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Effect of Agricultural Financing on Agricultural Output Growth in Nigeria (1980-2022)

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ABSTRACT

Agricultural financing through government assisted programs and credits catalyzes the process of agricultural production and productivity. The poor performance of agricultural sector in Nigeria's economy with its resultant food shortages and high food prices over the years has been aptly attributed to the inadequate capital to finance agricultural investments. The study examined the effects of agricultural financing on the growth of agricultural output in Nigeria.

The study made use of time series data from CBN Statistical Bulletin and World Development Indicators. The dependent variable is the agricultural output growth while government agricultural expenditure, agricultural credit guarantee scheme funds, commercial banks credits to the agricultural sector and interest rates on loans to the agricultural sector were the independent variables. The methods of analyses were the descriptive statistics for describing the trends and patterns of the independent variables, unit root tests (URT) for ascertaining the stationarity of the variables, Autoregressive distributive lag (ARDL) for the estimation of the long-run relationship between the variables, Error Correction Model (ECM) for estimating the short-run relationship between the variables as well as the post-estimation tests to ascertain the stability of the series residuals. Granger Causality was used to analyze the causal relationships that existed among the variables.

The findings of the study revealed that only agricultural output growth (AOG) and government agricultural expenditure (GAEX) were stationary at levels (1(0)) while agricultural credit guarantee scheme funds (ACGSF), commercial banks loans to the agricultural sector (CBCA) and interest rates on loans to the agricultural sector (INTR) were stationary at first difference (1(1)). The study also revealed that government agricultural expenditure (GAEX), commercial banks credit to the agricultural sector (CBCA) and interest rates on loans to the agricultural sector (INTR) have significant positive long-run relationship (p-value of 0. 0067, 0.0037 and 0.0013) with

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the growth of agricultural output in Nigeria while agricultural credit guarantee scheme funds (ACGSF) had significant negative impacts with a p-value of 0.0053 on the growth of agricultural output in Nigeria. The study also revealed a strong causal relationship between interest rates on loans and commercial banks credit to the agricultural sector. Furthermore, the post-estimation tests conducted revealed that the variance of the residuals were constant, not correlated but were not normally distributed in the study.
Therefore, the study concluded that the commercial banks' credit to the agricultural sector, government agricultural expenditure and interest rates on loans to the agricultural sector are the major determinants of agricultural output growth in Nigeria. The study therefore recommends that there should be an increase in the financing of the agricultural sector with lower interest rates on loans from commercial banks to attract agricultural stakeholders and further boost the growth of agricultural output in Nigeria.

Keywords: Agricultural financing, agricultural output growth.

1. INTRODUCTION

Agriculture is the practice of cultivating crops and rearing of animals for the purpose of producing food for man, animals, as well as the provision of raw materials for industries. Agriculture is the largest economic activity in the rural areas of Nigeria where almost 50% of the population lives (Cletus and Sunday, 2018).The sector plays an indispensable role in the economic development process of developing countries and this role cannot be overemphasized. Generally, the sectors' contribution to the development of an economy can be noted in four major ways; production contribution, factor contribution, market contributions and foreign exchange contribution (Iganiga and Uhemhilin, 2011). These contributions in effect have been the source of gainful employment opportunity with attendant implications for poverty alleviation and improvement of income distribution. Based on these contributions, agriculture is regarded as the fundamental to the Socio-economic development of a nation (Ahmed, 1993).

Until the discovery of oil in Nigeria, agriculture was the most important sector of the economy accounting for more than two-thirds of colonial Nigeria's export earnings. The contributions of agriculture declined drastically during the civil war (1967-70) and after the discovery of oil in Nigeria due to lack of visionary planning for sustainable development. Nigeria, a nation that had been a major agricultural net exporter and was largely self-sufficient in food production quickly became a net importer of agricultural commodities. Inadequate financing and lack of proper management has been identified as a major cause of the low performance of the Nigerian agricultural sector (Orji *et al* 2014).

Agricultural financing is one of the most important instruments of economic policy for Nigeria, in her effort to stimulate development in all directions (Obansa and Maduekwe, 2013). The role of finance in agriculture, just like in the industrial and service sectors, cannot be over-emphasized, given that it is the oil that lubricates production (Eze *et al* 2010). Agricultural financing is mainly a long-term financing aimed at inducing agricultural-led growth and development in an economy (Obansa and Maduekwe, 2013).

