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AGRICULTURAL FINANCING AND AGRICULTURAL OUTPUT IN NIGERIA

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Abstract

Despite Nigeria's innumerable potentials to be the world hub of food supply and the government initiatives, productivity remained on the decline due to financial access constraints. This study examine the effect of agricultural financing on agricultural output in Nigeria the study specifically examine the effect of agricultural credit on agricultural output, determine the effect of agricultural credit on economic growth; and determine the causality relationship among agricultural credit, agricultural output, and economic growth. The study utilised data covering the period of 1991 to 2022 sourced from the Food and Agricultural Organisation (FAO) database analysed using the Full Modified Least Squares technique and the Granger causality. The result revealed that agricultural credit not only boosts agricultural productivity but also contributes positively to the broader economic growth. Conversely, lending rates does not significantly affect agricultural output and economic growth. Also, a unidirectional causality was found from economic growth to agricultural credit. The study submitted that agricultural credit positively and significantly affects agricultural output and economic growth. The Nigerian government needs to introduce subsidy programmes that lower the interest rates on loans specific to the agricultural sector.

Key Words: *Agricultural Output, Financing, Economic growth, Full Modified Least Squares*
Jel Codes: *Q14, Q18, E44, C32*

1. Introduction

Agriculture is widely recognized as a crucial driver of sustainable development, particularly in reducing extreme poverty and hunger. Nigeria reflects this global outlook by prioritizing agricultural development through government policies and international initiatives as a critical pathway for achieving progress (Kersten et al., 2017; United Nations, 2015). The sector plays a key role in supporting the livelihoods of a substantial portion of the population, ensuring food security, supplying raw materials to industries, and generating foreign exchange earnings (Philip et al., 2009). During the 1960s, Nigeria's agricultural sector thrived, contributing approximately 90% of the nation's GDP and foreign exchange earnings through the export of products like palm oil, cocoa, and groundnuts (Sulaimon, Ayeomoni, & Aladejana). However, the commercial discovery of oil in the early 1970s caused a shift in economic priorities, resulting in the neglect and underfunding of agriculture. This shift led to a significant decline in the sector's contribution to GDP (Olu & Manson, 2023).

Access to agricultural financing is essential for revitalizing Nigeria's agricultural sector (Beck & Demirguc-Kunt, 2006). However, smallholder farmers, who form the backbone of agricultural production, face significant challenges in securing adequate funding. These challenges include insufficient financial resources, poor loan repayment culture, and limited access to formal financial institutions (Philip et al., 2009). To address these issues, the Nigerian government has introduced several initiatives, such as the Agricultural Transformation Agenda (2011), Growth Enhancement Support Scheme (2012), Anchor Borrowers Programme (2015), Presidential Fertilizer Initiative (2016), and Livestock Transformation Plan (2019). These programs aim to improve farmers' access to agricultural inputs, credit, and markets. However, their impact has been limited by inadequate support from financial institutions (Olu & Manson, 2023; Olubiyo & Hill, 2003; FAO, 2020).

Despite increased government allocations to agriculture—such as the N291.4 billion budgeted in 2022, representing 1.8% of the N16.9 trillion national budget—this funding still falls short of the 10% benchmark set by the Maputo Declaration (Central Bank of Nigeria, 2022). Similarly, commercial bank lending to agriculture, totaling $1,049.68 billion, remains significantly lower than the global average of $80 billion annually for agricultural value chains, highlighting a persistent financing deficit (Emenuga, 2019).

The relationship between agricultural financing, agricultural productivity, and economic growth in Nigeria is complex and multi-dimensional. Some studies have demonstrated that agricultural credit positively influences productivity and export performance (Efobi & Osabuohien, 2011; Ijaiya, 2013). Conversely, other studies emphasize challenges such as high interest rates, non-performing loans, and weak oversight by lending institutions (Ngozi, 2015; Chigbu, 2004). High borrowing costs deter farmers from accessing credit, restricting investments in agriculture, while inflation exacerbates both supply and demand issues within the sector (Johnson, 2013). These constraints hinder agricultural growth and impede Nigeria's efforts to diversify its economy away from oil dependence (Lawal, 2011; Oji-Okoro, 2011).

This study, therefore, seeks to investigate the impact of agricultural financing on agricultural productivity and economic growth in Nigeria. The research is guided by the following objectives:

- examine the effect of agricultural credit on agricultural output in Nigeria;
- determine the effect of agricultural credit on economic growth; and
- determine the causality relationship among agricultural credit, agricultural output, and economic growth.

