

Research Article

Impact of Agricultural Credit Guarantee Scheme Fund on Agricultural Output in Nigeria

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Abstract

The study examined the impact of Agricultural Credit Guaranteed Scheme Fund (ACGSF) on agricultural productivity in Nigeria covering the period 1986Q1 to 2024Q4. The objectives of the study were to determine the impact of Agricultural Credit Grant Scheme Fund (ACGSF) granted to categorized farm production on agricultural output, assess the nature of the relationship between Agricultural Credit Grant Scheme Fund (ACGSF) and agricultural output, trace the direction of causality between Agricultural Credit Grant Scheme Fund (ACGSF) and agricultural output and ascertain the optimal ACGSF loan to crop production required to boost agricultural output in Nigeria. Data for the study were sourced from the Central Bank of Nigeria (CBN) Statistical bulletin 2024 and were interpolated using Eview Econometric package. Augmented Dickey-Fuller (ADF) unit root test and Autoregressive and Distributed Lag (ARDL) bounds test of co-integration were carried out and the Autoregressive Distributed Lag ARDL model was applied to extract the data set. The findings showed that the variables were integrated of order zero and one and had a long run relationship. The result of the short run ARDL indicated that loans granted to Mixed Production in the third quarter had positive significant effect on agricultural output while those granted to crop production had negative but insignificant effect. It was shown by the finding that loans granted to and fishery production had positive insignificant effect on agricultural output in Nigeria. The result of the ARDL Bound test showed that the variables had a long run relationship among the variables used in the model. There was an evidence of a unidirectional causality flowing from agricultural output to loan granted to Mixed Farming Productivity (MIP) by the result of the Granger Causality. The result of the Non-Linear Threshold Quadratic model showed that the maximum loan to be granted to the crop production in order to guarantee maximum agricultural productivity was ₦710,266.055. The study recommended the need to give priority to loans the mixed farming production than fishery or crop production; monitor and evaluate the loans granted to farmers from the first quarter to the third quarter; diversify loans given to farmers; and grant each farmer at least a sum of ₦710,266.055 in order to attain a maximum agricultural productivity in Nigeria.

Keywords

Agricultural Credit; Agricultural Output; Scheme Fund; Model; Integration

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1. Introduction

Nigeria's large population provides a great platform for exploiting its agricultural potentials especially crop production, fishery and other mixed farming. The livestock sector had over the years continued to provide sustainable livelihoods, nutrition and food security, and had served as the basis for social relations and empire building. Livestock production is an integrated economic activity which currently contributes 5-6 per cent of the Gross Domestic Product (GDP) and 20 per cent of the agricultural component of the Gross Domestic Product [1]. Livestock production provides food products such as meat, milk, eggs and other dairy products throughout the year. It provides employment and income to millions of people in rural areas and generates draught power and organic manure for arable farming mainly in the savanna ecological zones of the country.

The agricultural sector in Nigeria is primarily made up of Livestock production, crop production, fisheries, and mixed farming. The sector provides work for about 60-70 per cent of the population and contributes in 2023 up to 24% to the nation's Gross Domestic Product (GDP). It is the hope of the economy in meeting the needs of the rising population in terms of the level of food crop and livestock production but inadequate access to agricultural credit is one of the impediments to the growth and productivity of the sector. Provision of agricultural credit is expected to play a critical role in agricultural development.

As Nigeria grapples with the challenge of diversifying its economy away from oil dependence, agriculture has emerged as a promising sector. The government's strategic focus on enhancing agricultural output and productivity through initiatives like the ACGSF is not only substantial for enhancing real output growth but also has extensive implications for food security, rural employment, and the overall livelihood of the population [16].

Since the availability of credit is directly linked to other problems facing agriculture, absence of agricultural credit would impact negatively on production, processing, transportation and storage. This is based on the fact that majority of the farmers are still wallowing in absolute poverty which remains circular from one generation to another.