To address the challenges of agricultural financing deficit and achieve food security, the Federal Government of Nigeria has introduced various financing scheme to enhance availability and accessibility of fund for agriculture. Some of these schemes are the Agricultural Credit Guarantee Scheme Fund (ACGSF), Agricultural Credit Support Scheme (ACSS), Commercial Agriculture Credit Scheme (CACS) and the Anchor Borrowers Programme. Government also can directly influence activities in the agricultural sector directly and indirectly using both the capital expenditure and recurrent expenditure. Capital expenditure involves expenditure on the building of feeder roads in rural areas, silos, tractors and other equipment for farmers, resulting in increased output and well-being of lives of people in those areas. Provision of loan facilities, subsidizing of farm inputs and financial support to farmers would make the agricultural sector more attractive and raising entrepreneurship in agribusiness, thereby leading to positive externalities to other sectors of the economy.

In light of the above, agricultural financing is relevant for improving the efficiency and efficacy of the sectors' operations. Against this backdrop, this study focused on the effect of agricultural financing on agricultural output growth in Nigeria between the years 1980 to 2022 with a particular spotlight on commercial bank credits, agricultural credit guarantee scheme funds, and government agricultural expenditure and how these variables contribute to the agricultural output growth process. Towards this end, this study seeks answers to the following research questions:

1. What relationship exists between agricultural financing and agricultural output growth in Nigeria?
2. Is there a causal relationship between Nigeria's agricultural output growth and agricultural financing sources?

2. LITERATURE REVIEW

Agricultural financing has been defined by various authors in different ways. Obansa and Madukwe, (2013) defined agricultural financing as the mobilization of resources at all levels in order to increase production and productivity in agriculture and to enhance the productive capacity. Mattia et al (2016) defined agricultural financing as the provision of credit which is crucial to the development of the farming sector. It includes both government money and non-governmental groups working toward sector growth, economic empowerment, and social empowerment. In the same vein, Adejumo and Bolarinwa (2017) hypothesized agricultural financing programs as part of financial arrangements set up by the government at all levels to assist farmers' access to finance and invariably boost agricultural productivity.

The nexus between agricultural financing and agricultural output growth has been examined by several researchers and these includes the research works of; Obudah and Tombofa (2016), in their study on the effect of agricultural financing on output growth and macro-economic growth in Nigeria collected data from CBN Bulletin and used the ordinary least squares method, co-integration and error correction technique to do the analysis. Their result showed that there existed a positive relationship between agricultural credit and agricultural output. They also found that agricultural credit has a positive effect on the real GDP over the period of study. They asserted that failure of borrowers to payback credit had caused a reduction in lenders confidence and this is a serious limitation to the financing of the agricultural sector in Nigeria. Egwu (2016) investigated the impact of agricultural financing on agricultural output, economic growth and poverty alleviation in Nigeria with the use of the ordinary least square regression technique. The study result revealed that the Credit Guarantee Scheme Fund Loan and the commercial banks credit to Nigeria's Agricultural sector has significantly impacted agricultural output positively thereby reducing the poverty rate and stimulated the economic growth within the study period. The result also predicts that in the long-run, farmers should be able to apply their own funds for agricultural development even without loans from the Guarantee Scheme Fund.

In another recent study, Olowofeso et al (2017) investigated the relationship between agricultural sector financing and agricultural output growth using the non-linear auto-regressive distributed lag (NARDL) model. Their findings showed no evidence of asymmetry in the impact of agricultural sector credit on agricultural output growth in the short-run but indicated different long-run stability relationships between agricultural sector credit and output growth in the agricultural sector. Iganiga and Unemhilin (2011), investigated the effect of Federal government agricultural expenditure on agricultural output in Nigeria. They employed co- integration and error correction methodology to determine the nature of the relationship and the results showed that a positive relationship exists between government capital expenditure and agricultural output, however, it was also noted by the researchers that with a one-year lag period, the result shows that the impact of government expenditure on agriculture is not instantaneous. The results revealed negative effects from total credit to agriculture and population growth rate, this negative effect confirmed that it is not enough to give out credit facilities for agricultural practices without proper monitoring it.