By addressing these objectives, this study seeks to provide insights into the dynamics of agricultural financing in Nigeria, its impact on agricultural productivity and overall economic performance.

2. Literature Review

Agricultural financing encompasses a broad array of financial tools, mechanisms, and institutions designed to provide capital and financial services to farmers, agribusinesses, and other stakeholders within the agricultural sector. It plays a crucial role in driving financial flows across the agricultural value chain, supporting critical activities such as production, processing, marketing, and distribution (Adejumo & Bolarinwa, 2017). This form of financing includes a wide range of financial products and services tailored to the specific needs of farmers and agribusinesses. Traditional methods involve loans, credit lines, and leasing arrangements, while innovative instruments include agricultural insurance, warehouse receipt systems, and commodity futures contracts (Mbelu & Ifionu, 2022). Agricultural financing is essential for fostering inclusive economic development and reducing poverty, particularly in rural areas where agriculture is the primary source of livelihood. By granting smallholder farmers and rural entrepreneurs access to financial resources, it enables investments in productivity-enhancing measures, thereby strengthening their participation in agricultural value chains and contributing to poverty reduction and food security. Furthermore, agricultural financing promotes productivity, efficiency, and resilience within the sector by providing affordable capital and risk management tools, optimizing resource allocation, improving farming practices, and supporting sustainable growth (Mbelu & Ifionu, 2022).

Agricultural output refers to the total economic value derived from diverse activities such as crop production, livestock farming, forestry, and fisheries (Muftaudeen & Hussainatu, 2014). It captures both tangible and intangible contributions, including the goods produced and services rendered. Ewetan et al. (2017) note that agricultural output encompasses not only raw production figures but also the value of products consumed domestically or exported internationally. Cash crops, primarily cultivated for profit, constitute a significant portion of agricultural output. These include commodities such as cocoa, coffee, cotton, oil palm, rubber, and sugarcane, which are produced for both domestic and international markets (Francis, 2013, as cited in Ibitomi & Ijaiya, 2020; Eno & Eze, 2023). In contrast, food crops—such as cereals, legumes, vegetables, tubers, and fruits—are mainly grown for consumption, serving as the foundation for food security and nutrition at local and global levels (Ibitomi & Ijaiya, 2020; Eno & Eze, 2023). Livestock farming also contributes significantly to agricultural output, with animals such as cattle, goats, sheep, and poultry raised for meat, eggs, milk, fur, and leather. Livestock provides a critical source of protein-rich food and raw materials for industries like textiles and leather manufacturing (Obasi, 2015). Similarly, fisheries focus on the sustainable management of aquatic resources, particularly fish, for food production. Sustainable fishing practices are necessary to maintain fish stocks and preserve aquatic ecosystems (Obilor, 2013). Forestry complements agricultural output through the sustainable management of forest resources for timber production, ecosystem services, and biodiversity conservation. Practices such as afforestation, reforestation, and sustainable timber harvesting aim to balance economic benefits with ecological preservation (Obilor, 2013).

The sources of funding for agricultural activities are diverse and support a wide range of activities, from input acquisition to farm expansion. Many farmers rely on self-financing, investing personal funds in tools, seedlings, and fertilizers (Adetiloye, 2012). Informal sources, including contributions from friends and family, are also significant, particularly in rural settings (Aryeetey & Udry, 1995). Government funding is a major contributor, often through budgetary allocations to support initiatives such as crop and livestock production, input subsidies, and agricultural research (Anderu & Omotayo, 2020).

Government-led initiatives aimed at improving financial access have also been instrumental. For instance, the Agricultural Credit Guarantee Scheme Fund (ACGSF) secures loans for rural farmers, mitigating financial risks and enhancing inclusion (Olaitan, 2006). Similarly, the Commercial Agricultural Credit Scheme (CACS), implemented in partnership with the Central Bank of Nigeria (CBN), provides low-interest loans to commercial farmers along the agricultural value chain (Mbutor et al., 2013). Additional programs like the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) and the Anchor Borrowers' Programme (ABP) reduce risks and improve access to finance for smallholder farmers (CBN, 2011; Mbutor et al., 2013).

Private sector funding is equally vital in agricultural financing. Commercial banks extend loans and credit facilities based on profitability and liquidity considerations (Olokoyo & Ogunnaike, 2011). Foreign direct investment (FDI) constitutes another significant source, involving long-term investments by foreign entities seeking ownership and management rights in agricultural enterprises (Rotjanapan, 2005). Development partners, including organizations such as the Alliance for a Green Revolution in Africa (AGRA), the African Development Bank (AfDB), the Food and Agriculture Organization (FAO), and the UK Department for International Development (DFID), provide support through capacity-building initiatives, policy formulation, and direct funding to drive agricultural development (Oyaniran & Onomia, 2018).