The government's commitment to leveraging agriculture's potential for national development led to the implementation of the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1978 [10]. The ACGSF represents a financial instrument aimed at catalysing agricultural production and economic growth in Nigeria.

The agricultural purposes in respect of which loans can be guaranteed by the fund are those connected with establishment or management of plantation; animal husbandry; Processing in general where it is integrated with a least 50 per cent of farm output and Farm machinery and hire services. The Nigerian government in the 1970s has introduced some policies and initiatives in an attempt to attract finance in order

to enhance agricultural productions in the country but most of these initiatives failed. It becomes a worry if the surviving ones are really fulfilling the purpose of their establishment since rural poverty is still on the rise with a significant amount of Nigerian involved in agricultural production.

There was consistent increase in the lending portfolios of banks to agriculture between 1978 and 1989, but after the deregulation of the financial system, banks started shying away by reducing their loans to the sector due to the perceived risk. In order to reverse the declining trend different innovations were introduced under the Scheme such as the Self-Help Group Linkage Banking, Trust Fund Model and the interest Draw Back [4, 14]. By shouldering a portion of this risk, the ACGSF effectively shares the burden with financial institutions, making agricultural lending a considerably less perilous endeavor [16].

Despite various government policies and increased budgetary allocations, Agriculture's share in the country's gross domestic product has been very small, and many smallholder farmers continue to struggle with restricted access to credit. This paper addresses the underutilization of the agricultural sector's potential that has persisted for decades in Nigeria.

This paper explored the effectiveness of the ACGSF and its implications on the agricultural output in Nigeria with the aim of proposing solutions and policy recommendations that can unleash the agricultural sector's true potential. It is against this backdrop that this paper analysed the impact of ACGS category based loans on agricultural output in Nigeria. Therefore, the following questions were addressed:

- 1) What is the impact of Agricultural Credit Grant Scheme Fund (ACGSF) grant to categorized farm production on agricultural output in Nigeria?
- 2) What is the nature of the relationship between Agricultural Credit Grant Scheme Fund (ACGSF) and agricultural output in Nigeria?
- 3) What is the direction of causality between Agricultural Credit Grant Scheme Fund (ACGSF) and agricultural output in Nigeria?
- 4) What is the optimal ACGSF loan to crop production required to boost agricultural output in Nigeria?

The paper covered a period of 39 years (1986 – 2024). The Agricultural Credit Grant Scheme Fund (ACGSF) was based on the categorized loans granted to crop production, Fishery and Mixed farming. The limitation of the study was based on the insufficient data on the subject matter in Nigeria.

2. Review of Related Literature

The fractional reserve theory of banking has been used since medieval Italy, but the modern system was developed in the early 1800s. The fractional reserve theory of banking is a theory that states that only the banking system as a whole can create money, while individual banks are merely financial

intermediaries. Fractional reserve theory explained that the banking system as a whole can create money through systemic interaction while individual banks are financial intermediaries that gather deposits and lend them out. In this theory, the emphasis are being laid on the requirement of banks to keep 10-20%, and lend out the remainder. The concept of fractional banking emerged during the gold trading era, with the realization that not all people needed their deposits at the same time [15] and [5].

The theory of financial intermediation has its origins in a number of early models which include Edgeworth (1888) as the first formal statistical model of the intermediation mechanism, which Supported the central bank's role as the lender of last resort, as the one that emphasized the role of banks in allocating capital in the economy and Schumpeter (1911) which explained the role of banks in allocating capital in the economy. These early models were based on resource allocation models that assumed perfect and complete markets. However, more recent theories have emphasized the role of frictions like transaction costs and asymmetric information in understanding intermediation.