Megbowon et al (2019) studied the impact of government expenditure on agricultural productivity in South Africa using annual time series data from 1983 to 2016. The Bounds Co-integration test and ARDL model were used in this study. The study found government expenditure on agriculture to be of significance effect on agricultural productivity. It showed that there is a long-run positive relationship between government expenditure on agriculture and agricultural productivity. Uremadu et al, (2018) studied the effect of government agricultural expenditure on agricultural output using time series data from 1981 to 2014. The data was analyzed using co-integration test and vector error correction model. The Johansen co-integration tests revealed that there is a long-run relationship between agricultural output and government agricultural expenditure. The vector error correction model results indicated that agricultural output adjusted rapidly to changes in total government agricultural expenditure, real exchange rate, banking system credit to agriculture, average annual rainfall and population growth rate. Other related research studies includes; Lawal and Abdullahi (2011), Adofu (2012), Mathew and Mordecai (2016), Ewubare and Eyitope (2015) and Idoko et al (2012) among others.

3. METHODOLOGY

The study area is officially known as the Federal Republic of Nigeria, but often times referred to as Nigeria. It is a country in the lower middle income group with a gross national per capita income of US$1,190.00, and its currency is the Naira, which is equal to the sub division of 100 kobo (FAO, 2012). The major exports of the country are: crude oil (petroleum), natural gas, sesame, cashew nuts, leather, tobacco, shrimps and prawns, cocoa, cassava, rubber, food, live animals, aluminium alloys and other solid minerals, (CIA World Fact book 2015) while major imports are: refined petroleum products, wheat, rice, sugar, herbicides, fertilizers, chemicals, vehicles, aircraft parts, vessels, vegetable products, processed food, beverages, spirits and vinegar, equipment, machines and tools (NBS 2015).

The research work used secondary data in the form of annual time series data. The time series data were collected for the period between 1980 and 2022, denoting a period of 43years.

E-ISSN No: 2456-6713 Print ISSN No: 3048-6459

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The sources of data used were; Central Bank of Nigeria (CBN) Statistical Bulletin, World Development Indicators (WDI) and FAOSTAT data. The data collected from FAOSTAT include:

(a.)Value of Agricultural Production (1980-2022).
(b.) Population data (1980-2022)

The data on:

(i) Government agricultural expenditure,
(ii) Commercial banks credit to the agricultural sector and
(iii) Agricultural credit guarantee scheme funds were collected from the CBN's statistical bulletins for the years 1980-2022. While data for
(iv) Interest rates on loans to the agricultural sector were collected from the World Development Indicators (WDI) for the years 1980-2022.

For this research study, firstly descriptive statistics such as the mean, median, minimum, maximum, standard deviation, kurtosis and skewness were used to describe each variable. The variables includes, government agricultural expenditure data, agricultural credit guarantee scheme funds, interest rates on loans to the agricultural sector data and the commercial banks credit to the agricultural sector data in Nigeria.

Stationarity test was carried out in order to overcome the issue of non-stationarity of time-series data. The test conducted is the augmented dickey fuller's test (ADF).

The research made use of the Autoregressive Distributive Lag (ARDL) of econometric method of analysis to establish the relationship that exist between agricultural financing and agricultural output growth. The study adopts the ARDL model due to its robustness and consistency in time series analysis. ARDL bound testing can be used conveniently regardless of the sequence of series integration because it has both long-run and short-run dynamics i.e. whether I(1) or I(0).

Post-estimation tests such as heteroskedasticity test, serial correlation test, normality test and stability test were conducted to checkmate the residuals of the series used in this study.

Furthermore, Pair-wise granger causality test was employed to examine the causal relationships among the variables used in the study.

The Autoregressive Distributed Lag (ARDL) Model

This model is used when the data set contains both I(0) and I(1) variables. ARDL and bounds test is the most suitable technique for examining the long and short run relationship between agricultural output growth and agricultural financing sources. The technique is superior to other approaches of co-integration (such as Johansen and Engel Granger) due to the following reasons:

(i) The approach does not require all variables to be integrated of order one.

E-ISSN No: 2456-6713 Print ISSN No: 3048-6459

International Educational Applied Research Journal

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(ii) It can be applied to a small sample size.
(iii) It also produces unbiased estimates even in the presence of endogenous co-variates (Harris and Sollis, 2003).
(iv) The method can be applied even when the variables have different optimal number of lags and
(v) The approach can further estimate the short and long run relationships between the dependent variables and its predictors.