The connection between agricultural financing and agricultural output is a crucial subject in economic research. Two key theoretical frameworks that provide insights into this relationship are the Law of Returns to Scale **and the** Keynesian theory of public expenditure. The Law of Returns to Scale, a core concept in microeconomics, examines how changes in the level of input affect output. In the context of agriculture, this theory suggests that increasing financial investments in farming activities can enhance agricultural output, but only up to a certain point. Initially, additional financial resources can boost productivity by enabling investments in modern equipment, better-quality seeds, and improved farming methods. However, beyond a specific threshold, further increases in financial inputs may result in diminishing returns, where the output grows at a slower rate than the increase in input. This highlights that while agricultural financing is crucial for increasing output, there is an optimal level of investment, beyond which further financing may not lead to proportionate productivity gains (Olowofeso, Adeboye, Adejo, Bassey, & Abraham, 2017).

The Keynesian theory of public expenditure, on the other hand, focuses on the role of government spending in boosting economic activity, particularly during economic downturns or periods of underemployment. In the agricultural sector, this theory suggests that well-targeted public expenditure, such as subsidies, infrastructure development, research funding, and market support, can significantly enhance agricultural output. By investing directly in agriculture, governments can stimulate demand for agricultural products, build necessary infrastructure for efficient production and distribution, and support innovations to improve productivity. Furthermore, Keynesian economics emphasizes the multiplier effect, where government spending in agriculture can initiate a ripple effect across the economy, stimulating further economic activity and fostering growth in agricultural output (Ayorinde, Bamiro, Ajiboye, Adeyonu, & Ogunseemi, 2024).

Numerous studies have investigated the relationship between agricultural financing and agricultural output in Nigeria, employing various methodologies and data sources. Ayorinde, Bamiro, Ajiboye, Adeyonu, and Ogunseemi (2024) analyzed the effects of both public and private financing on agricultural output in Nigeria from 1981 to 2020. Their findings indicated that loans from commercial banks and the Agricultural Credit Guarantee Scheme Fund had a positive impact on agricultural output. Olu and Manson (2023) examined the role of agricultural financing from deposit money banks and the government on agricultural output in Nigeria using ordinary least squares analysis. Their study concluded that both bank and government financing positively influenced agricultural output during the period under review.

Similarly, Abubakar and Muhammady (2023) studied the effect of commercial bank financing on agricultural output in Nigeria from 1981 to 2020. They found that commercial bank financing significantly contributed to agricultural output in the long term. Ezu (2023) explored the connection between agricultural financing and economic growth in Angola from 2003 to 2022. The results revealed a positive relationship between agricultural credit and agricultural GDP, suggesting a causal link. Salisu and Alamu (2023) focused on the effects of bank lending on agricultural activities in Nigeria from 1981 to 2021. They found a statistically significant positive impact of commercial bank lending on agricultural output.

Cookey and Akidi (2023) analyzed the role of agricultural finance in Nigeria's economic development from 1986 to 2022. Their study established a significant relationship between agricultural bank loans and Nigeria's real GDP, highlighting the essential role of agricultural financing in fostering economic growth. Mbelu and Ifionu (2022) also examined the impact of agricultural financing on economic growth in Nigeria from 1981 to 2019. Using various tests, including stationarity, co-integration, error correction models, and Granger causality, their findings showed that agricultural financing—through the Agricultural Credit Guarantee Scheme Fund, commercial bank loans, and microfinance loans—positively affected Nigeria's GDP.

Afolabi, Ayodele, Daramola, and Adewumi (2022) applied the Auto Regressive Distributed Lag (ARDL) technique to assess the impact of agricultural funding on Nigeria's economic growth. Their results demonstrated that both Central Bank Credit to Agriculture (CBCA) and Agricultural Gross Domestic Product (AGDP) significantly influenced Nigeria's GDP during the study period. Ogbonnaya, Nwachukwu, and Uwazie (2022) examined the relationship between agricultural output and agricultural credit funding in Nigeria from 1981 to 2021. Using multiple regression analysis, they concluded that increases in the Agricultural Credit Guarantee Scheme Fund (ACGSF) and commercial bank lending to agriculture positively affected agricultural output. Similarly, Okore and Nwadiubu (2022) analyzed the impact of agricultural financing on agricultural output in Nigeria from 1986 to 2020. Their study found that both commercial bank loans to agriculture and the disbursement of the Agricultural Credit Guarantee Scheme Fund had a significant and positive impact on agricultural output.

