DOMESTIC AGRICULTURAL FINANCING THROUGH GOVERNMENT AND COMMERCIAL BANK'S CREDITS AND AGRICULTURAL OUTPUT PERFORMANCE IN NIGERIA

[1]Ogbonna, S. I. and [2]Nnamerenwa, G. C.
[1]Department of Agricultural Economics and Extension, Faculty of Agricultural Sciences
National Open University of Nigeria, Abuja, Kaduna Campus, Kaduna, Nigeria
[2]Department of Agricultural Economics,
Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria
Corresponding Author's E-mail: sogbonna@noun.edu.ng **Tel.:** +2348034004788

ABSTRACT
This study focused on understanding the influence of domestic agricultural financing through government and commercial banks credits and agricultural output performance in Nigeria. The study employed time series data obtained from Central Bank of Nigeria, Statistical Bulletin and National Bureau of Statistics which covered from 1981 to 2019. The data obtained were analyzed using econometric method like the multiple regression technique. Findings revealed that agricultural performance in Nigeria within the reference period was negatively influenced by the value of commercial banks loans and advances to agriculture and positively influenced by the credit allocation to agricultural sector under ACGSF and by government capital expenditure on agriculture among other factors. The study concludes adequate financing of the agricultural sector is imperative for a positive performance to be recorded in the sector constantly. Finance is inseparable from agricultural performance in Nigeria. For more positive performance to be recorded in the agricultural sector, adequate financing of the sector is indispensable. Both Government and commercial banks in Nigeria should effectively support the provision of adequate credit to the agricultural sector such that farmers could transit from subsistence to commercial orientation in a sustainable manner in Nigeria.

Keywords: Domestic Financing, Government credit, Commercial bank credit, Agriculture, output Performance.

INTRODUCTION
Finance for agricultural development and performance has an increasing role in contemporary times as the importance of agricultural surplus for the structural transformation accompanying economic growth is often stressed by development economists. Finance affects economic growth, stagnation or even decline in any economic system. However, a growing concern has developed over time regarding the need for effective access to credit facilities for farming purposes. The Nigerian government recognizes that finance is an essential medium to increase agricultural development and performance because the agriculture sector is one of her main sources of revenue for economic growth. Access to finance by farmers for agricultural investment purposes is an incentive for increasing the agricultural sector's performance. This stimulates productive growth, and supports the survival of small and new enterprises.

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. The problem of access to finance for agriculture is not solely as a result of non-availability of finance; but it is caused by the reluctance of credit providers to give out loans without certainty of recovering the loan. Because of the challenges facing farmers which have

adverse effects on agricultural production, the government thought it fit to undertake intermediary role in handling loan approval and disbursement challenges of formal lending institutions who lend to farmers through the establishment of the Agricultural Credit Guarantee Scheme (ACGS) in which she stands as a guarantor for agricultural loans in order to mitigate the risk involved in agricultural financing (Onyebinama and Nnamerenwa, 2013).

Agriculture contributes immensely to Nigerian economy in many ways, namely: in the provision of food for the increasing population; supply of adequate raw materials to a growing industrial sector; a major source of employment generation; foreign exchange earnings; and provision of market for the products of the industry sector (Njoku *et al.,* 2018.). The support for agriculture is widely driven by both the government and the public sector, which has established an institutional support in the form of agricultural research, extension, commodity, marketing, input supply, and land use legislation to fast-track development of agriculture. The problem of agricultural development and performance in Nigeria indicates that efforts directed at achieving expanded economic base were frustrated by the scarcity of, and restrictive access to loans. One of the reasons for the decline in the contribution of agriculture to the economy is lack of formal credit policy and paucity of credit institutions which can assist farmers (Njoku, 2016). Also, in line with Nigeria's quest for development and improved agricultural performance, the erratic nature of events within the banking industry vis-a-vis agricultural financing is a cause for concern. This uncertain nature of access to credit by farmers results in their loss of confidence in banks credits (Etonihu *et al.,* 2013). This has also resulted in growth impediment in the overall economy of Nigeria.

Varying opinions exists concerning the role of agricultural financing and its contributions to the attainment of agricultural growth and development (Nnamerenwa, 2012; Eze *et al.,* 2010; Udoka *et al*., 2016; Olorunsola *et al*., 2017). It is pertinent therefore, to empirically analyze domestic agricultural financing through government and commercial banks credits and agricultural output performance in Nigeria.

In Nigeria, agriculture remains one of its basic economic activities as the role agriculture plays in economic development and growth cannot be underestimated. Agriculture, as the mainstay of the nation's economy, remains the largest employer of labour, a major source of food for the ever-growing population and generates huge amount of national income and export earnings. Despite the indispensable relevance of agriculture in Nigeria's economy, the sector has suffered deterioration over the years due to inconsistent and poorly conceived government policies (like the credit policy) and lack of adoptive tendencies to new innovations owing to poor funding. According to Ogbonna and Osondu (2018) and Onyebinama and Nnamerenwa (2013), the continuous shortage of capital to finance agricultural investments remains a major factor constraining food production in Nigeria despite her comparative advantage in the form of favourable climatic and ecological conditions. Based on such development, agricultural output growth performance in Nigeria has been slow and its contribution to the Gross Domestic Product (GDP) has witnessed constant fluctuations overtime.

Several authors (Rahji and Fakayode, 2009; Nnamerenwa, 2012; Eze *et al*., 2010; Udoka *et al*., 2016; Olorunsola, *et al*., 2017) have nevertheless opined that agricultural production and development are influenced by financing decisions and other macroeconomic environments and shifts in these factors heightens agricultural production instability. Therefore, there is the need to fashion the country's credit intervention policies like the ACGS with the aim of stimulating increased food production through efficient credit delivery and allocation system. This is imperative considering that agricultural advancement in Nigeria

requires an efficient credit scheme, and with adequate and timely supply of such credit scheme, agriculture can advance beyond its primary function of supplying food and fiber.

