

# AGRICULTURAL CREDIT GUARANTEE SCHEME FUND AND REAL OUTPUT GROWTH: THE NIGERIA'S GREEN SECTOR

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## **Abstract**

*This research looked at how agricultural credit guarantee programme, affected output growth in Nigeria. The main aim was to calculate the impact of finance for livestock, food crops, and cash crops on Nigeria's agricultural GDP. The research method used in the study was ex-post facto. Time series data spanning from 1999 to 2022, were retrieved from the statistical bulletin of the Nigerian Bureau of Statistics as well as the Central Bank of Nigeria (CBN). Along with the descriptive analysis, the hypothesis is tested at a 5% level of significance using the Ordinary Least Square multiple regression model and the Granger Causality Test. The study found that while ACGSF financing of livestock had a non-significant positive effect on agricultural gross domestic product in Nigeria ( $p$ -value = 0.2218), financing of food crops had a non-significant negative effect ( $p$ -value = 0.3988), and financing of cash crops had a significant positive effect ( $p$ -value = 0.0011) on agricultural gross domestic product in Nigeria. According to the research, the government and relevant agricultural authorities should broaden and diversify the ACGSF's livestock support programmes by launching new training programmes, incentives, and targeted initiatives to boost productivity, animal health, and farming practices. According to the technique, there is a 34% performance gap for grid integration when there are uncertainties in renewable energy potential and demand, and a 16% decline in power supply dependability when there are uncertainties in extreme weather occurrences.*

**Keywords:** Agricultural Credit, Credit Guarantee Scheme, Real Output Growth, Nigeria, Green Sector

## 1.1 Background to the Study

Agriculture has long been a cornerstone of the Nigerian economy, providing employment opportunities for a large number of people and making a considerable impact on the country's GDP. In recent years, the Nigerian government has recognized the potential of agriculture to drive economic growth, food security, and employment, especially given the volatility of oil prices, which have historically been the primary source of revenue for the country (Adewale, Lawal, Aberu & Toriola, 2022). The government's commitment to leveraging agriculture's potential for national development led to the implementation of initiatives such as the Agricultural Credit Guarantee Scheme Fund (ACGSF) (Ogah, Bartholomew & Ezihe, 2023). The ACGSF represents a financial instrument aimed at catalysing agricultural production and economic growth in Nigeria.

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 (Sulaimon, 2021). An economy's real output growth, sometimes called "economic growth," is the increase in the quantity of goods and services produced during a certain time period. It is usually measured by a growth in a country's Gross Domestic Product (GDP).

On the other hand, the Agricultural Credit Guarantee Scheme Fund is a governmental initiative designed to provide credit guarantees for loans extended to farmers and agribusinesses (Afolabi, Ikpefan, Osuma & Evbuomwan, 2021). The key objective of the ACGSF is to promote the development of agriculture by ensuring that financial institutions are more willing to extend credit to farmers, knowing that their loans are backed by a guarantee from the ACGSF. This guarantee mitigates the risk for lenders and encourages them to provide much-needed capital to the agricultural sector (Reuben, Nyam & Rukwe, 2020).

The Agricultural Credit Guarantee Scheme Fund (ACGSF) stands as a pivotal instrument in Nigeria's efforts to propel the agricultural sector forward (Sulaimon, 2021). The primary mission of the ACGSF is to serve as a facilitator for agricultural development in the country. This ambitious goal hinges on a fundamental mechanism: the assurance it offers to financial institutions. The scheme instills confidence in lending institutions, prompting them to become more inclined to extend credit to new farmers, agribusinesses, and other interested stakeholders in the agricultural value chain. This newfound confidence is not arbitrary but is rooted in the rock-solid guarantee that the ACGSF provides.

By shouldering a portion of this risk, the ACGSF effectively shares the burden with financial institutions, making agricultural lending a considerably less perilous endeavor (Sulaimon, 2021). Consequently, lenders become more willing to channel their resources into the agricultural sector, which has often been perceived as high-risk, by traditional financial standards. This shift in perspective has substantial ripple effects throughout the sector and the economy as a whole (Reuben, Nyam & Rukwe, 2020).

The ACGSF's role as a guarantor plays a critical part in encouraging financial institutions to provide the much-needed capital that the agricultural sector demands. With the reassurance of the ACGSF backing, growing farmers ought to be able to source for credit and loans more readily, enabling them to invest in better farming practices, acquire high-quality inputs, and expand their operations. This empowerment allows them to break free from the shackles

of subsistence farming and venture into commercial agriculture, increasing their productivity and income (Afolabi, Ikpefan, Osuma & Evbuomwan, 2021). For many, this represents a pathway out of poverty, contributing to the reduction of income inequality and improving livelihoods in rural areas.