Orji, Ogbuabor, Alisigwe, and Anthony-Orji (2021) explored how agricultural financing and agricultural output growth contributed to employment generation in Nigeria from 1981 to 2017. They found that agricultural financing boosted employment generation, with lagged agricultural output growth significantly contributing to employment, particularly in the short term. George-Anokwuru (2018) studied the relationship between credit from deposit money banks and agricultural output in Nigeria from 1985 to 2015. Through econometric techniques, including unit root tests and Error Correction Models (ECM), the study found a positive and statistically significant link between credit from deposit money banks and agricultural output.

Mu'azu and Lawal (2017) conducted an empirical analysis of the impact of agricultural financing on agricultural output in Nigeria from 1986 to 2012. Their study found a significant influence of agricultural financing on agricultural output, with bidirectional causality between government spending on agriculture and agricultural productivity. Olowofeso, Adeboye, Adejo, Bassey, and Abraham (2017) used a nonlinear autoregressive distributed lag (NARDL) model to investigate the relationship between credit to agriculture and agricultural output in Nigeria from 1992 to 2015. They concluded that positive changes in credit to agriculture were a key driver of long-term agricultural output growth. Lastly, Obudah and Tombofa (2016) analyzed the impact of agricultural financing on agricultural output and macroeconomic growth in Nigeria. Their results from the error correction model revealed a positive relationship between agricultural credit and agricultural output, with agricultural credit also fostering real GDP growth during the study period.

3. Methodology

The study utilized an ex-post facto research design, which aims to identify potential relationships by observing existing conditions and tracing back to factors that may have contributed to them. The primary objective of this research is to examine the relationship between agricultural credit and economic growth in Nigeria. The dependent variable is economic growth, measured by real Gross Domestic Product (RGDP), while the independent variable is agricultural credit, represented by the volume of agricultural financing. Additionally, other relevant factors that may influence economic growth are included in the analysis.

Bernanke and Gertler (1995) outline two critical components of the credit channel theory. The first component is the balance-sheet channel, which emphasizes how monetary policy changes impact the borrower's balance sheet. The second component is the bank lending channel, which examines how monetary policy actions can affect the supply of loans in the banking system (Walsh and Wilcox, 1995).

When the government enacts contractionary monetary policy, it typically leads to a reduction in bank reserves and deposits, which results in a decrease in bank loans. This decline in loans, in turn, reduces investment spending and economic output. Based on these assumptions, the LM curve can be derived from a set of portfolio-balance conditions that involve two assets: money and credit (bonds). The demand for loans, which helps define the credit curve or commodities and credit (CC) curve, is given by equation (1):

$$L^d = L\,(\underset{-}{\sigma}, \underset{+}{\mathrm{i}}, \underset{+}{\mathrm{y}}) \tag{1}$$

where σ is the interest rate on loans, i is the interest rate on bonds, y is the income to capture the transactional demand for credit, and the signs (- + +) indicate the relationship between loans demand and each of the variables (interest rate on loans, interest rate on bonds and income). Considering a simplified bank balance sheet (which ignores net worth) with assets: reserves, R; bonds, *Bb;* loans, LS and liabilities: deposits, D. Since reserves consist of required reserves, ΔD , plus excess reserves, E, the banks' adding-up constraint is:

$$B^b + L^s + E + (D - \tau) \tag{2}$$

Assuming that desired portfolio proportions depend on rates of return on the available assets (zero for excess reserves), we have $L^s = \lambda(\sigma, \mathrm{i})D(1-\tau)$ with similar equations for the shares of Bb and E. Thus the condition for clearing the loan market is

$$L^d = L^s = (\sigma, \mathrm{i}, \mathrm{y}) = \lambda(\sigma, \mathrm{i})D(1-\tau) \tag{3}$$

The demand for deposits arises from the transactions motive and depends on the interest rate, income, and total wealth, which is constant and therefore suppressed: $D(i, y)$ Equating the two gives

$$D(\underset{-}{\mathrm{I}}, \underset{+}{\mathrm{y}}) = \underset{+}{\mathrm{m}(\mathrm{i})}\mathrm{R} \tag{4}$$

Implicitly, $D(i, y)$ and $L(\sigma ,i, y)$ define the nonbank public's demand function for bonds since money demand plus bond demand minus loan demand must equal total financial wealth.

