistent covariance estimator. Diagnostic tests were also conducted to test for autocorrelation, heteroskedasticity and normality. The ADF test showed that all of the variables including the dependent variable were stationary at first differencing except one (i.e CBLA) which is stationary at level. The regression results using Newey-West estimator revealed that there is a positive relationship between the dependent variable (RAGDP) and commercial banks` loan to agriculture (CBLA) though it is insignificant. The results also revealed that real interest rate (RIR), government recurrent expenditure on agriculture (GREA) and government capital expenditure on agriculture (GCEES) impact negatively on the dependent variable (RAGDP). The equation in the model demonstrated a good fit from the coefficient of determination (R^2) and the F-statistic. The diagnostic tests showed that there is no presence of autocorrelation or heteroscedasticity and the residuals are normally distributed. However, following the empirical findings in this study, it showed that commercial banks have not played an important role in the development of agriculture for the period 1980-2015.

5.2 Conclusion

Based on the findings, the following conclusions were drawn.

The study concludes that there is no significant relationship between commercial bank loan on agriculture (CBLA) and real agricultural gross domestic product (RAGDP) in line with the work done by Izhar and Tarig (2009) which indicates that institutional credit is not a significant determinant of agricultural production as a result of the small portion of the total sectoral distribution of commercial banks` loan to agriculture. The finding also follows the work of Matthew and Mordecai (2016) which concludes that commercial bank loans to the

agricultural sector do not play an important role in expanding agricultural output.

The study also concludes that there is a significant and negative relationship between real interest rate (RIR) and real agricultural gross domestic product (RAGDP) which is in line with the finding of Kolawole (2013), who empirically investigated the effect of interest rate and some macroeconomic variables on the performance of the Nigerian agricultural sector using time series annual data from 1980 to 2011 who found that there was an inverse relation between interest rate and agricultural productivity.

The study further concludes that there is a significant but negative relationship between government recurrent expenditure on agriculture (GREA) and real agricultural gross domestic product (RAGDP) which follows the work of Matthew and Mordecai (2016) which found that public agricultural expenditure has a significant but negative impact on agricultural output.

There is a negative insignificant relationship between government capital expenditure on economic services and real agricultural gross domestic product which follows the findings of Deverajan, swaroop and Zou (1996) who examined the impact of government expenditure on economic growth using data from 43 developing countries over 20 years and found that there is a negative relationship between government capital expenditure on economic growth (which agriculture contributes to) despite increasing government expenditure on the sector thereby implying that developing countries have been misallocating public expenditure in favor capital expenditures at the expense of current expenditure.

5.3. Recommendation

In view of the findings and conclusions drawn from this study, the following recommendations are suggested Commercial Banks should recognize the importance of the agricultural sector and grant more loans to agriculture. The government on its own part should pass an Act, which will encourage the Commercial Banks to give out loans to farmers and concessionary terms and without unnecessary prerequisites.

The rate of interest on agricultural credit should be reduced to encourage farmers borrow more funds from commercial banks at an affordable rate leading to an increase in agricultural

investment and therefore improved agricultural productivity and development.

There is need for the establishment of effective monitoring agencies by the federal government to ensure that the amount allocated to agricultural sector judiciously spent. Furthermore, the government should also increase its quantum of recurrent expenditure on agriculture. This will provide the needed funds for the farmers to increase agricultural production

Infrastructural facilities such as good road network, bore-hole water and electricity should also be concentrated in the rural part of the country. The provision of these facilities would impact positively on rural farmers` productivity and the aggregate agricultural GDP.

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