In order to specify the functional form of the model, thus;
$AOG = \int (GAEX, ACGSF, CBCA \; and \; INTR)$... (1)

The above equation can be written as;

$AOG_t = \alpha + \beta_1 GAEX + \beta_2 ACGSF_t + \beta_3 CBCA_t + \beta_4 INTR_t + \mu_t$................ (2)

Equation could be modified to the autoregressive distributed lag model in its broadest version as follows:

$\Delta \, lnAOG_t = \beta_0 + \beta_1 lnGAEX_{t-1} + \beta_2 lnACGSF_{t-1} + \beta_3 lnCBCA_{t-3} + \beta_4 lnINTR_{t-1} + + \mu_t$.......(3)

Where:

Δ stands for difference in respective variables and (-) is a lag sign.

AOG stands for agricultural output growth,

GAEX stands for Government agricultural expenditure,

ACGSF stands for agricultural credit guarantee scheme funds,

CBCA stands for commercial banks' credit to the agricultural sector,

INTR stands for interest rates on loans to the agricultural sector

μ_t Stands for the error term

Model Specification

The estimation of the relationship between agricultural output growth and agricultural financing sources for this research study is structured econometrically as specified below:
$Y_t = \beta_0 + \beta_1 GAE_t + \beta_2 ACGSF_t + \beta_2 CBCA_t + \beta_3 INT_t + \mu_t$.................. (4)

Where, Y_t is the dependent variable, β_0 is the intercept, β_1 is the parameter of explanatory variable, β_2-β_3 is the vector of the parameters of other explanatory variables and μ_t is the error term (assumed to have zero mean and independent across time period).

The econometric model in equation 4 was adopted to examine the impact of agricultural financing on agricultural output growth in Nigeria from 1980-2022, the properties of the series were tested with the application of recent unit root and co-integration tests, the equation, with all the series converted into natural log to stabilize the variance, is expressed and estimated as follows:

$\ln Y_t = \beta_0 + \beta_1 \ln GAE_t + \beta_2 \ln ACGSF_t + \beta_2 \ln CBCA_t + \beta_3 \ln INT_t + \mu_t$……….(5)

Where:

ln= Natural Logarithm

Y=Agricultural output growth

GAEX=Government agricultural expenditure

CBCA=Commercial banks credit to the agricultural sector

ACGSF=Agricultural credit guarantee scheme funds

INTR=Interest rate on commercial bank loans to the agricultural sector

μ_t=Stochastic error term

t=Time subscript

β_0=Intercept

β_1-β_4=Parameters of estimate

4. RESULTS AND DISCUSSION

The results for data analysis carried out for this research study is presented in this chapter and the chapter is divided into five parts. The first part contains the descriptive statistics of the variables, the second parts entails the trend analysis of the variables, part three holds the unit root test, part four contains the co-integration test and part five is for the granger causality test.

Descriptive Statistics of the Variables

Table 1 presents the descriptive statistics of the variables employed in this research study. The mean value of ACGSF, GAEX, CBCA, INTR and AOG were 3959475.10, 26970.44, 78936.67, 13.01535 and 2828.071 respectively while their standard deviations were 4790653.12, 27664.02, 132652.00, 4.350515 and 858.1157 respectively. The mean above shows the average values of variables during the specified time period, while the standard deviation takes into account the deviation of the minimum and maximum variable values of the mean. The table also shows that all variables were positively skewed and the Jarque-Bera result suggests that not all the variables were normally distributed as the p-values are significant at 5% level of significance.

Table 1 Descriptive Statistics

	ACGSF	CBCA	GAEX	INTR	AOG
Mean	39594475.	78936.67	26970.44	13.01535	2828.071
Median	728545.4	25300.00	16045.20	13.88000	2913.641
Maximum	14624110	498420.0	107463.9	19.18000	4621.762
Minimum	24654.90	50.00000	285.5000	5.890000	0.213854
Std.dev.	4790653.	132652.0	27664.02	4.350515	858.1157
Skewness	0.739378	2.004993	0.828125	-0.226093	-0.50914
Kurtosis	1.961068	5.866424	2.900005	1.449373	4.392734
Jarque-Bera	5.851758	43.53099	4.932746	4.674308	5.333123
Probability	0.053618	0.000000	0.084892	0.096602	0.069491
Sum	1.70E+08	3394277.	159729.	559.6600	121607.1
SumSq.Dev.	9.64E+14	7.39E+11	3.21E+10	794.9331	30927228

Observations	43	43	43	43	43

Source: Computed by the Author using E-Views 12, 2024

Estimation of Unit Root Tests

Table 2 presents the results of the Augmented Dickey-Fuller (ADF) unit root tests for variables included in the research study. The ADF test helps determine whether a time series variable is stationary, which is crucial for econometric modelling to avoid spurious regression results.