Endogenous growth theory, pioneered by economists like Paul Romer, Robert Lucas Jr., & Kenneth Arrow, emerged in the 1980s as a response to the limitations of traditional neo-classical growth theory. Unlike the older theory, which relied on external factors like capital accumulation and technological progress to explain economic growth, endogenous growth theory delves into the drivers of long-term economic development. The Endogenous Growth Theory primarily assumes that economic growth is driven by internal factors like investment in knowledge, human capital, and technological innovation, meaning that technological progress is not exogenous but rather arises from within the economy, with key assumptions including: increasing returns to scale in knowledge creation, spillover effects from R&D activities, and a significant role for government policies promoting innovation and education [13].

Empirical investigation by [4] on the influence of agricultural credit on Nigeria's economic growth from 1981 to 2017 found that deposit money bank credit to the agric sector (DMBCA) had a significant and direct relationship with economic growth only in the short run, while agricultural credit guarantee scheme fund (ACGSF) had insignificant effect in both the short and long run. In the same vain, [8] found out that bank private sector credit to agriculture and agricultural credit guarantee scheme fund had significant effect.

Nwadioha et al [9] assessed the impact of agricultural credits on Nigeria's economic growth rate from 1985 to 2019 using ordinary least squares (OLS) and found that funding cash crops and food crops had a positive and significant impact on economic growth, while funding livestock had a positive but insignificant impact. Other papers tha had similar conclusions are [16], and [14].

Achumu et al [2] explored the impact of agricultural fi-

nancing from both the government and private sector banks on Nigeria's gross domestic product (GDP). Utilizing the Bayesian VAR methodology and annual data from 1981 to 2019, the study revealed that funding from the agriculture credit guarantee scheme significantly and positively affects Nigeria's aggregate national output. Non-government guaranteed direct loans and advances from banks to the agricultural sector also had a significant positive impact on the country's aggregate national output. However, the real contribution of direct government expenditures on the agriculture sector to the GDP was positive but not significant.

Ogbodo et al [11] analysed the impact of agricultural credit guarantee scheme fund on agricultural output in Nigeria from 2000-2020 using ordinary least square and Granger causality test. The paper found that agricultural credit guarantee scheme fund had positive and significant impact on agricultural output in Nigeria [11]. Other papers that had similar conclusions are [15, 10] and [1].

Okoye et al [12] evaluated the impact of looked at how agricultural credit guarantee programme on output growth in Nigeria. The paper found that the programme had positive insignificant positive effect on agricultural gross domestic product in Nigeria while financing of food crops had a insignificant negative effect. The result also showed that financing of cash crops had a significant positive effect on agricultural gross domestic product.

There are many papers on the Agricultural Credit Grantee Scheme and agricultural productivities. Some of these works include. [3] on the effect of credit to farmers and agricultural productivity in Nigeria; [4] on the impact of agricultural credit on economic growth in Nigeria. Other researcher are [6-12], e.t.c.

In spite of many papers on this subject matter, none disintegrated Agricultural Credit Grantee Scheme into cash crop, fishery, and mixed farming to find out the impact of the value of loan granted to each sub-sector. Previous studies were based on aggregated analysis. This paper used Environmental Kutznet Curve (EKC) as a Non-Linear (Quadratic) threshold model to solve the problem of optimal value which other previous researchers could not handle.

3. The Model

This study was anchored on the Keynesians' and monetarists' framework. Keynesians' framework posits that fiscal policy (FP) mainly influences income and output growth. While monetarists' framework posits that it is monetary policy (the quantity of money in the system (– MP)) that influences the level of economic activity.

Augmented Dickey Fuller (ADF) unit root test was employed to check the order of integration of the variables in the models. The general form of ADF was specified as:

$$\Delta Y_t = \beta_t + \beta_2 t + \partial Y_{t-1} + \alpha \sum_{i=1}^n \Delta Y_{t-i} + U_t \quad (1)$$

Where: Y = time series,

t = a linear time trend,

Δ = the first difference operator,

α_0 = constant,

n = the optimum number of lags in the independent variables and

U = random term.

The ARDL bounds test technique was used to determine the long-run relationship among the variables used in the model.