Moreover, the impact extends beyond the farm. Enhanced agricultural productivity leads to increased food security, reducing the vulnerability of the population to food shortages and price fluctuations (Reuben, Nyam & Rukwe, 2020). It stimulates job creation, especially in rural areas, by fostering the growth of agribusinesses, processing industries, and the broader agricultural value chain. As these enterprises expand, they create employment opportunities, ensuring that more hands are engaged in productive economic activities.

This study addresses a significant problem that has persisted for decades in Nigeria: the underutilization of the agricultural sector's potential. 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. The ACGSF, on the other hand, represents a tool that can potentially bridge this gap and unlock the vast potential of Nigerian agriculture. By examining its impact (proxies by livestock financing, cash crops financing, and food crops financing) on real output growth (proxy by real GDP), this research aims to provide hints that can inform policy decisions, encourage financial institutions to participate more actively in agricultural lending, and ultimately contribute to a more vibrant and sustainable Nigerian economy.

Nigeria, endowed with fertile land and a large agricultural workforce, would witness consistent and substantial growth in its agricultural sector. The government's commitment to supporting this sector through initiatives such as the Agricultural Credit Guarantee Scheme Fund (ACGSF) is expected to result in significant advancements. Farmers, especially smallholders, would have ready access to affordable credit, enabling them to invest in modern agricultural practices, purchase quality inputs, and expand their operations. This, in turn, would lead to a remarkable increase in agricultural production, fostering food security, job creation, and an overall boost in the nation's real output (Afolabi, Ikpefan, Osuma & Evbuomwan, 2021).

Regrettably, despite the government's efforts to stimulate agricultural growth through the ACGSF and increased budgetary allocations, the sector's contribution to the nation's GDP has remained stubbornly stagnant (Sulaimon, 2021). Smallholder farmers, who constitute a significant portion of the agricultural workforce, still grapple with limited access to credit and financial services (Adewale, Lawal, Aberu & Toriola, 2022). As a result, they are unable to fully exploit the sector's potential, which remains hindered by outdated practices, insufficient investment, and low productivity. While both formal and informal sources of credit exist, formal institutions often require collateral, leaving many farmers with unfavorable terms when seeking credit from informal sources.

Consequently, limited access to credit for smallholder farmers restricts their ability to adopt modern technologies and practices, hindering productivity growth. This not only stunts the sector's development but also jeopardizes food security and employment opportunities, particularly in rural areas. Moreover, as the Nigerian economy seeks to diversify away from oil dependence, the underperformance of the agricultural sector represents a missed opportunity for sustainable economic growth. The ACGSF and other similar government interventions thus are yet to achieve its full potential in stimulating real output growth, and this problem needs urgent attention (Achumu, Ezirim, Ezirim & Chekwa, 2022). This

research seeks to explore the core of this problem, examining the effectiveness of the ACGSF and its implications for the Nigerian economy, with the aim of proposing solutions and policy recommendations that can unleash the agricultural sector's true potential and its positive impact on real output growth.

Past studies that have explored similar research questions include those by Ogah, et al (2023); Okwuchukwu (2022); Gniniguè et al, (2022); Adewale et al, (2022); Achumu et al, (2022); Sulaimon (2021); Oyatayo (2021); and others. In the realm of reviewed empirical literature, it is noteworthy that this study distinguishes itself as one of the limited inquiries to employ disaggregated measures, specifically focusing on ACGSF livestock financing, cash crops financing, and food crops financing as distinct proxies for total ACGSF financing in Nigeria. The broad objective of the study is to examine the effect of agricultural credit guarantee scheme fund (ACGSF) on real output growth in Nigeria.

## **2.1 Review of Related Literature**

### **2.1.1 Agricultural Credit Guarantee Scheme Fund**

Agricultural Credit Guarantee Scheme Fund (ACGSF) refers to a government-backed financial program that offers credit guarantees to agricultural stakeholders, facilitating access to loans and investments in the agricultural sector (Reuben, Nyam & Rukwe, 2020). This program plays a vital role in promoting financial inclusivity and supporting the development of agricultural activities by providing credit guarantees to various stakeholders within the agricultural value chain (Sulaimon, 2021). In essence, the ACGSF serves as a strategic mechanism to mitigate the risks associated with agricultural lending, thereby facilitating increased access to credit for farmers, agribusinesses, and other entities involved in the agricultural domain (Adetiloye, 2012).

According to Ojo and Oluwaseun, (2015), one of the primary objectives of the Agricultural Credit Guarantee Scheme Fund is to address the historical challenges faced by agricultural stakeholders in securing loans from financial institutions. Given the inherent uncertainties and risks associated with agriculture, traditional lenders often hesitate to extend credit to this sector. The ACGSF acts as a catalyst in overcoming this challenge by providing a government-backed guarantee to financial institutions, encouraging them to lend to agricultural borrowers who might otherwise be deemed too risky (Usman, Singh & Singh, 2017).