Despite the presence of numerous financial institutions, credit requirements of farmers are often not satisfied. In most cases where funds are given by banks, delay in disbursement of loans approved by government constitutes an impediment (Omosebi and Saheed, 2016). Most times, these loans get to the farmer after the planting season thereby resulting to diversion and subsequent default (Omosebi and Saheed, 2016). With the alarming high rate of loan default common in developing countries, Commercial banks occasionally approve loans to farmers and often times do so at higher interest rates with other stringent conditions like provision of collateral (Bassey *et al.*, 2014a). In support, Olorunsola *et al.*, 2017 stated 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 study specifically estimated the effect of commercial banks loan to the agricultural sector on agricultural performance in Nigeria within the 1981-2019 period; and estimated the effect of government credit allocation under ACGSF and capital expenditure on agriculture on agricultural performance in Nigeria within the 1981-2019 period. The following hypotheses were formulated for the study:

Ho₁: Commercial banks loan to the agricultural sector do not positively impact on agricultural performance in Nigeria within 1981 -2019.

Ho₂: Government credit allocation under ACGSF and government capital expenditure on agriculture do not positively impact on agricultural performance in Nigeria within 1981-2019.

The importance of adequate credit allocation for agricultural production cannot be overemphasized. The fact that there is a great potential in transforming agriculture through the manipulation of agricultural credit policies is still a burning and pertinent desire of most agricultural credit image makers in Nigeria today, despite the imperfectness of the agricultural credit market. Credit has been viewed as a necessary item in various aspects of farm operations and there is no doubt about the critical role it plays in agricultural development in Nigeria. Credit enables farmers to purchase necessary agricultural inputs needed in growing and expanding agricultural output (Adeola and Ikpesu, 2016).

Oboh and Adeleke (2016), noted that agriculture plays a critical role in promoting inclusive growth by stimulating economic growth, reducing poverty, and creating employment for a large number of people particularly in developing countries. Sustainable development takes place when there is growth in the production of safe food to meet the needs of a population, ensuring economic efficiency, which will stimulate expanded reproduction (Gryshova *et al.*, 2016). Agricultural credit contributes to economic development. This is done by enhancing production and productivity, and thus, higher incomes and better quality of life for the people. By enhancing production and productivity, agricultural development is ensured. The criterion for agricultural development, according to Omosebi and Sheed (2016) is the raising up of farmers to make substantial investment in agriculture and stimulate increased productivity. Adequate financing of the agricultural sector, therefore, is imperative in actualizing this aim since the larger the dose of finance the greater the thrust of its impact (Nnamerenwa, 2012). It is in the realization of the fact that agricultural finance is a critical factor in agricultural development that for most governments in the developing countries, the channeling of institutional finance to agriculture has increasingly become an important policy investment for increasing agricultural output (Adeola and Ikpesu, 2016). Agricultural

development must be accompanied by adequate credit provision to farmers. This would ensure rapid investment, adoption of new technologies or innovations and breaking of the vicious cycle of poverty among farmers. It will also increase farmer's income and capital formation status (Onyebinama and Nnamerenwa, 2013; Enyim *et al*., 2013; Awotide *et al*., 2015; Obansa and Maduekwe, 2013; Okafor *et al*., 2016).

In agricultural production, credit is an indispensable factor of production. Commercial banks and other specialized agencies (Like the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) have the responsibility of providing credit to farmers in Nigeria just like in most other developing economies. According to Salami and Arawomo (2013), specialized agencies (Like the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) are established for the purpose of advancing agricultural credit. More so, Agricultural Credit Guarantee Scheme Fund (ACGSF) is an important agricultural financing scheme by the Central Bank of Nigeria (CBN) set up to promote lending to the agricultural sector by providing guarantee to commercial banks (Nnamerenwa, 2012; Onyebinama and Nnamerenwa, 2013; Anetor *et al.*, 2016). Despite the establishment of the scheme which is fraught with such challenges as increased loan defaults to government and bank-related problems, Ugoani *et al*. (2015) argued that Nigerian farmers face many constraints in accessing the credit. Nnamerenwa (2012) and Eseyin *et al*. (2016) noted that the credit available under the ACGSF is not sufficient to serve the poor farmers leading to credit rationing which was unhealthy for the expected rate of development of the agricultural sector in Nigeria.

Oluwaseyi and Risikat (2020), the lending system in Nigeria hinges on the modern finance theory in which the provision of relative information and incentive portfolio to the parties involved in a financial contract is the basis of this theory. Robinson, (2001) cited in Oluwaseyi and Risikat (2020), noted that the theory suggests that major concerns that hinder the financial institution from lending are: i) whether the borrower is riskier than he is believed to be; and ii) whether the borrower will acquire greater risks before the lending period lapses. In another viewpoint, Robinson, (2001) cited in Oluwaseyi and Risikat (2020) opined those borrowers may lack the needed information about borrower's goals and risks. As a result, the intentions, skills and previous experiences of borrowers serve as underlining factors in issuing loans by the lender Oluwaseyi and Risikat (2020).

There have been extensive empirical studies examined the relationship between agricultural financing and agricultural output performance across the global. Ammani (2012) found a positive relationship between the two variables. The study employed three regression models to estimate the impact of formal credit (ACGSF) supply on agricultural productivity in Nigeria. The Ordinary Least Squares (OLS) method was used. The findings from the study showed that formal credit positively and significantly improved agricultural production in the following specific areas: crop, livestock and fishing sub-sectors.

Imoisi *et al.* (2012) examined the effects of credit facilities on agricultural output and productivity in Nigeria from 1970-2010. Results showed that there is a significant relationship between Deposit Money Banks loan and advances, and agricultural output. Mbutor *et al*. (2013) examined the impact of finance to Nigerian agricultural production. The vector error correction methodology was applied following the nature of data properties. The results showed a positive effect of finance on agricultural output. However, variance decomposition revealed the poor state of agricultural financing with a disproportionate dependence of the sector on weather conditions. Toby and Peterside (2014) analyzed the role of banks in financing the agriculture and manufacturing sectors in Nigeria between 1981 and 2010. Using descriptive statistics combined with multiple regression analysis, the study revealed that there exists a significantly

weak correlation between commercial bank lending and the contribution of agriculture to GDP on the one hand, and a significantly positive correlation between merchant bank lending and agricultural contribution to GDP, on the other hand.