The first objective of the study was to examine the effect of agricultural agricultural credit on agricultural output in Nigeria. Relying on the above theoretical framework, this studyadapted the model used in the study conducted by Ogbuabor, Alisigwe, and Anthony-Orji (2021), Afolabi, Ayodele, Daramola, and Adewumi (2022), Cookey and Akidi (2023) and as a build-up to the study of Adewale, Lawal, Aberu, and Toriola (2022) on the analysis of banks' credit and agricultural output in Nigeria. In the analysis of the first objective, this study makes use of agricultural output proxy by agricultural gross domestic product as the dependent variable, while agricultural credit, bank lending rate, and foreign exchange rate were the independent variables. The model is expressed in a functional relationship as follows.

$$AOUT = F(CRF, BLR, FREX) \tag{5}$$

where: AOUT = Agricultural output, CRF = Agricultural credit, BLR = Banks lending rate, FREX = Foreign Exchange Rate.

The functional relationship is therefore transform into econometric model specify as follows:

$$AOUT = \beta_0 CRF + \beta_1 BLR + \beta_2 FREX + \beta_3 INFL + \varepsilon_t \tag{6}$$

In the equation, $\beta_0,....,\beta_4$ are the intercept terms, while the disturbance terms is denoted by ε_t.

The second objective of the study was to determine the effect of agricultural agricultural credit on economic growth. Based on evidence from equation (6), the model for the second objective is specified such that economic growth proxy by real gross domestic product serves as the dependent variable, while credit to famers, banks lending rate, and foreign exchange rate were the independent variables.The model is expressed in a functional relationship as follows.

$$GR = \beta_0 + \beta_1 CRFM + \beta_2 BLR + \beta_3 FREX + \varepsilon t \tag{7}$$

Where: economic growth GR proxy by real gross domestic product and$\beta_0,....,\beta_4$ are the intercept terms, while the disturbance terms is denoted by εt.

In the analysis of the causality relationship among agricultural credit, agricultural output and economic growth, the following pairwise causality model is specified:

$$GR_t = \sum_{i=1}^{m} \alpha_i GR_{t-i} + \sum_{j=1}^{n} \delta_j AOUT_{t-j} + \sum_{k=1}^{o} \mathrm{J}_k CRFM_{k-j} + \varepsilon_{1t}$$

$$AOUT_t = \sum_{i=1}^{m} \gamma_i GR_{t-i} + \sum_{j=1}^{n} \psi_j AOUT_{t-j} + \sum_{k=1}^{o} \mathrm{J}_k CRFM_{k-j} + \varepsilon_{2t}$$

$$ABCR_t = \sum_{i=1}^{m} \gamma_i GR_{t-i} + \sum_{j=1}^{n} \psi_j AOUT_{t-j} + \sum_{k=1}^{o} \mathrm{J}_k CRFM_{k-j} + \varepsilon_{2t}$$

Case 1: Unidirectional causality from GR to AOUT. This is indicated if $\sum \alpha_i \neq 0$ and $\sum \delta_j = 0$

Case 2: Unidirectional causality from AOUT to GR. This is indicated if $\sum \gamma_i = 0$ and $\sum \psi_j \neq 0$.

Case 3: Bilateral causality. This is indicated if $\sum \alpha_i \neq 0$ and $\sum \delta_j \neq 0$.

Case 4: No causality. This is indicated if $\sum \alpha_i = 0$ and $\sum \delta_j = 0$.

The expected sign of the coefficients of the explanatory variables is summarized in terms of differentials as follows:

Agricultural credit, is expected to exert a positive effect on economic growth in Nigeria i.e$\frac{\partial GR}{\partial CRFM}$>0; while bank lending rate and foreign exchange rate are expected to exert a negative effect on economic growth in Nigeria i.e$\frac{\partial GR}{\partial BLR}$<0 and $\frac{\partial GR}{\partial FREX}$>0

Also, agricultural credit, is expected to exert a positive effect on agricultural output in Nigeria i.e$\frac{\partial AOUT}{\partial CRFM}$>0; while bank lending rate and foreign exchange rate are expected to exert a negative effect on agricultural output in Nigeria i.e$\frac{\partial AOUT}{\partial BLR}$<0 and $\frac{\partial AOUT}{\partial FREX}$>0

3.2 Data Sources and Measurement

This is a country specific research and it focuses attention specifically on the Nigerian economy. This study makes used of annual time series data. The data covers the period of 32years (1991-2022). The choice of the time frame is informed by data availability and the need to provide a broader scope for the analysis and to ensure that the study span through the periods of major institutional economic and financial policies geared towards revitalizing the agricultural sector and promote sustainable economic growth in Nigeria. Data on agricultural credit from Food and Agricultural Organisation (FAO) on credit to agriculture in Nigeria is only available from 1991 which informed the starting date of the analysis.Data on other variables were sourced from the World Bank World Development Indicators