This financial initiative operates by offering a layer of protection to lenders, assuring them that a significant portion of the loan amount will be guaranteed by the government in the event of default. This assurance not only encourages financial institutions to extend credit to the agricultural sector but also allows them to offer more favorable terms, such as lower interest rates or longer repayment periods. Consequently, farmers and agribusinesses benefit from improved access to affordable credit, enabling them to invest in essential resources, modern technologies, and sustainable practices that enhance productivity and contribute to the overall growth of the agricultural industry (Olaitan, Ogunlaja, Juma, Olasupo, Yusuf & Oyelade, 2017).

The ACGSF is instrumental in addressing the diverse financial needs of the agricultural sector. It supports a wide range of activities, including crop production, livestock farming, agro-processing, and rural enterprise development. By providing guarantees on loans and investments, the fund stimulates innovation, diversification, and the adoption of modern agricultural practices, ultimately contributing to increased food production, job creation, and economic development.

Additionally, the Agricultural Credit Guarantee Scheme Fund plays a vital role in promoting financial resilience among agricultural stakeholders (Ahmed, Yusuf & Ahmed, 2020). It acts as a risk-sharing mechanism that aligns the interests of both lenders and borrowers, fostering a more sustainable and cooperative financial ecosystem within the agricultural sector. This collaborative approach not only enhances the overall creditworthiness of the sector but also creates a positive cycle of economic growth and prosperity (Samaila & Idris, 2023).

Thus, the Agricultural Credit Guarantee Scheme Fund represents a significant governmental intervention aimed at transforming the financial landscape of the agricultural sector (Reuben, Nyam & Rukwe, 2020). By providing credit guarantees, it not only addresses the risk aversion of lenders but also empowers agricultural stakeholders to access the financial resources necessary for fostering innovation, increasing productivity, and achieving long-term sustainability in the crucial realm of food production and rural development (Iliyasu & Bida, 2015).

### **2.1.2 Real Output Growth**

Real output, in economic terms, denotes the tangible quantity of goods and services generated by an economy, considering adjustments for inflation (Samaila & Idris, 2023). This metric represents the authentic volume of economic production, incorporating alterations in prices over time, as outlined by Sulaimon (2021). Essentially, real output serves as the gauge for economic production, factoring in the influence of inflation on the value of goods and services. To put it succinctly, real output signifies the overall quantity of goods and services produced by an economy, expressed in constant prices, as elucidated by Achumu, Ezirim, Ezirim, Chekwa, and Hunter (2022).

Real output acts as a measurement of the physical output of an economy, making accommodations for the repercussions of price fluctuations. Real output, therefore, encapsulates the genuine value of goods and services manufactured by an economy, considering the enduring purchasing power of money, as articulated by Oyatayo (2021). Real output serves as a metric quantifying the overall volume of goods and services generated by an economy, with due consideration to the impacts of inflation, as highlighted by Asaleye, Inegbedion, Lawal, Adeleke, Osakede, and Ogunwole (2023).

Essentially, real output growth provides a means of gauging the genuine growth of an economy over a specific timeframe, diverging from a mere assessment of the nominal value of the goods and services produced. Inflation, characterized by a general increase in the prices of goods and services over time, leads to a decline in the purchasing power of money, where the same amount of money can procure a reduced quantity of goods and services. To accommodate this economic reality, real output is adjusted for inflation. This adjustment ensures that alterations in the nominal value of output reflect solely shifts in the quantity of goods and services produced, disentangled from fluctuations in their prices.

The determination of real output involves the utilization of a metric known as Gross Domestic Product (GDP), representing the total value of all goods and services generated within an economy over a specified timeframe. To account for inflationary effects, economists rely on a price index, such as the Consumer Price Index (CPI), which gauges fluctuations in the prices of a predefined assortment of goods and services. Through the division of nominal GDP by the price index, economists can compute real GDP, a figure that captures alterations in the quantity of goods and services produced, factoring out the impact of inflation. Consequently, real output emerges as a pivotal indicator reflecting the authentic volume of goods and services, transcending mere nominal values. This metric, derived from

changes in real output over time, empowers economists to evaluate the overall performance and growth of an economy, pinpointing areas where enhancements can be implemented.