Agunuwa *et al*. (2015) researched on the impact of credit from commercial banks on agricultural productivity in Nigeria between 1980 and 2013. The results of their research showed a positive relationship between commercial banks' credits and agricultural productivity. Nnamocha and Eke (2015) investigated the effect of Bank Credit on Agricultural Output in Nigeria via Error Correction Mode (ECM) using yearly data (1970- 2013). Empirical results from the study showed that, in the long-run bank credit and industrial output contributed a lot to agricultural output in Nigeria, while only industrial output influenced agricultural output in the short-run.

Anetor *et al*. (2016) examined the impact of credit (ACGSF and bank loans) on agricultural productivity. Using Vector Autoregressive (VAR) approach, the study found out that ACGSF has poorly affected the performance of the agricultural sector while bank loans significantly and positively impacted the sector.

Oboh and Adeleke (2016) carried out a study on accelerating agricultural growth that is inclusive in Nigeria. An assessment was carried out on the agricultural sector's potential in accelerating sustainable broad-based growth and key strategies for realizing inclusive agricultural growth in Nigeria were examined. Results indicated that agriculture's significant contribution to economic growth is a necessary (but not sufficient) condition for achieving inclusive growth.

Udoka *et al.* (2016) examined the effect of commercial banks' credit on agricultural output in Nigeria. Estimated results showed that there was a positive and significant relationship between agricultural credit guarantee scheme fund and agricultural production. This means that an increase in agricultural credit guarantee scheme fund could lead to an increase in agricultural production in Nigeria; there was also a positive and significant relationship between commercial banks credit to the agricultural sector and agricultural production in Nigeria. In addition, the study also confirmed a positive and significant relationship between government expenditure on agriculture and agricultural production. However, the study also showed negative relationship between interest rate and agricultural output in line with theoretical postulations. This is because an increase in interest rate discourages farmers and other investors from borrowing and thus less agricultural investment and output. However, Olowofeso *et al*. (2017) observed an insignificant relationship between agriculture financing and output in the short run, different equilibrium relationships existed in the long run.

Olorunsola *et al*. (2017) investigated the relationship between credit to agriculture and agricultural output in Nigeria. Results show no evidence of asymmetry in the impact of credit to output growth in the agricultural sector (positive and negative changes) in the short-run, but different equilibrium relationships exist in the long-run. The dynamic adjustments show that the cumulative agricultural output growth is mostly attracted by the impact of the positive changes in credit to agriculture with a lag of four quarters of the prediction horizon.

Oluwaseyi and Risikat (2020) examined the role of different types of finance in the development of the Nigerian agricultural sector and two-period (1986-2000 and 2001-2017) analyses are carried out to ascertain this effect. Findings show that there exists a positive and significant relationship between Agricultural Credit Guarantee Scheme Fund (ACGSF) and agricultural output; and industrial output and agricultural output in the pre-2000 analysis. However, only industrial output positively impacted the agricultural sector in the post-2000

analysis while two major sources of finance (ACGSF and Rural Commercial Bank Credit) negatively impacted the agricultural sector during this period.

MATERIALS AND METHODS
The Study Area

This study was carried out in Nigeria. Nigeria is the most populous African country south of the Sahara (Onyebinama and Nnamerenwa, 2013). It is a geo-political and sovereign entity that is composed of 36 states and the Federal Capital Territory (FCT-Abuja). Nigeria is situated along the coast of West Africa between latitudes 4° and 14^oN and longitudes 3° and 15^OE. It shares a common boundary with Niger on the West, Cameroun Republic on the East, and Gulf of Guinea on the south. Nigeria occupies a land area of 98.3 million hectares, of which only about 34.2 million hectares are actually being cultivated and less than one percent of the arable land is irrigated (NBS,20189). The country enjoys an annual rainfall ranging from 381cm along the coast to 64cm or less in the far north. Rainfall, as one of the important climatic factors influencing agriculture in the country, is characterized by an alternation of wet and dry seasons of varying duration. In the south, rainfall lasts from January to October with a peak in September while in the north; rainfall lasts from May to September with a peak in August. The mean annual temperature ranges from $28^0 – 31^0$C in the south. The estimated the total population of the country in 2018 was approximately 200.9 million people as provided by the National Population Commission (NPC, 2019). Over 60 per cent of the population lives in the rural areas (Obiechimina, 2007). Farming, mining and manufacturing, craft works and trading to mention a few assume a major share of occupation of the people. Major agricultural commodities produced in the country are divided into crops, livestock, fishery and forestry products. Crop production in the country is usually for food or export purposes (Onyebinama and Nnamerenwa, 2013). The principal food crops include maize, millet, sorghum, rice, wheat, acha, beans, cassava, potato, yam, cocoyam, plantain and vegetables. Export crops include groundnut, cotton, rubber, oil palm, cocoa, tobacco and coffee. Livestock products include poultry, chevron, lamb/mutton, beef, pork, milk and eggs. Fishery products of the country are obtained from such activities as artisanal coastal and brackish water catches, artisanal inland rivers and lakes catches, industrial coastal fish and shrimps catches and fish farming. The study made use of secondary data, mostly time series. Data on the activities of the ACGSF, agricultural production and other variables were collected from the publications of development finance and research department of the CBN. Also documents of the National Bureau of Statistics (NBS), National Planning Commission (NPC), Nigeria Metrological Centre (NIMET) Food and Agricultural Organization (FAO) and other official sources served as supplementary data sources. Such information as commercial bank loans to agriculture, loans guaranteed by ACGSF to the agricultural sector, government capital expenditure on agriculture, annual rainfall, real exchange rate, population estimates, value of food imports and major output of specific agricultural sub-sectors (crop, livestock and fish) were obtained from these secondary data sources. Secondary data utilized by the research covered 1981 to 2019.
Data obtained for the study was analyzed using regression model. The model which was used to estimate the impact of commercial banks loan to the agricultural sector on agricultural performance in Nigeria within 1981-2019 period was specified, and in its implicit form, was given as:

$TQA_t = f(CBLA_t, FIMP_t, RF_t, RER_t, POP_t, SGP_t, T_t)$ ...(1)

where;
TQA_t = Agricultural output (Grain Equivalent) in period t,

$CBLA_t$ = Value of commercial bank loan to agriculture (₦'million),
$FIMP_{t-1}$ = Value of aggregate food imports (₦'Million) in period t-1.
RF_t = Average annual rainfall (mm) in period t,
RER_t = Real exchange rate (₦/$) in period t,
POP_t = Nigeria's population (Millions) in period t,
SGP_t = A dummy variable for stance of government policy on interest rate (SGP= 1 in years of fixed and concessionary interest rate policy, and SGP= 0 in years of floating interest rate policy), and T_t = Linear trend time (T = 0, 1, 38), a proxy for technology, which measures productivity effect.

On a priori ground, it was expected that the coefficient estimates for $CBLA_t, RF_t, POP_t, T_t > 0$; and $FIMP_t, RER_t, SGP_t < 0$

The model which was used to estimate the impact of government credit allocation under ACGSF and government capital expenditure on agriculture on agricultural performance in Nigeria within 1981-2019 period was specified, and in its implicit form, was given as;

$$TQA_t = f(ACGSF_t, GEA_t, FIMP_t, RF_t, RER_t, POP_t, SGP_t, T_t) \qquad \ldots (2)$$

where;
TQA_t = Agricultural output (Grain Equivalent) in period t,
$ACGSF_t$ = Value of guaranteed agricultural loan (₦'million),
GEA_t = Government capital expenditure on agriculture (₦'million) in period t, and
$FIMP_{t-1}$ = Value of aggregate food imports (₦'Million) in period t-1.
RF_t = Average annual rainfall (mm) in period t,
RER_t = Real exchange rate (₦/$) in period t,
POP_t = Nigeria's population (Millions) in period t,
SGP_t = A dummy variable for stance of government policy on interest rate (SGP= 1 in years of fixed and concessionary interest rate policy, and SGP= 0 in years of floating interest rate policy), and
T_t = Linear trend time (T = 0, 1...,38), a proxy for technology, which measures productivity effect.

On a priori ground, it was expected that the coefficient estimates for $ACGSF_t, GEA_t, RF_t, POP_t, T_t > 0$; and $FIMP_t, RER_t, SGP_t < 0$

The estimate of agricultural sector output performance response was based on the assumption that the underlying data process is stationary. This assumption was verified by conducting a unit root test on the time series variables. Studies (Adeleye *et al*., 2019; Adeleye *et al*., 2018) have shown that the use of OLS with non-stationary variables may result in spurious regressions, thus, the need for the unit root test. Although various approaches (Dickey-Fuller test, Phillips-Perron test and variance root-test), have been devised for testing time series data for unit root problem. In this study, however, the Augmented Dickey-Fuller (ADF) test was adopted. The choice for ADF test is formed by its popularity, recommendation and use by various authors including Onyenweaku *et al.* (2008). Where the assumption of stationary does not hold in data processes, the Difference–Stationary Process (DSP) approach was employed in getting the non- stationary time series data to be stationary. Durbin Watson test was used to test for first order autocorrelation. EViews statistical package version 10 of computer program was used in the data analysis. The choice of the lead equation was judged based on the magnitude of the coefficients and conformity with a priority expectation of signs, explanatory power of the model (R^2), the significance of the regression parameters and the F - statistic. The conversion factors used in this analysis indicate the grain equivalent of one metric tonne. The conversion factors are accepted internationally and are used by the Federal Department of

Agriculture of the Federal Ministry of Agriculture, Water Resources and Rural Development. The factors, as adopted from Nnamerenwa (2012) were as follows: cereals = 0.96; grain legumes =1.06; roots and tubers = 0.26; oilseeds and nuts = 1.47; vegetables and fruits = 0.08; vegetable oils = 2.40; sugar = 1.08; beverages = 0.08; livestock products = 0.46 and fish = 0.46.

Diagnostic Tests: Stationary Properties of the Variable used in the Analysis

Estimation of the economic model in equations (1) and (2) were preceded by examination of the statistical properties of the series, including tests of stationary state of the individual series. The Augmented Dickey Fuller (ADF) unit root test results for the logged and non-logged variables used in the analysis are presented in Tables 1 and 2, respectively.

Table 1: Result of unit root test for non-logged variables used in the analysis

Non- transformed Variables	Level	1st Difference	Integration order
Aggregate agricultural output (TQA_t)	-2.504	-7.883**	I(1)
Value of ACGSF loan for agriculture ($ACGSF_t$)	-2.745	-6.151**	I(1)
Value of commercial banks loans to Agric. ($VLGL_t$)	0.545	-5.238**	I(1)
Average annual rainfall (RF_t)	-4.715**	-	I(0)
Value of food import ($FIMP_t$)	-3.034	-7.302**	I(1)
Government expenditure on Agric. (GCA_t)	-2.265	-5.208**	I(1)
Population (POP_t)	0.285	-6.379**	I(1)
Real exchange rate (RER_t)	-1.953	-5.186**	I(1)

Note: At level, critical value at 1% = - 4.285, and at 5% = -3.563; at first difference, critical value at 1% = - 4.297, and at 5% = -3.568. Asterisks * and ** represent 5% and 1% significance levels, respectively. These tests were performed by including a constant and a deterministic trend in the regressions.

The result in Table 1 showed that only average annual rainfall was stationary at level I(0). All the other variables were found to be stationary at order one, I (1). Therefore all the non-logged variables used for the study were integrated of order one, I (1) except for the average annual rainfall which was used at level, I(0). The difference- stationary values for the variables found to be stationary at order one, I (1) was generated and used for analysis.