Table 1. Variable Description

SN	Variables	Description	Measurement	Source
1	Agricultural output	AOUT	Agriculture, forestry, and fishing, value added (constant LCU)	World Bank Development Indicators 2024
2	Agricultural Credit	ACR	Total credit to agriculture in US $	Food and Agricultural Organisation 2024
3	Banks lending rate	BLR	Lending interest rate (%)	World Bank Development Indicators 2024
4	Foreign Exchange Rate	FREX	Official exchange rate (LCU per US$, period average)	World Bank Development Indicators 2024
5	Economic growth	GR	GDP per capita, PPP (constant 2017 international $)	World Bank Development Indicators 2024

Source: Authors' Compilation

3.3 Estimation Techniques

To ensure the statistical robustness of the analysis, the study performs various diagnostic tests to evaluate the time series properties, which will guide the selection of the most appropriate analytical techniques. The diagnostic tests used include line graphs, the Jarque-Bera test for checking the normality of residuals, and unit root tests.

In examining the relationship between agricultural credit and economic growth in Nigeria, the study adopts a two-stage econometric procedure. The first stage involves conducting the Augmented Dickey-Fuller (ADF) test to determine the order of integration of the variables. Following this, suitable econometric methods will be applied to explore both the long-run and short-run relationships within the model. Furthermore, the Pairwise Granger causality test will be employed to assess the direction of causality between agricultural credit and economic growth in Nigeria.

4. Results and Discussion

4.1 Pre-Test Analysis

The descriptive statistics including the mean, standard deviation and Jarque-Bera statistics to show the properties of the distribution of each of the variable in the dataset is presented in Table 2

Table 2. Descriptive Statistics

	AOUT	ACR	BLR	FREX	GR
Mean	10575.39	31784.90	18.53864	150.8797	4109.661
Median	10590.47	28118.48	17.69000	130.2483	4155.450
Maximum	19091.07	81293.95	31.65000	425.9792	5429.100
Minimum	3590.837	2221.580	11.48313	9.909492	2895.351
Std. Dev.	5534.513	26911.48	3.880924	115.7801	942.1246
Skewness	0.076359	0.155682	1.160651	0.830993	-0.057307
Kurtosis	1.513047	1.358665	5.597852	2.923761	1.349953
Jarque-Bera	2.979138	3.721239	16.18303	3.690683	3.647721
Probability	0.225470	0.155576	0.000306	0.157971	0.161401
Observations	32	32	32	32	32

Source: Authors' own calculations
Note: AOUT: agricultural output; CRFM: agricultural credit; BLR: banks lending rate; FREX: foreign Exchange Rate; GR: economic growth

As displayed in Table 2, the mean agricultural output (AOUT) in Nigeria is 10575.39, with a minimum value of 3590.837 and a maximum value of 19091.07. The standard deviation (SD) is 5534.513, indicating considerable variability around the mean. The skewness is 0.076359, suggesting a slight right-skew, implying that while the mean output is moderate, there are instances of higher values. The kurtosis of 1.513047 indicates a relatively normal distribution, with a Jarque-Bera statistic of 2.979138, suggesting normality at the 5% level of significance.

Agricultural credit (ACR) has a mean of 31784.90, ranging from a minimum of 2221.580 to a maximum of 81293.95. The substantial standard deviation of 26911.48 indicates wide variability in credit access. The skewness of 0.155682 indicates a slight right-skew, suggesting some farmers receive significantly more credit than others. The kurtosis of 1.358665 suggests a relatively normal distribution, supported by the Jarque-Bera statistic of 3.721239. However, the significant disparity in credit access might exacerbate inequalities among farmers with serious implications on agricultural productivity and economic growth.

The mean banks lending rate (BLR) is 18.53864, with a standard deviation of 3.880924. The skewness of 1.160651 indicates a notable right-skew, suggesting that lending rates tend to be higher than the mean, which might deter borrowing for agricultural activities. The kurtosis of 5.597852 highlights a heavy-tailed distribution, supported by the Jarque-Bera statistic of 16.18303, indicating non-normality at the 5% level. Meanwhile, high lending rates could constrain investment in agriculture, hindering sector growth and economic development.