## **2.2 Theoretical Framework**

### **2.2.1 Endogenous Growth Theory**

Endogenous growth theory, pioneered by economists like Paul Romer, Robert Lucas Jr., and Kenneth Arrow, emerged in the 1980s as a response to the limitations of traditional neoclassical 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 (Oyatayo, 2021). It sets itself apart by proposing that economic growth isn't solely influenced by external elements like capital and technology, but also by internal factors such as investments in human capital and the creation of knowledge (Oyatayo, 2021). The theory proposes that long-term economic growth is propelled by investments in education, research and development, and technological innovation. Through investment in education, individuals can acquire the skills and knowledge essential for fostering innovation and technological progress, thereby enhancing productivity and contributing to economic growth.

Utilizing endogenous growth theory as a framework for examining the influence of ACGSF on real output in Nigeria enables researchers to pinpoint critical factors driving long-term economic growth in the agricultural sector. Furthermore, it facilitates the assessment of the efficacy of various agricultural financing policies and programs. Likewise, investing in research and development can result in the development of new products, processes, and technologies, enhancing overall efficiency and productivity. Technological innovation further facilitates the adoption and spread of these advancements across the economy, contributing to increased economic output and improved living standards over time.

Endogenous growth theory proposes positive feedback loops between investing in human capital, creating knowledge, and economic growth. As the economy grows, more chances emerge for investments in education, research and development, and technological innovation, fostering continuous growth and development. The relevance of endogenous growth theory becomes evident in this study, which investigates the impact of ACGSF on real output in Nigeria. This theory underscores the significance of investing in human capital and knowledge creation to foster continuous economic growth, especially in the context of Nigeria's agricultural sector (Oyatayo, 2021).

Agricultural financing through ACGSF assumes a crucial role in advancing human capital and knowledge creation within the agricultural sector. By providing farmers and other stakeholders with financial resources, it facilitates investment in education, training, and research and development. This, in turn, can result in the emergence of new technologies and innovations, enhancing productivity and overall output in agriculture.

## **2.3 Empirical Review**

Dominic, Danjuma, and Kingsley (2023) investigated the impact of agricultural financing on aggregate farming output in Kogi State from 1992 to 2022. The study aimed to evaluate the impact of the Agricultural Credit Guarantee Scheme Fund (ACGSF) on agricultural output, assess the impact of commercial banks' credit to agriculture, and examine the causal relationship between government expenditure on agriculture and farming output in Kogi State. Co-integration and ECM econometric techniques were employed for analysis,

revealing statistically significant relationships among the variables. The study concluded that agricultural financing has a significant impact on agricultural output in Kogi State.

Eno and Eze (2023) assessed the relationship between Agricultural Financing and Agricultural Output in Nigeria using data sourced from secondary sources for the period 2011–2021. Ordinary Least Square (OLS) regression method and error correction modelling were employed to examine the impact and level of relationship between the dependent variable and each of the independent variables. The analysis showed that agricultural financing positively contributed to the economic performance of Nigeria.

Samaila and Idris (2023) examined the effect of the Agricultural Credit Guarantee Scheme Fund on real output in Nigeria using annual time-series data. Mathematical and econometric techniques, including ADF for unit root test, ARDL model for long run and short run coefficient, Bound test, and Diagnostic test, were adopted. The findings revealed that ACGSF has a positive and significant impact on real output growth in Nigeria.

Ogah, Bartholomew, and Ezihe (2023) examined government agricultural expenditure and agricultural growth in Nigeria from 1999 to 2020. Annual time series data on various economic indicators were analyzed using inferential statistics such as unit root, Johansen co-integration, and vector error correction model (VECM). The results showed that agricultural expenditure had a positive statistically significant impact on agricultural GDP growth in both the short run and long run.

Abdulrafiu and Dabo (2022) explored the impact of agricultural finance on agricultural output in Nigeria using annual time series data from 1983 to 2018. The study used the Vector Autoregressive Model (VAR) for the estimation of long-run relationships and Granger Causality for determining causal relationships among variables. The findings revealed that both government agricultural finance and financing from commercial banks have a significant positive long-run impact on agricultural output and also have significant causal effects on agricultural output in Nigeria.

Achumu, Ezirim, Ezirim, and Chekwa (2022) explored the impact of agricultural financing 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.

Okwuchukwu (2022) investigated the effect of agricultural sector funding on the productivity of the agricultural sector in Nigeria using time series data from 1981 to 2018. Extracting data from the statistical bulletin of the Central Bank of Nigeria, the National Bureau of Statistics, and the IMF database, the study employed AGDP as a proxy for agricultural sector output. ACGS, CBCA, GEXA, and INTR were used as proxies for explanatory variables, with rainfall introduced as a control variable. Long-run relationships among variables were verified using the Johansen co-integration model, and the vector error correction mechanism (VECM) examined the speed of adjustment from short-run dynamics to long-run equilibrium. The results showed that ACGS had a positive and significant long-run effect on AGDP, while

CBCA, GEXA, and INTR had negative but significant effects on AGDP within the reference period.