The ADF unit root test results indicate that the variables ACGSF, CBCA and INTR are integrated of order 1, requiring first differencing to achieve stationarity while GAEX and AOG was already stationary in its level form and thus integrated of order 0.

Table 2: Results of Augmented Dickey-Fuller Unit Root Tests

Variables	ADF test statistic	Probability value	Order of Integration
AOG	-5.151772	0.0007*	1(0)
GAEX	-3.885797	0.0215**	1(0)
ACGSF	-4.674363	0.0035*	1(1)
CBCA	-7.05835	0.0000*	1(1)
INTR	-7.398781	0.0000*	1(1)

&Significant at 1% and 5% Level of Significance (LOS) respectively. ADF is calculated with trend and intercept using Lag Length: 1 (Automatic-based on SIC, max lag=9)*

Source: Computed by the Author using E-Views 12, 2024

Estimate of Co-integration using the Autoregressive Distributed Lag with Error Correction Regression

The ARDL (Auto-Regressive Distributed Lag) model analysis as presented in Table 4.3 examines the relationship between agricultural output growth and its determinants (the agricultural financing sources) over the period from 1980 to 2022. Also, the Error Correction Model (ECM) for the short-run co-integration results is presented in table 4.

Table 3 presents the result for the ARDL long-run form of co-integration test, the result shows that CBCA, ACGSF and INTR were significant at 5% level of significance with p-values of 0.0037, 0.0053 and 0.0013 respectively.

CBCA has a positive coefficient of 0.880400 and a p-value of 0.0037. This indicates that a unit increase in CBCA will lead to an increase in AOG by 0.880400. INTR also had a positive coefficient of 2.590431 with a p-value of 0.0013, indicating that a unit increase in INTR will lead to a 2.590431 increase in AOG. However, ACGSF has a negative coefficient of -1.109964 and was positively significant at 5% level of significance. This suggests that an increase in ACGSF will lead to a decrease in AOG by 1.109964. This could be as a result of corruption, misappropriation and embezzlement of funds by the administrator of such funds.

The R-squared value of 0.690882 and the adjusted R-squared value of 0.645424 suggest that about 69% of the variation in the Agricultural output grow is explained by the independent variables which are: GAEX, ACGSF, CBCA and INTR. This shows that the model is well-fitted and has a tight fit, therefore, the model is statistically robust. The Durbin-Watson statistic value is 2.162533 indicating that there is no issue with auto-correlation in the residuals. This diagnostic statistics indicates that the model is well-specified and explains a substantial proportion of the variation in agricultural output growth. The probability value of the F-statistic equals 0.0000 showing that the model is significant at the 5% level of significance.

The F-bounds test is used to determine whether there is a long-run relationship (co-integration) among the variables. The Wald F-statistic value is 6.050370. This is compared to the critical values at different significance levels. For the 5% significance level, the critical bounds are 2.86 for the lower bound and 4.01 for the upper bound. The Wald F-statistic is greater than the upper bound critical value of 4.01 suggesting a strong indication of long-run relationship among the variables. Therefore, we reject the null hypothesis of no long-run relationship between the variables in the model.

The key output from the result presented in table 4 is the error correction model coefficient. The coefficient of the error correction term (Co-intEq(-1)) is -1.197515. This negative and significant value confirms the existence of a long-run equilibrium relationship. This suggests that deviations from long-run equilibrium are corrected at a rate of about 120% per period, implying a strong adjustment back to equilibrium. This negative and statistically significant coefficient (p-value = 0.0000) indicates the speed at which the dependent variable returns to equilibrium after a change in the independent variables. Specifically, it suggests that approximately 120% of any deviation from the long-run equilibrium is corrected within one period. This high adjustment speed implies a strong and stable long-run relationship between the variables. Significant coefficients in the ECM also suggest that variables such as ACGSF and CBCA have substantial impacts in the short run.