The model adopted in this study was the ARDL Model (ARDL) which was first mentioned by Yule (1926) and Granger and Newbold (1974) to address the problem of spurious correlation in time series. The paper also adopted Non-Linear Threshold Model using the Environmental Kuznets Curve (EKC) by Kuznets (1955). The model in this case was used to find the maximum value of ACGSF loan required

for greater agricultural output in Nigeria.

The functional form of the model is specified as:

$$AGO = f(CRP, FIP, MIP, TOP, RER, INF) \quad (2)$$

Where:

AGO = Agricultural Output

CRP = Loans granted to crop production

FIP = Loans granted to Fishery

MIP = Loans granted to Mixed faming

TOP = Trade Openness

RER = Real Exchange Rate

INF = Inflation rat

Equation (2) was transformed into econometric form indicating the degree of effect each explanatory variable on agricultural output and the error term.

$$AGO_t = \alpha_0 + \alpha_1 CRP_t + \alpha_3 FIP_t + \alpha_4 MIP_t + \alpha_6 TOP_t + \alpha_7 RER_t + \alpha_8 INF_t + u_{it} \quad (3)$$

where: All the variables remained as defined

Equation (3) was transformed to Autoregressive Distributed Lag (ARDL) to capture objective one as shown in equation (4).

$$\begin{aligned} \Delta AGO_{t,j} = & C_0 + C_1 AGO_{t-j} + C_2 CRP_{t-j} + C_3 FIP_{t-j} + C_4 MIP_{t-j} + C_5 TOP_{t-j} + C_6 RER_{t-j} + \\ & C_7 INF_{t-j} + \sum_{i=1}^{n1} a_{1i,j} \Delta AGO_{t-1,j} + \sum_{i=1}^{n2} a_{2i,j} \Delta CRP_{t-1,j} + \sum_{i=1}^{n3} a_{3i,j} \Delta FIP_{t-1,j} + \sum_{i=1}^{n4} a_{4i,j} \Delta MIP_{t-1,j} + \\ & \sum_{i=1}^{n4} a_{5i,j} \Delta TOP_{t-1,j} + \sum_{i=1}^{n4} a_{5i,j} \Delta RER_{t-1,j} + \sum_{i=1}^{n4} a_{7i,j} \Delta INF_{t-1,j} + \mu_t \end{aligned} \quad (4)$$

Where: All the variables remain as defined

Δ = differenced operator

Granger causality test was carried out to ascertain the direction of causality between variables used in the model as shown.

$$\begin{aligned} AGO_t = & B_0 + \sum_{i=1}^n B_1 AGO_{t-i} + \sum_{i=1}^n B_2 CRP_{t-i} + \sum_{i=1}^n B_3 FIP_{t-i} + \sum_{i=1}^n B_4 MIP_{t-i} \\ & + \sum_{i=1}^n B_5 TOP_{t-i} + \sum_{i=1}^n B_5 RER_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (5)$$

$$\begin{aligned} CRP_t = & B_0 + \sum_{i=1}^n B_1 CRP_{t-i} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 FIP_{t-i} + \sum_{i=1}^n B_4 MIP_{t-i} \\ & + \sum_{i=1}^n B_5 TOP_{t-i} + \sum_{i=1}^n B_5 RER_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (6)$$

$$\begin{aligned} FIP_t = & B_0 + \sum_{i=1}^n B_1 FIP_{t-i} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 CRP_{t-i} + \sum_{i=1}^n B_4 TOP_{t-i} \\ & + \sum_{i=1}^n B_5 MIP_{t-i} + \sum_{i=1}^n B_5 RER_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (7)$$

$$\begin{aligned} MIP_t = & B_0 + \sum_{i=1}^n B_1 MIP_{t-1} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 CRP_{t-i} + \sum_{i=1}^n B_4 FIP_{t-i} \\ & + \sum_{i=1}^n B_5 TOP_{t-i} + \sum_{i=1}^n B_5 RER_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (8)$$