Afolabi, Ikpefan, Osuma, and Evbuomwan (2021) analyzed the influence of agricultural credit on Nigeria's economic growth from 1981 to 2017. Data from the Central Bank of Nigeria (CBN) statistical bulletin and world development indicator (WDI) were used, focusing on the effects of the Agricultural Credit Guarantee Scheme Fund (ACGSF) and deposit money bank credit to the agric sector (DMBCA) on Nigeria's economic growth. The analysis employed tests for stationarity, Auto-Regressive Distributed Lag (ARDL), and found that DMBCA had a significant and direct relationship with economic growth only in the short run, while ACGSF was insignificant in both the short and long run.

Marafa (2021) assessed the relationship between agricultural financing and productivity in Nigeria using the Autoregressive Distributed Lagged (ARDL) bounds test. Using annual time series data from 1981 to 2019, the study found a long-run relationship between agricultural production and financing variables. In the short run, all variables were significant in influencing agricultural production, while in the long run, bank private sector credit to agriculture and agricultural credit guarantee scheme fund were the only variables influencing production. The Granger causality test indicated that agricultural credit guarantee scheme fund led to changes in agricultural production, while bank private sector credit to agriculture and government spending on agriculture could not predict changes in agricultural production.

Nwadioha and Igoni (2021) assessed the impact of agricultural credits on Nigeria's economic growth rate from 1985 to 2019. Using data from the Central Bank of Nigeria Statistical Bulletin, the study employed real gross domestic product (RGDPGR) as the dependent variable against cash crops (CARP), food crops (FORP), and livestock (LISK) as explanatory variables. The Ordinary Least Squares model (OLS) was adopted for analysis, and the results revealed that cash crops and food crops had a positive and significant impact on economic growth, while livestock had a positive but insignificant impact on Nigeria's economic growth. The study concluded that Nigerian cash crops and food crops were significant variables promoting economic growth.

Orji, Ogbuabor, Alisigwe, and Orji (2021) explored the impact of agricultural financing and agricultural output growth on employment generation in Nigeria from 1981 to 2017. Utilizing the Auto Regressive Distributed Lag (ARDL) Model, the study revealed that agricultural financing positively influences employment generation in both the short and long run. Additionally, the lag of agricultural output growth mainly contributes to employment generation in the short run. Other factors, such as price and agricultural output, were found to significantly affect employment generation, while variables like labor force population, wages, and aggregate expenditure were deemed insignificant. The study concludes that policymakers should ensure optimal utilization of funds allocated for specific agricultural schemes and interventions.

Sulaimon (2021) investigated the linear effect of the Agricultural Credit Guarantee Scheme Fund (ACGSF) on agricultural performance in Nigeria from 1981 to 2019. Employing summary statistics, augmented Dickey-Fuller test, and threshold regression, the study used real agriculture Gross Domestic Product as a percentage of total real GDP to proxy agricultural performance. The findings revealed a significant positive effect of ACGSF on agricultural performance below a threshold value of ₦68,399.7 (₦Thousand) and a negative effect beyond ₦1,059,993 (₦Thousand).



Reuben, Nyam, and Rukwe (2020) analyzed the effect of the Agricultural Credit Guarantee Scheme Fund (ACGSF) on farmers' agricultural output (GDP) in Nigeria. The study aimed to examine the trend in the volume of loans guaranteed by ACGSF to farmers and determine the effect of ACGSF on agricultural output. Using descriptive and multiple regression analysis on secondary data from Central Bank of Nigeria bulletins, National Bureau for Statistics, and other financial bulletins, the study found that credit supplied to the livestock, crop, and fishery sectors had a positive and significant effect on agricultural output in Nigeria.

### 3.1 Model of the Study

The model used for this study is the modification of the work of Samaila and Idris (2023) which examined the effect of the Agricultural Credit Guarantee Scheme Fund on real output in Nigeria. Their original model is stated as follows:

$$GDP_t = \beta_0 + \beta_1 ACGSF_t + \beta_2 CBCFA_t + \mu_t \dots \dots \dots \text{eq 1}$$

Where:

GDP = Gross Domestic product i.e., real output growth

ACGSF = Agriculture credit guarantee scheme fund

CBCFA = Commercial bank credit facilities to agriculture

$\beta_0$  = Intercept

$\beta_1 - \beta_2$  = The respective coefficient of the explanatory variables

$U_t$  = Error term of a specified period of term

However, the present study modified the Equation 1 above to arrive at the model shown below.

$$AGDP = f(LIF, FCF, CCF) \dots \dots \dots \text{eq2}$$

Its econometric form is expressed underneath:

$$AGDP_i = \beta_0 + \beta_1 LIF_t + \beta_2 FCF_t + \beta_3 CCF_t + \mu \dots \dots \dots \text{eq 3}$$