Table 3: Auto-regressive Distributed Lag result for long-run relationship

Levels Equation

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Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGAEX	0.318698	0.229206	-1.390439	0.1767
LNCBCA	0.880400*	0.275281	3.198183	0.0037
LNACGSF	-1.109964*	0.363374	-3.054604	0.0053
LNINTRATE	2.590431*	0.714726	3.624371	0.0013

EC = LNAOG - (0.3187*LNGAEX + 0.8804*LNCBCA - 1.1100*LNACGSF + 2.5904*LNINTRATE)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.050370	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.372698	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26

*** significant at 1% level of significance**

Source: Computed by the author using E-views12, 2024.

Table 4: Error correction model regression estimate for short-run relationship		

E-ISSN No: 2456-6713 Print ISSN No: 3048-6459

International Educational Applied Research Journal

Peer-Reviewed Journal-Equivalent to UGC Approved Journal

A Multi-Disciplinary Research Journal

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.39514	1.609262	7.702378	0.0000
D(LNGAEX)	-1.118456*	0.311016	-3.596129	0.0011
D(LNCBCA)	-0.874366	0.819924	-1.066398	0.2948
D(LNCBCA(-1))	-1.831704**	0.829420	-2.208415	0.0350
D(LNCBCA(-2))	-1.329710	0.838898	-1.585069	0.1234
CointEq(-1)*	-1.197515	0.155317	-7.710138	0.0000
R-squared	0.690882	Mean dependent var		0.023728
Adjusted R-squared	0.645424	S.D. dependent var		2.157259
S.E. of regression	1.284568	Akaike info criterion		3.476202
Sum squared resid	56.10387	Schwarz criterion		3.729534
Log likelihood	-63.52405	Hannan-Quinn criter.		3.567799
F-statistic	15.19811	Durbin-Watson stat		2.162533
Prob(F-statistic)	0.000000			
* p-value incompatible with t-Bounds distribution.				

Source: Computed by the Author using E-Views 12, 2024

Residual Tests:

Heteroskedasticity Test

This test checks if the variance of the residuals is constant (homoskedasticity) or if it varies (heteroskedasticity).The probability value (F-statistics) with the value 0.549588 is not significant showing the residuals are constant which amounts to homoskedaticity.

Table 5: heteroskedasticity test result

Heteroscedasticity test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.961036	Prob. F(24,14)	0.5496
Obs*R-squared	24.26906	Prob. Chi-Square(24)	0.4463

Scaled explained SS	8.849067	Prob. Chi-Square(24)	0.9979

Source: Computed by the Author using E-Views 12, 2024

Serial Correlation LM Test

This test checks for serial correlation (autocorrelation) in the residuals. The insignificant nature of the probability value of 0.9092 indicates that the residuals are not correlated overtime. This implies that residuals are not correlated over time, which leads to unbiased standard errors and efficient estimators.

Table 6: Serial correlation test result

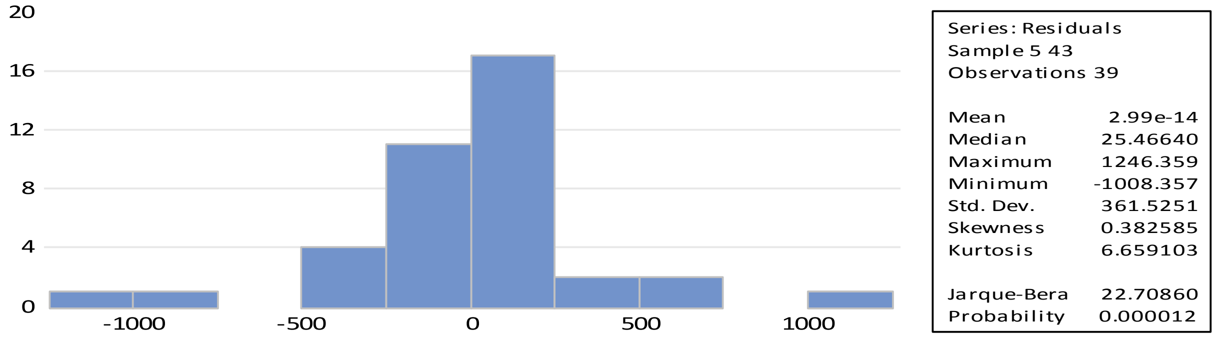
Breusch-Pagan-Godfrey Serial Correlation LM Test
Null hypothesis: No serial correlation