$$\begin{aligned} TOP_t = & B_0 + \sum_{i=1}^n B_1 TOP_{t-1} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 CRP_{t-i} + \sum_{i=1}^n B_4 FIP_{t-i} \\ & + \sum_{i=1}^n B_5 MIP_{t-i} + \sum_{i=1}^n B_5 RER_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (9)$$

$$\begin{aligned} RER_t = & B_0 + \sum_{i=1}^n B_1 RER_{t-1} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 CRP_{t-i} + \sum_{i=1}^n B_4 FIP_{t-i} \\ & + \sum_{i=1}^n B_5 MIP_{t-i} + \sum_{i=1}^n B_5 TOP_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \end{aligned} \quad (10)$$

$$INF_t = B_0 + \sum_{i=1}^n B_1 RER_{t-1} + \sum_{i=1}^n B_2 AGO_{t-i} + \sum_{i=1}^n B_3 CRP_{t-i} + \sum_{i=1}^n B_4 FIP_{t-i} + \sum_{i=1}^n B_5 MIP_{t-i} + \sum_{i=1}^n B_6 TOP_{t-i} + \sum_{i=1}^n B_7 INF_{t-i} + \mu \quad (11)$$

In order to ascertain the optimal ACGSF loan granted to crop production required to boast agricultural output in Nigeria, the basic equation was specified as:

$$AGO_t = a_0 + a_1 CRP_t + a_2 CRP_t^2 + a_3 FIP_t + a_4 MIP_t + a_5 GXTOP_t + a_6 RERP_t + u_{it} \quad (12)$$

where CRP and its squared term were the variables of interest.

The optimal ACGSF loan granted to crop production was estimated using the following mathematical operation:

$$PD^* = -\frac{a_1}{a_2} \quad (13)$$

Where: PD* = the optimal ACGSF loan granted to the crop production threshold

a_1 = the coefficient of the ACGSF loan granted to the crop production linear term and

a_2 = the coefficient of the ACGSF loan granted to the crop production quadratic term.

Different post estimation tests such as normality, heteroscedasticity, autocorrelation and serial correlation tests were carried out in order to check for the robustness of the estimates. Data utilized in this paper were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the National Bureau of Statistics from 1986-2024.

4. Results

Descriptive statistics was carried out in order to find out the distribution of the data used in the study. The results of the descriptive statistics were presented in Table 1.

Table 1. Descriptive Statistics.

	AGO	CRP	FIP	MIP	INF	RER	TOP
Mean	11651.64	151328.3	126034.2	176181.1	18.64342	147.9069	35.56342
Median	5483.798	19035.55	14396.10	1000.000	11.83500	127.5876	35.26000
Maximum	48894.96	520425.0	708621.2	1559385.	72.84000	543.0000	53.28000
Minimum	35.70264	2384.900	428.0000	0.000000	5.390000	3.182800	9.140000
Std. Dev.	13840.18	194041.9	178701.7	335441.0	17.16793	141.2185	10.18148
Skewness	1.247376	0.888553	1.480599	2.253077	1.831937	1.154370	-0.393052
Kurtosis	3.532182	1.951877	4.392717	8.519852	5.025015	3.645788	2.866525
Jarque-Bera	41.21104	26.95889	67.81961	321.5699	110.9895	36.39970	4.026575
Probability	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000	0.133549
Sum	1771049.	23001894	19157196	26779529	2833.800	22481.86	5405.640
Sum Sq. Dev.	2.89E+10	5.69E+12	4.82E+12	1.70E+13	44505.42	3011342.	15653.05
Observations	152	152	152	152	152	152	152

Source: Author's computation

The result of the descriptive statistics revealed that the individual characteristics of the variables used in the study highlighting their median, mean, maximum and minimum values, standard deviation and Jarque-Bera statistics (normality Test). The Agricultural Output (AGO) had a mean value of 11651.64 with maximum and minimum values of 48894.96 and 35.70264 respectively. It recorded a standard deviation of 13840.18 which is higher than its mean and a

Jarque-Bera value of 41.21104 with a probability value of 0.0000 which indicated that Agricultural Output was not normally distributed. Loans granted to crop production (CRP), Fishery (FIP), Mixed farming (MIP) inflation rate and real exchange rate were not normally distributed as shown by the result of their respective JarqueBera values and their p-values.