Where,

$\beta_0$  = constant

$\beta_{1-3}$  = coefficients of the predictors

AGDP = Agricultural Gross Domestic Product

LIF = Livestock financing

FCF = Food crops financing

CCF = Cash crops financing

$\mu$  = error term

$\beta_1, \beta_2, \beta_3 > 0$

**Table 3.1: Measurement of Variables**

Variable	Type	Acronym	Measurement
1. Agricultural GDP	Dependent	AGDP	Natural log of Agricultural GDP
2. Livestock financing	Independent	LIF	Natural Log of total livestock loan by ACGSF
3. Food crops financing	Independent	FCF	Natural Log of total food crops loan by ACGSF
4. Cash crops financing	Independent	CCF	Natural Log of total cash crops loan by ACGSF

**Source: Researcher's Compilation, 2023**

#### 4.1: Analysis

Table 4.1 shows the data and their respective log transformations. The descriptive analysis was done using the raw data while the inferential analyses were carried using the log transformed equivalents.

**Table 4.1: Descriptive Statistics**

	<b>AGDP</b>	<b>LIF</b>	<b>FCF</b>	<b>CCF</b>
Mean	12777.98	895514.1	3733706.	253991.5
Median	13239.13	774888.5	3631077.	172709.5
Maximum	19091.07	2342247.	8039640.	757593.0
Minimum	4703.640	11952.00	204058.0	4920.000
Std. Dev.	4583.171	694370.9	2337447.	225196.8
Skewness	-0.337736	0.403393	0.082824	0.419742
Kurtosis	1.956058	2.099469	1.854495	1.950804
Jarque-Bera	1.546075	1.461860	1.339620	1.805546
Probability	0.461609	0.481461	0.511806	0.405444
Sum	306671.6	21492339	89608947	6095795.
Sum Sq. Dev.	4.83E+08	1.11E+13	1.26E+14	1.17E+12
Observations	24	24	24	24

**Source:** *Eviews 11.0 Descriptive Statistics Output, 2023*

The mean AGDP of 12777.98 reflects the average real output growth in Nigeria during the study period. The maximum and minimum values of 19091.07 and 4703.640 indicate the range within which AGDP fluctuated, showcasing substantial variation in agricultural performance. The standard deviation of 4583.171 underscores this volatility, suggesting notable dispersion from the mean. The skewness of -0.337736 suggests a slight leftward skew, indicating a tendency towards more negative deviations from the mean. The positive kurtosis of 1.956058 implies a distribution with heavier tails and more outliers than a normal distribution, indicating occasional extreme values in AGDP. The Jarque-Bera test probability of 0.461609 suggests that AGDP's distribution is not significantly different from a normal distribution, reinforcing the robustness of the descriptive statistics.

The mean LIF of 895514.1 represents the average financing directed towards the livestock sector in Nigeria. The maximum value of 2342247.0 indicates the highest observed financing, while the minimum of 11952.00 represents the lowest. The substantial standard deviation of 694370.9 points to considerable dispersion in livestock financing, emphasizing the range of investment levels. The positive skewness of 0.403393 suggests a rightward skew, indicating a tendency towards more positive deviations from the mean. The kurtosis of 2.099469 signifies a distribution with heavier tails than a normal distribution, suggesting occasional extreme values. The Jarque-Bera test probability of 0.481461 indicates that the distribution of LIF is not significantly different from a normal distribution, affirming the reliability of the descriptive statistics.

The mean FCF of 3733706.0 represents the average financing directed towards the food crops sector in Nigeria. The maximum value of 8039640.0 indicates the highest observed financing, while the minimum of 204058.0 represents the lowest. The substantial standard deviation of

2337447.0 points to considerable dispersion in food crops financing, emphasizing the range of investment levels. The skewness of 0.082824 suggests a relatively symmetrical distribution of FCF. The kurtosis of 1.854495 signifies a distribution with tails slightly heavier than a normal distribution, indicating occasional extreme values. The Jarque-Bera test probability of 0.511806 indicates that the distribution of FCF is not significantly different from a normal distribution, reinforcing the reliability of the descriptive statistics.

The mean CCF of 253991.5 represents the average financing directed towards the cash crops sector in Nigeria. The maximum value of 757593.0 indicates the highest observed financing, while the minimum of 4920.000 represents the lowest. The substantial standard deviation of 225196.8 points to considerable dispersion in cash crops financing, emphasizing the range of investment levels. The positive skewness of 0.419742 suggests a rightward skew, indicating a tendency towards more positive deviations from the mean. The kurtosis of 1.950804 signifies a distribution with tails slightly heavier than a normal distribution, indicating occasional extreme values. The Jarque-Bera test probability of 0.405444 indicates that the distribution of CCF is not significantly different from a normal distribution, affirming the reliability of the descriptive statistics.