Concomitantly, the Augmented Dickey Fuller (ADF) unit root test result for the logged variables used in the analysis and presented in Table 2 showed that government expenditure on Agric. (GCA_t) and Average annual rainfall (RF_t) were stationary at level I(0). All the other variables were found to be stationary at order one, I(1). Therefore all the logged variables used for the study were integrated of order one, I(1) except for the average annual rainfall (RF_t) and Government expenditure on Agric.(GCA_t) which were used at level, I(0).

Table 2: Result of unit root test for logged variables used in the analysis

Transformed Variables	Level	1st Difference	Integration order
Aggregate agricultural output (TQA_t)	-1.432	-6.340**	I(1)
Value of ACGSF loan for agriculture ($ACGSF_t$)	-2.516	-4.246*	I(1)
Value of commercial banks loans to Agric. ($VLGL_t$)	-1.874	-6.032**	I(1)
Average annual rainfall (RF_t)	-3.767**	-	I(0)
Value of food import ($FIMP_t$)	-2.007	-6.136**	I(1)
Government capital expenditure on Agric. (GCA_t)	-3.772	-	I(0)
Population (POP_t)	-0.631	-6.147**	I(1)
Real exchange rate (RER_t)	-1.837	-4.642**	I(1)

Note: At level, critical value at 1% = - 4.285, and at 5% = -3.563; at first difference, critical value at 1% = - 4.297, and at 5% = -3.568. Asterisks * and ** represent 5% and 1% significance levels, respectively. These tests were performed by including a constant and a deterministic trend in the regressions.

RESULTS AND DISCUSSION
Estimated effect of Commercial Banks Loan to Agriculture on Agricultural Performance in Nigeria

The regression results of the estimated effect of commercial banks loan to agriculture on agricultural performance in Nigeria is shown on Table 3. The semi-log model was chosen as the lead equation based on the number and signs of the significant variables and the level of the coefficient of multiple determination over the other functional models.

Table 3: Regression result for the effect of commercial banks loan to agriculture on agricultural performance in Nigeria (1981-2019)

Variable	Linear	Exponential	Double-log	Semi-log[++]
Constant	-29.208(-0.809)	-0.083(-2.836)**	0.395(2.210)**	40.469(2.594)**
$CBLA_t$	-6.96E-05(-1.811)*	-2.00E-07(-2.222)**	-1.122(-1.782)*	-45.146(-2.466)**
$FIMP_{t-1}$	0.019(0.707)	6.33E-05(0.842)	1.103(0.870)	43.842(1.081)
POP_t	9.229(1.966)*	0.225(0.561)	6.366(1.753)*	46.087(2.925)***
RF_t	0.006(1.005)	8.31E-06(0.543)	0.129(0.262)	106.914(0.632)
RER_t	-21.888(-1.736)*	-0.088(-1.080)	-0.211(-1.498)	-63.824(-1.316)
SGP_t	52.123(1.122)	0.194(0.142)	0.273(3.200)**	84.232(2.874)***
T_t	-1.804(-0.525)	-0.008(-1.801)*	1.118(1.608)	54.443(2.150)**
R^2	0.674	0.778	0.687	0.720
Adj. R^2	0.640	0.735	0.643	0.703
F-Statistic	20.554	20.570***	18.020**	13.319**
DW-test	1.880	1.847	2.209	2.239

Note: asterisk ***, ** and * represent1%, 5% and 10% significance levels respectively. Figures in brackets are t- values and variables are as defined in equation (1). [++] represents lead equation.

The overall goodness of fit of the equation, as indicated by the coefficients of multiple determinations (R^2 = 0.720), showed that the independent variables included in the model explained about 72 percent of the variations in agriculture output (dependent variable) in the period under review. The F- statistics was significant and confirms the significance of the entire model. The Durbin-Watson statistic test for the existence of serial autocorrelation showed that there was no positive first-order serial autocorrelation at 1%, that is, DW (2.239) > Du (1.85).

Evidence from the result in Table 3 indicates that the value of commercial bank loans to agriculture, population growth, technological changes (T) and government policy were significant determinants of agriculture performance in the period under review. Value of commercial banks loans to agriculture was negatively related to agricultural output, an indication that agriculture output did not increase as the value of commercial banks loans to agriculture increased. Increase in value of commercial banks loan to farmers ought to enable them purchase improved farm inputs. The use of improved farm inputs will likely lead to an increase in agricultural output (Onuoha *et al.,* 2007; Nnamerenwa, 2012). However, the negative relationship that exist between commercial banks loan to agriculture and agricultural performance is a clear indication that the banking sector are not supporting agricultural

development in Nigeria financially as supposed. The negative relationship may also mean that there is diversion of agricultural fund by the commercial bank's operators to other non-agricultural sectors where more returns can be made due to the willingness of the credit user to accept loan on high interest rate. Farmers on their part may avoid borrowing from commercial banks due to high interest rate charged on the loan and the duration of the loan. The finding is similar to Mbutor *et al*., 2013; Onwumere *et al*., 2017; Oluwaseyi, and Risikat, 2020). The elasticity of response of agriculture output relative to value of commercial bank to agriculture was higher than unity (ER = 1.125). It suggests that a 10% increase in the value of commercial banks loan to agriculture led to 11.3% decrease in agriculture performance in Nigeria within the reference period.

There was a direct relationship between the quantity of agriculture output and population. The supply of agriculture would naturally increase as the population increased because of the labour needed for agriculture production necessitated by the increase in population or demand. The elasticity of response of agriculture output relative to population was elastic (ER = 3.610) with the surmised positive sign. It suggests that 10% increase in population will probably lead to about 36.1% increase in domestic agriculture output. This finding is in line with Nnamerenwa (2012).

The trend variable was directly related to the quantity of agriculture output in the period under review. This indicated that agriculture output increased as new technologies in agriculture production were adopted by agriculture farmers. In the presence of improved technologies, an agriculture farm firm will innovate to increase subsistence agriculture production. The elasticity of response of agriculture output relative to technological changes was higher than unitary (1.345). It suggests that a 10% increase in technological advancement will probably lead to about 13.3% increase in domestic agriculture output.