F-statistic	0.099360	Prob. F(2,12)	0.9062
Obs*R-squared	0.635319	Prob. Chi-Square(2)	0.7279

Source: Computed by the Author using E-Views 12, 2024

Normality Test

The null hypothesis (H0) is that the residuals are normally distributed. The normality test typically provides the p-value of 0.0000. As such, the p-value is below the 5% therefore we reject the null hypothesis, suggesting that the residuals are not normally distributed.



Source: Computed by the Author using E-Views 12, 2024

Fig. 1 Normality Test Graph

Stability Test

In this graph, the CUSUM line stays within the 5% significance boundaries throughout the sample period. This indicates that the model is structurally stable at the 5% significance level. There is no

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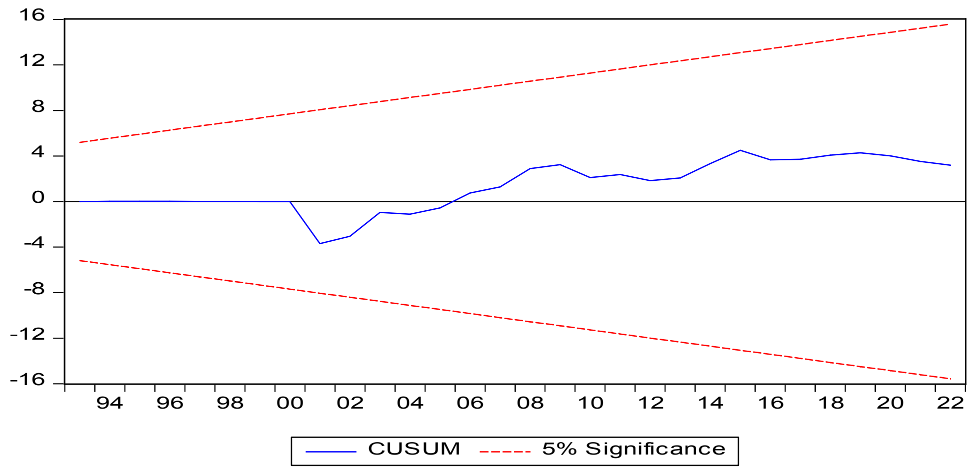
evidence of a structural break or instability in the regression coefficients over the time period analyzed.



Source: Computed by the Author using E-Views 12, 2024

Fig. 2 Stability Test Graph.

Causal relationship that exists between Agricultural Financing Sources and Agricultural Output Growth in Nigeria.

The analysis examined the causal relationships between several variables representing Agricultural Financing Sources, GAEX (government agricultural expenditure), CBCA (commercial banks credit to the agricultural sector), and INTR (interest rate) and Agricultural Output Growth (AOG) in Nigeria. The test evaluated whether each variable "Granger causes" the others, which means whether it statistically helps predict changes in another variable.

The results indicate that between GAEX and AOG there is no strong evidence to suggest that government agricultural expenditure (GAEX) Granger causes agricultural output growth (AOG), as the p-value (0.3430) is higher than conventional significance levels (such as 0.05). Similarly, agricultural output growth does not Granger cause government agricultural expenditure (p-value = 0.2231).

The relationship between CBCA and agricultural output growth (AOG) also lacks strong evidence of Granger causality (p-value = 0.1447). Also, agricultural output growth (AOG) does not Granger cause CBCA, as indicated by a high p-value of 0.9734. There is also no significant Granger causality from interest rates to agricultural output growth (p-value = 0.9540). Similarly, agricultural output growth (AOG) does not Granger cause changes in interest rates (INTR) (p-value = 0.4010). CBCA does not significantly Granger cause government agricultural expenditure (GAEX) (p-value = 0.3618). Likewise, government agricultural expenditure (GAEX) does not Granger cause changes in CBCA (p-value = 0.1861).