## 4.2 Data Analysis

Ordinary Least Square multiple regression model was used to test the hypothesis at 5% level of significance. The OLS multiple regression analysis produced the coefficient of determination ( $R^2$ ), adjusted coefficient of determination ( $R^2$ ), t-statistic and F-statistic. The model tested is:

$$AGDP_i = \beta_0 + \beta_1 LIF_t + \beta_2 FCF_t + \beta_3 CCF_t + \mu$$

The log transformation of the variables was employed to enhance the accuracy and validity of the regression estimates. Logarithmic transformations are often applied in statistical analyses to stabilize variances and mitigate the impact of extreme values, which can distort the results and assumptions of linear regression models. By taking the natural logarithm of the variables, the data distribution is normalized, and the relationships between variables become more linear.

### 4.2.1 Ordinary Least Square Regression

Table 4.3 shows the estimates of the OLS regression analysis.

**Table 4.3: Ordinary Least Square Regression Estimates**

Dependent Variable: LOGAGDP				
Method: Least Squares				
Date: 11/28/23 Time: 01:29				
Sample: 1999 2022				
Included observations: 24				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLIF	0.144472	0.114568	1.261014	0.2218
LOGFCF	-0.107917	0.125176	-0.862120	0.3988
LOGCCF	0.185905	0.048633	3.822589	0.0011
C	3.002984	0.353178	8.502750	0.0000
R-squared	0.880295	Mean dependent var		4.072378
Adjusted R-squared	0.862339	S.D. dependent var		0.188189
S.E. of regression	0.069823	Akaike info criterion		-2.334694
Sum squared resid	0.097505	Schwarz criterion		-2.138352
Log likelihood	32.01633	Hannan-Quinn criter.		-2.282605
F-statistic	49.02580	Durbin-Watson stat		1.840442
Prob(F-statistic)	0.000000			

**Source:** *Eviews 11.0 Regression Output, 2023*

The coefficient of determination ( $R^2 = 0.880295$ ) is used to measure the explanatory power of the independent variables on the dependent variables. It denotes that 88.03% of the variations in AGDP explained by the independent variables. The Coefficient of Determination ( $R^2$ ) neglects to consider the reduction in degrees of freedom resulting from the inclusion of supplementary explanatory variables in the function, a factor that effectively inflates  $R^2$ . The Adjusted Coefficient of Determination ( $R^2 = 0.862339$ ) corrected this defect, and took into account the penalty of introducing additional explanatory variables. In actuality, the adjusted coefficient of determination shows that about 86.23% of the changes in AGDP were significantly accounted for by the predictors: LOGLIF, LOGFCF and LOGCCF. The high R-squared value of 0.880295 and the adjusted R-squared of 0.862339 suggest that the model explains a substantial proportion of the variation in AGDP.

The F-statistic of 49.02580, with an associated probability of 0.000000, underscores the overall significance of the model, providing strong evidence against the null hypothesis that none of the coefficients are different from zero. Thus, the model is shown to have an overall significance since the Prob(F-statistics) is less than 0.05. The Durbin-Watson statistic of

1.840442 indicates the absence of significant autocorrelation in the residuals, further validating the reliability of the regression results.

#### 4.2.2 Granger Causality Test Result

The Granger causality test was employed to establish the directional impact between variables. The potential outcomes encompass a unidirectional effect, signifying impact from one variable to the other but not reciprocally; a bidirectional effect, indicating a reciprocal influence between variables; and no effect, denoting an absence of impact between the variables. In assessing these scenarios, the significance of the p-values associated with the F-statistic was examined as follows.

**Table 4.4: Granger Causality Test for LOGLIF, LOGFCF, LOGCCF and AGDP**

Pairwise Granger Causality Tests			
Date: 11/28/23 Time: 01:59			
Sample: 1999 2022			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LOGLIF does not Granger Cause LOGAGDP	22	0.10282	0.9028
LOGAGDP does not Granger Cause LOGLIF		0.13435	0.8752
LOGFCF does not Granger Cause LOGAGDP	22	0.07759	0.9257
LOGAGDP does not Granger Cause LOGFCF		0.38945	0.6833
LOGCCF does not Granger Cause LOGAGDP	22	1.77499	0.1995
LOGAGDP does not Granger Cause LOGCCF		11.0908	0.0008

**Source:** *Eviews 11.0 Regression Output, 2023*

The Granger causality test results reveal that the null hypothesis that LOGLIF does not Granger cause LOGAGDP has a probability value of 0.9028, and the reciprocal null hypothesis that LOGAGDP does not Granger cause LOGLIF has a probability value of 0.8752. Both p-values are higher than 0.05 significance level, indicating a lack of statistical evidence to reject the null hypotheses, suggesting no Granger causality between livestock financing and agricultural output and vice versa.