There was an indirect relationship between the quantity of agriculture output and government policy on interest rate. As interest on credit increased, production cost increased as well. A decrease in production cost implies that a farm firm acquires and uses more inputs leading to an increase in output (Onyebinama *et al.,* 2007). Nonetheless, an increase in production costs due to higher input prices like credit will reduce the level of farm firm's investments level. Therefore, the quantity of agriculture output will reduce. This finding conformed to that of Onuoha *et al.* (2007), Nnamerenwa (2012), and Onyishi *et al.* (2015), who observed that government policy such as high interest rate on credit, tariffs on farm inputs and poor farm infrastructures adversely affects agriculture performance in Nigeria.

Estimate the Impact of Government Credit Allocation under ACGSF and Capital Expenditure on Agricultural Performance in Nigeria

The regression results of the estimated impact of government credit allocation under ACGSF and capital expenditure on agriculture on agricultural performance in Nigeria within the 1981-2019 period is presented in Table 4. The semi-log model was selected as the lead model based on the magnitude of the coefficient of multiple determinations (R^2), the signs of the regression coefficients as they conform to a priori expectations and the number of significant variables. The model showed that the explanatory variable included in the model accounted for 79.6% of the variation in agricultural output. The value of loan, average annual rainfall, value of food imports in the previous year, government capital expenditure on agriculture and population were significant determinants of aggregate agricultural output.

The value of ACGSF loan to agricultural sector was positively related to aggregate agricultural output an indication that aggregate agricultural output increased as value of

ACGSF loan to the sector increased. Increase in ACGSF loan to the sector will enable farmers to purchase expensive farming infrastructures such as storage facilities and machineries, as well as access better farm inputs. The use of better farm inputs will enhance agricultural output growth. This result was consistent with Bernard (2009), Nnamerenwa (2012), and Olorunsola *et al*. (2017) who had similar sign for ACGSF loan in his study on analysis of credit supply and agricultural output in Nigeria. However, the finding of the study went contrary to the finding of Anetor *et al*., (2016) who reported the ACGSF poorly affected the performance of agricultural output in Nigeria within their period of study. The elasticity of response of aggregate agricultural output relative to the aggregate value of ACGSF loan for the sector (ER = 0.746) suggests that a 10% increase in the value of ACGSF loan to agricultural sector will likely lead to about 7.5% increase in aggregate agricultural output.

Table 4: Regression result for the effect of government credit allocation under ACGSF and capital expenditure on agriculture on agricultural performance in Nigeria (1981-2019)

Variable	Linear	Exponential	Double-log	Semi-log[++]
Constant	-612.524(-2.521)**	0.084(1.916)*	0.061(2.278)**	3840.490(2.759)**
$ACGSF_t$	0.002(2.046)**	7.48E-05(0.130)	0.094(1.813)*	2863.485(1.917)*
GEA_t	200.935(1.018)	-0.001(-1.923)*	-0.135(-2.217)**	2659.195(2.475)**
$FIMP_{t-1}$	8.992(2.535)**	2.01E-02(0.090)	-0.027(-0.334)	-2682.835(-1.867)*
POP_t	-785.478(-1.826)*	-0.005(-0.180)	0.138(0.046)	11174.420(1.804)*
RF_t	0.184(1.032)	2.46E-05(2.613)**	1.166(2.318)**	3388.470(1.876)*
RER_t	397.993(0.406)	-2.071(-1.830)*	-0.280(-1.748)*	-2809.598(-1.024)
SGP_t	2299.001(2.041)**	-0.023(-0.211)	-0.093(-0.810)	-352.994(-0.280)
T_t	-90.327(-0.986)	0.003(0.029)	0.024(0.422)	-767.612(-1.212)
R^2	0.675	0.637	0.642	0.796
Adj R^2	0.642	0.608	0.618	0.769
F- value	11.152***	10.397**	11.297***	12.798***
DW-test	1.858	2.572	2.355	2.104

Note: asterisk ***, ** and * represent1%, 5% and 10% significance levels respectively. Figures in brackets are t- values and variables are as defined in equation (2). ++ represents lead equation.

Government capital expenditure on agriculture (proxy agriculture) was positively related to agriculture output an indication that agriculture output increased as government capital expenditure on agriculture increased. An increase in government investment in agriculture enables farm firms to produce at a reduced cost. A decrease in production costs implies that farm firms can acquire and use more inputs leading to an increase in output (Onyebinama *et al.,* 2007; Ibeagwa, 2019; Amunwa, 2021). An increase in government capital expenditure on agriculture will culminate into an increase in the agriculture subsector's share of total government capital expenditure on agriculture. This will create an enabling environment for agriculture production to strive through a reduced cost of production. Therefore, government capital expenditure on agriculture promotes agricultural performance in Nigeria.

Average annual rainfall and population were positively related to aggregate agricultural output. This indicated that aggregate agricultural output increased as average annual rainfall and population increased. An increase in rainfall enables crops to grow and produce fruits, thereby providing food for livestock and fish development. Increase in crop, livestock and fish output will significantly increase aggregate agricultural output. An increase in population will

lead to an increase in food demand. The utilization of more available labour force necessitated by the increase in population to meet the demand for food will likely increase aggregate agricultural output. This finding is in line with Onwumere *et al*. (2017). The elasticity of response of aggregate agricultural output relative to average annual rainfall and population were 2.705 and 2.910, respectively. This suggests that a 10% increase in annual rainfall pattern and population will increase aggregate agricultural output by 27.1% and 29.1%, respectively.

The value of food imports in the previous year was negatively related to aggregate agricultural output. A reduction in food imports will lead to an increase in the aggregate agricultural output. This result is consistent will the findings of Onyebinama *et al.* (2005) who found value of food imports to be negatively related to aggregate domestic output of agriculture, and posited that the value of food imports decreased as the value of the output of aggregate agriculture increased and vice versa.