There is some weak evidence (p-value = 0.0692) to suggest that interest rates (INTR) might Granger cause changes in government agricultural expenditure (GAEX), but this result is not strong enough to confidently reject the null hypothesis. Conversely, there is stronger evidence (p-value = 0.0266) that government agricultural expenditure (GAEX) does Granger cause changes in interest rates (INTR), suggesting a potential predictive relationship. There is no significant evidence that interest rates Granger cause changes in CBCA (p-value = 0.6907). However, there is evidence (p-value = 0.0370) suggesting that CBCA Granger causes changes in interest rates (INTR), indicating a predictive relationship between CBCA and interest rates (INTR).

Overall, these results indicate varying levels of predictive relationships among the variables tested. While some relationships show potential predictive power (such as CBCA on INTR), others do not provide strong evidence of causal influence.

Table 7: Results from the Pair-wise Granger Causality model

Null Hypothesis	F-statistic	Prob.
GAEX does not Granger Cause AOG	1.11538	0.3430
AOG does not Granger Cause GAEX	1.59037	0.2231
CBCA does not Granger Cause AOG	2.08392	0.1447
AOG does not Granger Cause CBCA	0.02704	0.9734
INTR does not Granger Cause AOG	0.04720	0.9540
AOG does not Granger Cause INTR	0.94677	0.4010
CBCA does not Granger Cause GAEX	1.05756	0.3618
GAEX does not Granger Cause CBCA	1.79510	0.1861
INTR does not Granger Cause GAEX	2.96428	0.0692
GAEX does not Granger Cause INTR	4.18202	0.0266
INTR does not Granger Cause CBCA	0.37530	0.6907
CBCA does not Granger Cause INTR	3.75373	0.0370

Source: Computed by the Author using E-Views 12, 2024

Hypothesis Testing

Based on the research questions raised, the following hypotheses were tested thus;

H_{o1}: There is no relationship between agricultural financing and agricultural output growth in Nigeria.

Based on the findings of this study, the long run Auto regressive distributive lag estimates shows that there is a strong, stable, positive and significant relationship between agricultural financing and agricultural output growth in Nigeria. Therefore, the null hypothesis that states that there is no relationship between agricultural financing and agricultural output growth in Nigeria is rejected.

H_{o2}: Interest rates on loans to the agricultural sector has no impact on agricultural output growth in Nigeria.

The result analysis indicates that interest rates on loans to the agricultural sector in the long run had a positive and significant relationship with agricultural output growth in Nigeria. On the basis of this, the null hypothesis that states that interest rates on loans to the agricultural sector has no impact on the agricultural output growth in Nigeria is also rejected.

5. CONCLUSION AND RECOMMENDATIONS

The major conclusion of the study based on the findings of the study is that commercial banks' credit to the agricultural sector (CBCA), government agricultural expenditure (GAEX) and interest rate (INTR) had significant positive relationships with agricultural output growth (AOG) in Nigeria within the observed period. This suggests that a unit increase in commercial banks' credit to the agricultural sector, government agricultural expenditure as well as interest rate will result in an increase in the agricultural output growth. This implies that CBCA and GAEX as a source of agricultural financing have positive and significant effect on agricultural output growth (AOG). The study also reveals that agricultural credit guarantee scheme funds (ACGSF) had a negative and substantial relationship with agricultural output growth in the long run which means that a unit increase in agricultural credit guarantee scheme funds will result in a decrease in the agricultural output growth.

In light of the findings of the study, the research has the following major policy implications and recommendations:

Agricultural financing has a significant influence on agricultural output growth. Therefore, increasing the amount of funds for financing the agricultural activities will significantly improve the performance of the sector and undoubtedly raise the contribution of the sector to food security in Nigeria.

i Commercial banks' credit to the agricultural sector also is of crucial importance and significantly influences the rate of agricultural output. As a result, the rate of interest on borrowing from the commercial banks should be very low to attract borrowers and also serve as an incentive to farming and other agricultural activities.

ii The study recommends financial adjustments on the government's budget so as to allocate more funds to the agricultural sector. This will thereby increase the governments' expenditure on agriculture and will provide funding for the smooth running of the sector.

iii The study also recommends providing easier access to agricultural loans for the farmers so as to increase the productivity of the agricultural sector. With adequate financing which is easily accessible, maintenance and purchase of farm equipment used for production will be made much easier which will hasten the production process and thus significantly have a positive impact on the output levels of the agricultural sector in Nigeria.

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