Furthermore, the p-value for the null hypothesis that LOGFCF does not Granger cause LOGAGDP is 0.9257, while the p-value for the reciprocal hypothesis is 0.6833. Again, both p-values are relatively high, suggesting no Granger causality between food crops financing and agricultural output, and vice versa.

However, for LOGCCF and LOGAGDP, the null hypothesis that LOGCCF does not Granger cause LOGAGDP has a significantly lower p-value of 0.1995, indicating potential Granger causality from cash crops financing to agricultural output. Conversely, the reciprocal hypothesis that LOGAGDP does not Granger cause LOGCCF has a very low p-value of 0.0008, further supporting the notion that agricultural output Granger causes cash crops financing.

Therefore, the Granger causality test suggests a lack of significant Granger causality between livestock and food crops financing with agricultural output, while indicating a potential bidirectional Granger causality between agricultural output and cash crops financing.

### 4.3 Test of Hypotheses

The regression Coefficients show how much and in which direction independent variables affect the dependent variable. A positive coefficient means a positive correlation, and a negative coefficient means a negative correlation. For the purpose of hypotheses testing, the probability values of the t-statistics were used to ascertain whether the effect of the predictors on AGDP is significant. Thus, each of the three null hypotheses are re-stated below and tested.

#### 4.3.1 Hypothesis One

$H_{01}$ : ACGSF livestock financing has no significant effect on agricultural gross domestic product in Nigeria.

For the logarithm of livestock financing (LOGLIF), the coefficient of 0.144472 suggests a positive relationship, implying that a one-unit increase in the logarithm of livestock financing is associated with a 0.144472 unit increase in AGDP. However, with a probability value of 0.2218 which is greater than 0.05, the result is not statistically significant at 5% level. This led to the acceptance of the null hypothesis that ACGSF livestock financing has a non-significant positive effect on agricultural gross domestic product in Nigeria (*p-value* = 0.2218).

#### 4.3.2 Hypothesis Two

$H_{02}$ : ACGSF food crops financing has no significant effect on agricultural gross domestic product in Nigeria.

Food crop financing has a coefficient of -0.107917, implying a negative association. In other words, a one-unit increase in the logarithm of food crops financing is associated with a decrease of 0.107917 units in AGDP. Similar to LOGLIF, this relationship is not statistically significant since the *p-value* = 0.3988 is greater than 0.05. We therefore accept the null hypothesis and conclude that ACGSF food crops financing has a non-significant negative effect on agricultural gross domestic product in Nigeria (*p-value* = 0.3988).

#### 4.3.3 Hypothesis Three

$H_{03}$ : ACGSF cash crops financing has no significant effect on agricultural gross domestic product in Nigeria.

On the other hand, cash crop financing exhibits a positive relationship (coefficient = 0.185905) with agricultural gross domestic product. Thus, a one-unit increase in the

logarithm of cash crops financing is associated with a 0.185905 unit increase in AGDP. Since the  $p$ -value = 0.0011 is less than 0.05, it implies that the effect of cash crops financing on AGDP is statistically significant. The alternate hypothesis was therefore accepted with the conclusion that ACGSF cash crops financing has a significant positive effect on agricultural gross domestic product in Nigeria ( $p$ -value = 0.0011).

### 5.1 Findings

The OLS regression analysis conducted revealed the following results:

- 1) ACGSF livestock financing has a non-significant positive effect on agricultural gross domestic product in Nigeria ( $p$ -value = 0.2218).
- 2) ACGSF food crops financing has a non-significant negative effect on agricultural gross domestic product in Nigeria ( $p$ -value = 0.3988).
- 3) ACGSF cash crops financing has a significant positive effect on agricultural gross domestic product in Nigeria ( $p$ -value = 0.0011).

The Granger causality test suggests a lack of significant Granger causality between livestock and food crops financing with agricultural output, while indicating a potential bidirectional Granger causality between agricultural output and cash crops financing.

### 5.2 Recommendations

- 1) The government and relevant agricultural authorities should diversify and expand livestock support programs under the ACGSF by introducing targeted initiatives, training programs, and incentives to enhance livestock farming practices, improve animal health, and increase productivity.
- 2) Policy makers should collaborate with financial institutions, development partners, or innovative financial instruments to ensure that food crop farmers have access to affordable credit without hampering overall agricultural growth.
- 3) Regulatory authorities should expand and strengthen support for cash crop farmers through tailored training programs, improved access to quality inputs, and market linkages to ensure sustainable growth in cash crop production.

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