The result of the Philips-Perron unit root test was presented with the aid of Table 2.

Table 2. The result of Philips-Perron Unit Root Test.

variable	Level		First Diff		Second Diff		I (d)
	ADF Stat	5% critical	ADF Stat	5% critical	ADF Stat	5% critical	
AGO	3.542962	-3.536601					I (0)
CRP	-2.216641	-3.536601	-6.853264	-3.540328	**	**	I (1)
FIP	-2.617959	-3.536601	-7.378113	-3.540328	**	**	I (1)
MIP	-3.872795	-3.536601			**	**	I (0)
INF	-3.528734	-3.536601	-6.942750	-3.540328	**	**	I (1)
RER	1.010343	-3.536601	-4.988298	-3.540328	**	**	I (1)
TO	-3.387845	-3.536601	-7.569091	-3.540328	**	**	I (1)

Source: Author's computation

The result of the unit root test showed that all the variables used in the study were stationary at first difference except Agricultural output (AGO) and loans granted to mixed production which were individually integrated of order zero I (0).

The study also adopted Autoregressive Distributed (ARDL) Bound test in carrying out co-integration test and the result was presented in Table 3.

Table 3. The results of the ARDL Bound Test.

Test Statistic	Value	K
F-statistic	30.68633	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Author's computation

The result of the ARDL bounds test showed that the variables had a long run relationship as the value of the F-statistics was higher than both the lower and the upper bounds. The F-statistics was 30.686 while the lower and the upper bounds at 5% were 2.45 and 3.61 respectively.

Autoregressive Distributed Lag (ARDL) model was estimated in order to obtain the short run and the long run dynamics of the variables in the model. The results were shown in Table 4.

Table 4. Short run ARDL.

Short Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

Short Run Coefficients				
D (AGO(-1))	-0.70916	0.06447	-11.0003	0.0000
D (AGO(-2))	-0.70916	0.06447	-11.0003	0.0000
D (AGO(-3))	-0.70916	0.06447	-11.0003	0.0000
D (CRP)	-0.001465	0.00278	-0.52814	0.5984
D (MIP(-3))	0.001408	0.00050	2.79584	0.0060
D (RER)	13.073214	3.93931	3.31866	0.0012
D (TO (-3))	-17.273277	9.91692	-1.7418	0.0841
CointEq (-1)	0.016173	0.0171	0.946	0.3461

Source: Author's computation using Eview

The result of the ARDL showed that the previous values of Agricultural output (AGO) significantly affected itself within the first, second and third quarters of the period under investigation in a short run. A change in AGO in the previous first quarter of the study reduced AGO by 0.709161 with t-statistics of -11.000289 and p-value of 0.0000. The second quarter of the AGO had coefficient of -0.709161 with p-value of 0.000. This signifies that a unit change in last two quarters' agricultural output significantly reduced current agricultural output by 0.709061 and had identical effect in the third quarter.

The result further showed that Loans granted for Crop Production had insignificant negative effect on agricultural output as shown by its coefficient of -0.001465 and p-value of 0.5984. The previous third quarter of the credit guaranteed to the crop production had a significant negative effect on agricultural output with a coefficient of -0.0077 and p-value of 0.0029.

Loans granted to the fishery production (FIP) created positive but insignificant impact on agricultural output and this extended to second and third quarters. A change in FIP brought about increase in agricultural output by 0.001592. It was also shown that loans from the Agricultural Credit and Guarantee Scheme Fund (ACGSF) to fishery production had insignificant negative zero effect in the second quarter but

insignificant positive zero effect in the third quarter. Loans guaranteed to Mixed Production in the third quarter had significant positive effect on agricultural output by having coefficient of 0.001408 and t-statistics of 2.796. The significance of this was reemphasized by its P-value of 0.006 being less than 0.05. Other quarters apart from the third had insignificant effect.