CONCLUSION AND RECOMMENDATIONS

This study that focused on the impact of finance on agricultural performance has shown that finance could impact both positively and negatively on agricultural performance in Nigeria. The amount of credit allocated to the agricultural sector influenced its output level. Broadly, the level of aggregate agricultural output is influenced by such factors as value of commercial banks loan to agriculture, value of credit allocation to agriculture under ACGSF, government capital expenditure on agriculture, average annual rainfall, value of food imports in the previous year, and population. The study revealed that commercial banks loan to agriculture was not supportive of agricultural growth in Nigeria. The established negative relation of commercial banks loans to agriculture and agricultural performance in Nigeria is evident that commercial banks loan to agriculture in Nigeria is not supporting agricultural performance in Nigeria but government capital expenditure on agriculture and her credit scheme policy for agriculture under the Agricultural Credit Guarantee Scheme Fund (ACGSF) plays vital role in enhancing agricultural performance in Nigeria. Since finance is vital for an effective production to be accomplished, it was recommended that credit allocation for agricultural production and capital expenditure on agriculture must be such that the rate of growth will grow output significantly and rapidly. Thus, increasing the average amount of loans allocated to farmers under the scheme would ensure increase in output through a hitch-free adoption of costly innovations and purchase of quality and efficient farm inputs necessitated by the possession of a strong purchasing power. Effort must be made to grow agricultural output level geometrically to maintain pace with population growth if food security is to be ensured in Nigeria. This can be pursued through adequate and timely financing of agricultural activities. As output increased; smallholder agriculture in Nigeria will be transformed from a subsistence orientation to a market orientation. Policy on suspending the concessionary interest rate charged on agricultural loans should be reassessed. There is need for stringent policy and sanctions that will compel commercial banks to advance loans to the agricultural sector in such volume that will positively influence the performance of the agricultural sector. Finally, having seen that the agricultural credit guarantee scheme influenced agriculture output levels, there is need therefore, to increase the number and value of loans guaranteed. This would further increase output performance across agricultural subsectors in particular and of agricultural sector in general.

REFERENCES
Adeleye, N., Ogundipe, A.A., Ogundipe, O., Ogunrinola, I. and Adediran, O. (2019). Internal and external drivers of inflation in Nigeria. *Banks Bank Syst.* 14 (4), 206–218.

Adeleye, N., Osabuohien, E., Bowale, E., Matthew, O. and Oduntan, E. (2018). Financial reforms and credit growth in Nigeria: empirical insights from ARDL and ECM techniques. *Int. Rev. Appl. Econ.,* 32 (6), 807–820.

Adeola, O. and Ikpesu, F. (2016). *An empirical investigation of the impact of bank lending on agricultural output in Nigeria: A Vector Autoregressive (VAR) Approach*. Proceedings of the Australia-Middle East Conference on Business and Social Sciences 2016, Dubai (in partnership with the Journal of Developing Areas, Tennessee State University, USA) ISBN 978-0-9925622-3-6 297.

Agunuwa, E. V., Inaya, L. and Proso, T. (2015). Impact of commercial banks' credit on agricultural productivity in Nigeria (Time Series Analysis 1980-2013). International *Journal of Academic Research in Business and Social Sciences*, 5(11).

Ammani, A. A. (2012). "An Investigation into the Relationship between Agricultural Production and Formal Credit Supply in Nigeria". *International Journal of Agriculture and Forestry,* 2(1): 46-52.

Amunwa, T. (2021) *Effects of selected macroeconomic variables on agricultural growth in Nigeria (1970-2018).* PhD Dissertation, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Nigeria.

Anetor, F. O., Ogbechie, C., Kelikume, I. and Ikpesu, F. (2016). Credit Supply and Agricultural Production in Nigeria: A Vector Autoregressive (VAR) Approach. *Journal of Economics and Sustainable Development,* 7(2), 131-143.

Awotide, B. A., Abdoulaye, T., Alene, A. and Manyong, V. M. (2015). *Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria.* International Conference of Agricultural Economists, IOAE.

Bassey, N. E., Attaret, A. E., Nkeme, K. K. and Udoh, E. (2014a). Determinants of Loan Repayment: A study of Rural Women Fish Traders in Akwa Ibom State, Nigeria. *B. J. Econ. Man. Trad.,* 4 (4), 541-550.

Enyim, O. B., Ewno, E. N. and Okoro, O. T. (2013). Banking sector credit and the performance of the agricultural sector in Nigeria. *European Journal of Scientific Research, 23*(2), 35-55.

Eseyin, O., Toluyemi, T. and Oni, O. O. (2016). Investment in Agricultural Sector: Implication for Poverty Reduction in Nigeria (1985-2012). *American Journal of Business and Society*, 1(3), 118-128.

Etonihu, S., Mejeha R.O. and Obunadike A. (2013). *Access to Bank Credit in sub-Saharan Africa: Key Issues and Reform Strategies.* IMF Working Paper WP/05/166 IMF Washington.

Eze, C. C., Lemchi, J. I., Ugochukwu, A. I., Eze, V.C., Awulonu, C. A. O and Okon, A. X. (2010). *Agricultural Financing Policies and Rural Development in Nigeria.* The 84th Annual Conference of the Agricultural Economics Society, Edinburgh.

Gryshova, Y., Mityay, O. V. and Gnatyeva (2016). Competitiveness of agriculture enterprises as the main factor of sustainable development of agricultural sphere. *Текст Том* 1(2), 25-35.

Ibeagwa, O. B. (2019). *Determinants of per capita agricultural gross domestic product, agricultural productivity of investment capital and food security in Nigeria (1980-2015).* PhD Dissertation, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Nigeria.

Imoisi, A. A., Sogules, I. W. and Ekpeyoung, B. I. (2012). "An Appraisal of Credit Facilities on Agricultural Output and Productivity in Nigeria: 1970-2010". *British Journal of Humanities and Social Sciences*, 7(2).

Mbutor, O. M., Ochu, R. E. and Okafor, I. I. (2013). The contribution of finance to agricultural production in Nigeria, *Economic and Financial Review. 51*, 2, 1-20.

National Bureau of Statistics (2019). *Foreign Trade Statistics 2019.* Publication of National Bureau of Statistics, Abuja.