Foreign Exchange Rate (FREX) has a mean of 150.8797, ranging from 9.909492 to 425.9792. The standard deviation of 115.7801 indicates moderate variability around the mean. The skewness of 0.830993 suggests a slight right-skew, indicating occasional periods of higher exchange rates. The kurtosis of 2.923761 indicates a relatively heavy-tailed distribution, supported by the Jarque-Bera statistic of 3.690683, suggesting non-normality. Fluctuations in exchange rates could impact the cost of imported inputs, affecting agricultural production costs and profitability.

Economic growth (GR) has a mean of 4109.661, with a standard deviation of 942.1246. The skewness of -0.057307 suggests a slight left-skew, indicating more instances of lower growth rates. The kurtosis of 1.349953 indicates a relatively normal distribution, supported by the Jarque-Bera statistic of 3.647721. However, the variability in growth rates implies uncertainty in the economic environment, influencing investment decisions and agricultural productivity.

Summarily, the result indicates that the mean values of agricultural credit and economic growth have a low mean values suggesting that their values are generally low, bank lending rate and foreign exchange rate showcase high mean values implying that the values of these variables over the scope of this study is generally high. However, agricultural output shows a moderate mean value. Furthermore, while the mean agricultural output, agricultural credit, foreign exchange rate and economic growth exhibit relatively normal distributions, banks lending rate display significant variability and skewness, highlighting challenges in agricultural financing and lending practices in Nigeria.

The result of pairwise correlation analysis to determine the presence or otherwise of multicollinearity in the dataset of is presented in Table 4.2

Table 3. Pairwise Correlation Coefficient

	AOUT	CRFM	BLR	FREX	GR
AOUT	1.000000				
CRFM	**0.711468**	1.000000			
BLR	-0.735088	-0.676839	1.000000		
FREX	**0.712053**	0.711089	-0.673815	1.000000	
GR	**0.754082**	**0.756718**	-0.659946	0.760253	1.000000

Source: Authors' own calculations

Note:AOUT: agricultural output; ACR: agricultural credit; BLR: banks lending rate; FREX: foreign Exchange Rate; GR: economic growth

The pairwise correlation coefficients is presented in Table 3 for the relationships between agricultural output, agricultural credit, bank lending rates, foreign exchange rates, and economic growth in Nigeria. The result of agricultural output (AOUT) shows a strong positive correlation with agricultural credit (ACR) at 0.711468, suggesting that increases in credit availability are associated with higher agricultural output. Conversely, there is a strong negative correlation between agricultural output and bank lending rates (BLR) at -0.735088. This indicates that higher lending rates, which increase the cost of borrowing, discourage investment in agriculture thereby negatively impacting output.

Foreign exchange rates (FREX) also show a strong positive correlation with agricultural output at 0.712053. This suggest that favourable exchange rates, perhaps making agricultural inputs more affordable or increasing the value of exported agricultural products, can boost output. However, the volatility associated with foreign exchange could pose risks to consistent agricultural growth. For economic growth (GR), the result shows that it has a significant positive correlation with agricultural output at 0.754082, reflecting the critical role agriculture plays in Nigeria's economy. The sector's performance directly influences overall economic conditions, highlighting its importance in national economic strategies.

The correlation between agricultural credit and bank lending rates is notably negative at -0.676839, indicating that as lending rates increase, the credit available to farmers decreases. This relationship is a critical consideration for financial policies aimed at enhancing agricultural credit facilities. Agricultural credit and economic growth correlate strongly at 0.756718, reinforcing the idea that agricultural financing is a catalyst for broader economic advancement. Effective credit systems can spur significant improvements in agricultural productivity, which in turn boosts economic growth. Lastly, the correlation between foreign exchange rates and economic growth is robust at 0.760253. This highlights the influence of stable and favourable exchange rates on the broader economic environment, impacting import costs, export revenues, and general economic stability.

Considering multicollinearity, a common threshold to suspect multicollinearity in a dataset is when correlation coefficients exceed 0.8. In this analysis, although several correlations are strong, none exceed the 0.8 threshold, suggesting that multicollinearity might not be a significant problem in this dataset.. The unitroot test is presented in Table 4 to determine the degree of stationarity.