Inflation and exchange rate in the short run had positive impact on agricultural output in Nigeria within the period under investigation. A change in inflation rate brought about 0.145 change on agricultural output in Nigeria with t-statistic and P-value of 0.050011 and 0.9602 respectively. On the other hand, a change in exchange rate brought about 13.07 change on agricultural output in Nigeria. The result indicated that exchange rate significantly affected agricultural productivity as evidenced by its t-statistics of 3.318655 and P-value of 0.0012. The decision on the significance level was based on the rule that the t-statistics (3.318655) was greater than 2 and the P-value (0.0012) was less than 0.05. Trade openness on the other hand had negative insignificant effect on agricultural output and this extended to both the second and the third quarter except the first quarter which had positive effect.

The results of the long run ARDL were shown with the aid of Table 5.

Table 5. Long run ARDL.

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRP	-0.404756	0.452868	-0.893763	0.3732
FIP	0.071548	0.086699	0.825250	0.4109
MIP	0.098729	0.103192	0.956753	0.3406
INF	-8.969144	180.641407	-0.049652	0.9605
RER	-72.754852	159.954386	-0.454847	0.6500

Long Run Coefficients				
TO	-491.6853	670.737901	-0.733051	0.4650
C	10110.216	21450.3001	0.471332	0.6383

Source: Author's computation using Eview

In the long run, ARDL results showed that loans granted to the crop production (CRP) had a negative but insignificant effect on agricultural output within the period under investigation. It showed that an increase in loans granted to crop production will decrease agricultural output by 0.404756 with P-value of 0.3732. This may be attributed to the infinitesimal contribution of crop production to Gross Domestic Product (GDP) in Nigeria. Loans granted to the Fishery Production (FIP) had positive impact on agricultural output in Nigeria in a long run. An increase in loan granted to fishery production increased agricultural output by 0.071548 with t-statistics and P-value of 0.82525 and 0.4109 respectively. This shows that loans granted to fishery contributed positively to the growth of the agricultural output but had insignificant effect. The result also indicated that loans granted to Mixed farming had insignificant positive effect on agricultural output in Nigeria.

An increase in loan granted to mixed farming from the Agricultural Credit and Guarantee Scheme Fund (ACGSF) increased agricultural productivity by 0,098729 within the study period.

Furthermore, the ARDL result also showed that inflation and exchange rate had negative impact on agricultural output in Nigeria. The coefficient of the inflation rate was -8.969144 with t-statistics of -0.04965 and P-value of 0.9605. It indicated that an increase in inflation rate decreased agricultural output by -8.969. An increase in exchange rate reduced agricultural output by 72.75 and this may be attributed to the fact that farmers productivities in Nigeria are dependent on imported inputs and gadgets required in the farm.

Granger Causality Test was carried out in order to obtain the direction of causality between variables in the model. The result of the causality test was presented in Table 6.

Table 6. Result of Granger Causality Test.

Null Hypothesis:	Obs	F-Statistic	Prob.
CRP does not Granger Cause AGO	150	0.93254	0.3959
AGO does not Granger Cause CRP		1.46154	0.2353
FIP does not Granger Cause AGO	150	0.34382	0.7096
AGO does not Granger Cause FIP		0.07141	0.9311
MIP does not Granger Cause AGO	150	0.00975	0.9903
AGO does not Granger Cause MIP		4.05207	0.0194
INF does not Granger Cause AGO	150	0.01185	0.9882
AGO does not Granger Cause INF		0.83138	0.4375
RER does not Granger Cause AGO	150	0.15584	0.8558
AGO does not Granger Cause RER		4.00041	0.0204
TO does not Granger Cause AGO	150	0.11628	0.8903
AGO does not Granger Cause TO		0.20039	0.8186
MIP does not Granger Cause CRP	150	0.33150	0.7184
CRP does not Granger Cause MIP		7.61986	0.0007
MIP does not Granger Cause FIP	150	0.14104	0.8686
FIP does not Granger Cause MIP		8.33396	0.0004