National Planning Commission. (2019) "Report on its Activities". *NPC* Abuja, Nigeria.

Njoku, G. K., Olweny, T. and Njeru, A. (2018). Relationship between farm production capacity and agricultural credit access from commercial banks. *Int. Acad. J. Econ. Fin.,* 3 (1), 159–174.

Njoku, M. E. (2016). Analysis of factors affecting agribusiness cooperators' access to credit from formal sources in Abia State, Nigeria. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension* 15(2): 23 – 28.

Nnamerenwa, G. C. (2012). *"Analysis of Intra-sectoral Credit Allocation under the Agricultural Credit Guarantee Scheme Fund in Nigeria (1978 – 2009)".* M.Sc Thesis, Department of Agricultural Economics, Michael Okpara University of Agriculture Umudike, Abia State, Nigeria.

Nnamocha, P. N. and Eke, C. N. (2015). "Bank Credit and Agricultural Output in Nigeria (1970 – 2013): An Error Correction Model (ECM) Approach". *British Journal of Economics, Management & Trade,* 10(2): 1-12.

Obansa, S. A. J. and Maduekwe, I. M. (2013). Agriculture Financing and Economic Growth in Nigeria. *European Scientific Journal,* 9(1), 168 – 204.

Obiechimina, M. E. (2007), Improving the Agricultural Sector towards Economic Development and Poverty Reduction in Nigeria. *CBN Bullion*, 31(4): 66-86.

Oboh, V. U. and Adeleke, A. I. (2016) Accelerating inclusive agricultural growth in Nigeria: An examination of strategic issues, challenges and policy options. *International Journal of Development and Economic Sustainability,* 4(6), 1-25.

Ogbonna, S. I. and Osondu, C. K. (2018). Analysis of supply structure and trends of formal funding of agriculture in Nigeria (1992-2012). *Scientific Papers Series, "Management Economic Engineering in Agriculture and Rural development,* 18(1): 277-285, 2018.

Okafor, I. G., Ezeaku, H. C. and Ugwuegbe, U. S. (2016). Relationship between Deposit Money Bank Credit and Economic Growth in Nigeria under a VAR G-Causality Environment. *IOSR Journal of Economics and Finance,* 7(2): Ver. III: 41-46.

Olorunsola E. O., Adeyemi A. A., Valli T. A., Kufre J. B. and Ochoche A. (2017). Agricultural Sector Credit and Output Relationship in Nigeria: Evidence from Nonlinear ARDL. *CBN Journal of Applied Statistics,* 8(1), 101 -122.

Oluwaseyi, P. and Risikat, D. (2020). Agriculture Financing and Growth Performance in Nigeria: Pre-2000 and Post- 2000 Analyses. *The Romanian Economic Journal,* Year XXIII (75): 16 -37.

Omosebi, A. and Saheed, A. A. (2016). Agricultural Credit and Economic Growth Nexus. Evidence from Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 6 (2), 146–158

Onuoha, G. C, Onyebinama U. A. U., Osuigwe, D. I. and Deekae, S. N. (2007). An Analysis of Artisanal Fishing in Uta Ewa Fishing Port, Ikot Abasi L.G.A, Akwa Ibom State. *International Journal of Agriculture and Rural Development,* 10(1): 28 – 32.

Onwumere, J. C., Ene, C. H. and Nnamerenwa, G. C (2017). Government credit, banks' credit and agribusiness sector performance under consolidation policy in Nigerian banking institutions (1995-2014): a trend analysis. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development,* 17(1), 307 -316.

Onyebinama U. A. U. and Nnamerenwa G. C. (2013). Comparative analysis of credit allocation to crop and livestock subsectors under the Agricultural Credit Guaranteed Scheme Fund (ACGSF) in Nigeria. *The Nigerian Agricultural Journal,* 44(1&2),135 -145.

Onyebinama, U. A. U., Chidebelu, S. A. N. D. and Nwagbo, E. C. (2005). "*Effects of Devaluation on Food Imports in Nigeria".* Proceedings of the 19th Annual Conference of the Farm Management Association of Nigeria (FAMAN):63 -67.

Onyebinama, U. A. U., Chidebelu, S. A. N. D. and Nwagbo, E. C. (2007), Effects of Exchange Rate Adjustment on the Output of Nigerian Agriculture. *The Nigerian Agricultural Journal,* 3(8): 82-91.

Onyenweaku, C. E., Okoye, B. C., Asumugha, G. N., Okezie C. A. and Tanko, L. (2008), Economic Assessment of the Trend in Cocoyam Production in Nigeria, 1960/61 -2006. *Medwell Agricultural Journal,* 3(2): 99 -101.

Onyishi L. O., Arene C. J. and Ifiorah C. M. (2015). Impact of interest rate reform on agricultural finance and growth in Nigeria. *RJOAS*, 1(37), 29 - 37.

Rahji, M. A. Y. and Fakayode, S.A. (2009). A Multinomial Logit analysis of Agricultural Credit Rationing by Commercial Banks in Nigeria. *International Research Journal of Finance and Economics, 24, 91.*

Salami, A. and Arawomo, D. F. (2013). *Empirical analysis of agricultural credit in Africa: Any role for institutional factors?* Working Paper Series, African Development Bank Group.

Toby, A. J. and Peterside, D. T. (2014). Analysis of the role of banks in financing the agriculture and manufacturing sectors in Nigeria. *International Journal of Research in Business Management (*IMPACT: IJRBM), *2*(2), 9-22.

Udoka, C. O., Mbat, D. O. and Duke, S. B. (2016). "The Effect of Commercial Banks' Credit on Agricultural Production in Nigeria. *Journal of Finance and Accounting*, 2016, 4 (1), 1-10.

Ugoani, J. N. N., Emenike, K. O. and Ben-Ikwunagum, D. O. (2015). Measuring Farmers Constraints in Accessing Bank Credit through the Agricultural Credit Guarantee Scheme Fund in Nigeria, *American Journal of Marketing Research, 1*(2), 53-60.