Source: Author's Computation using Eview

The result of the Granger Causality showed the existence of unidirectional causality flowing from Agricultural Output (AGO) to loan granted to Mixed Farming Productivity (MIP). There were also cases of unidirectional causality flowing from Agricultural Productivity to Trade Openness (TO), from Agricultural Output (AGO) to Real Exchange Rate (RER), from loan granted to Crop Production (CRP) to loan granted to Mixed Farming Productivity (MIP) and from loan granted to

Fishery Productivity (FIP) to Mixed Farming Productivity (MIP).

Non-Linear Threshold Quadratic model was estimated in order to find out the maximum credit to the crop production required to achieve maximum agricultural output in Nigeria. The result of the Non-Linear Threshold Quadratic model was shown in Table 7.

Table 7. The result of the Non-Linear Threshold Quadratic model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1985.027	1045.971	-1.897783	0.0597
CRP	0.077419	0.013095	5.912078	0.0000
CRP^2	-1.09E-07	2.07E-08	-5.282594	0.0000
FIP	-0.012744	0.003030	-4.206583	0.0000
MIP	0.001973	0.001323	1.491420	0.1380
INF	7.568121	14.89523	0.508090	0.6122
RER	68.73559	5.138521	13.37653	0.0000
TO	-15.05368	27.18619	-0.553725	0.5806

Source: Author's computation using Eview

The result of the Non-Linear Threshold Quadratic model showed that the coefficient of loan granted to crop productivity and the coefficient of its squared form were 0.077419 and 0.000000109 respectively, The maximum loan to be granted to the crop production in order to guarantee maximum crop productivity was obtained by dividing the coefficient of CRP by that of CRP^2.

$$\text{Max CRP} = \frac{0.077419}{0.000000109} = 710,266.055$$

The result showed that N710,266.055 is required as a maximum loan to be granted to the crop production in order to attain maximum crop output in Nigeria within the period under investigation.

5. Conclusion

This study has fully examined the impact of Agricultural Credit Guarantee Scheme Fund (ACGSF) on Crop Production, Fishery Production and Mixed Farming production in Nigeria. The study used ARDL Bound test, ARDL Model and Granger Causality and came up with the following conclusions. Loans granted to Crop Production and fishery had insignificant effect on agricultural output in Nigeria while loans granted to Mixed Production had significant positive effect on agricul-

tural output. There was evidence of a long run relationship among the variables used in the model as indicated by the ARDL Bound test. Granger Causality test result provided evidence of a unidirectional causality flowing from Agricultural Output (AGO) to loan granted to Mixed Farming Productivity (MIP). from loan granted to Crop Production (CRP) to loan granted to Mixed Farming Productivity (MIP) and from loan granted to Fishery Productivity (FIP) to Mixed Farming Productivity (MIP). The Non-Linear Threshold Quadratic model showed that ₦710,266.055 should be granted to farmers in order to guarantee maximum crop productivity. Based on the findings, this paper recommends that more loans should be given to the mixed farming production than fishery or crop production and should be administered with adequate monitoring and evaluation. This paper also recommends the need for diversification in granting the loan to different units that made up agricultural sector.

Abbreviations

ARDL	Autoregressive Distributed Lag
ADF	Augmented Dickey-Fuller
AGO	Agricultural Output
CRP	Loans Granted to Crop Production
FIP	Loans Granted to Fishery
MIP	Loans Granted to Mixed Farming

TOP	Trade Openness
RER	Real Exchange Rate
INF	Inflation Rate
ACGSF	Agricultural Credit Guarantee Scheme Fund

Conflicts of Interest

The authors declare no conflicts of interest.

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