Table 4. Augmented Dickey-Fuller test statistic

Variables	Level		Firs Difference		Order
	t-Statistic	Prob.*	t-Statistic	Prob.*	
AOUT	0.599094	0.9874	-4.856358	0.0005	I(1)
CRFM	-0.938101	0.7622	-3.847982	0.0065	I(1)
BLR	-1.936839	0.3119	-6.467431	0.0000	I(1)
FREX	1.856567	0.9996	-3.832355	0.0067	I(1)
GR	-0.809046	0.8021	-2.714551	0.0834	I(1)
Test critical values: 1% level	-3.661661		-3.670170		
5% level	-2.960411		-2.963972		
10% level	-2.619160		-2.621007		

Source: Authors' own calculations

Note: AOUT: agricultural output; ACR: agricultural credit; BLR: banks lending rate; FREX: foreign Exchange Rate; GR: economic growth

The result of the unit root test based on the Augmented Dickey-Fuller (ADF) test is presented in Table 4. For agricultural output AOUT, the ADF test statistic at the level is 0.599094 with a probability of 0.9874, indicating a failure to reject the null hypothesis of a unit root at any conventional significance level. However, the first difference of AOUT shows a t-statistic of -4.856358 with a probability of 0.0005, strongly rejecting the null hypothesis. This transition from non-stationarity at level to stationarity at first difference suggests that while agricultural output data may be trending or influenced by time-dependent factors, it stabilizes when differences over time are considered.

Similarly, at the level, agricultural creditACR has an ADF statistic of -0.938101 (Prob. 0.7622), indicating non-stationarity. In the first difference, the t-statistic is -3.847982 (Prob. 0.0065), rejecting the null hypothesis of a unit root. The implication here is that agricultural credit, though variable over time, becomes stable when viewed through changes rather than absolute levels, emphasizing the dynamic nature of credit allocation policies and their effects.

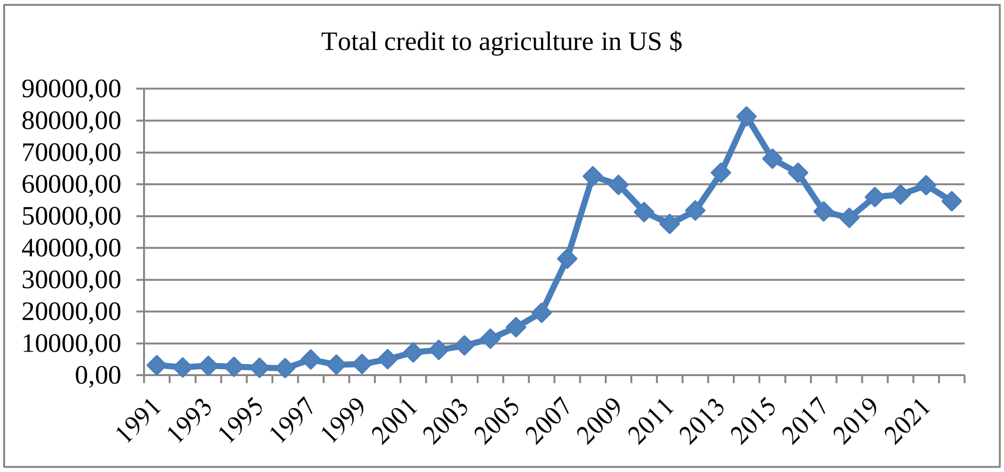
The level test for bank lending rate BLR shows a t-statistic of -1.936839 (Prob. 0.3119), which does not reject the unit root hypothesis. At first difference, the t-statistic is -6.467431 (Prob. 0.0000), strongly suggesting stationarity after differencing. This result underscores the variability of lending rates.

At level, foreign exchange rate FREX's ADF statistic is 1.856567 with a probability of 0.9996, showing strong non-stationarity. Upon differencing, the statistic is -3.832355 (Prob. 0.0067), indicating stationarity. This reflects the inherent volatility in exchange rates, impacted by various macroeconomic factors, and its implications for agricultural trade and input costs.

The ADF result at level for economic growth is -0.809046 (Prob. 0.8021), indicating non-stationarity. The first difference shows a t-statistic of -2.714551 with a probability of 0.0834, marginally failing to reject the null hypothesis at a 5% level but suggesting a move towards stationarity. This indicates that while growth rates are subject to fluctuations, these changes tend to follow a pattern that becomes apparent over time.

Overall, the stationarity achieved through differencing for all variables suggests that while the absolute values of these economic indicators are influenced by longer-term trends or cycles, their year-over-year changes are stable. This insight is crucial for developing economic policies that focus on incremental changes rather than absolute levels, particularly in areas like credit allocation to farmers, which directly impacts agricultural productivity and economic growth in Nigeria.

Figure 1 and 2 show the direction of movement of agricultural credit and economic growth in Nigeria over the coverage period of this study which is a period of 1991 to 2022.



Source: Authors' own calculations

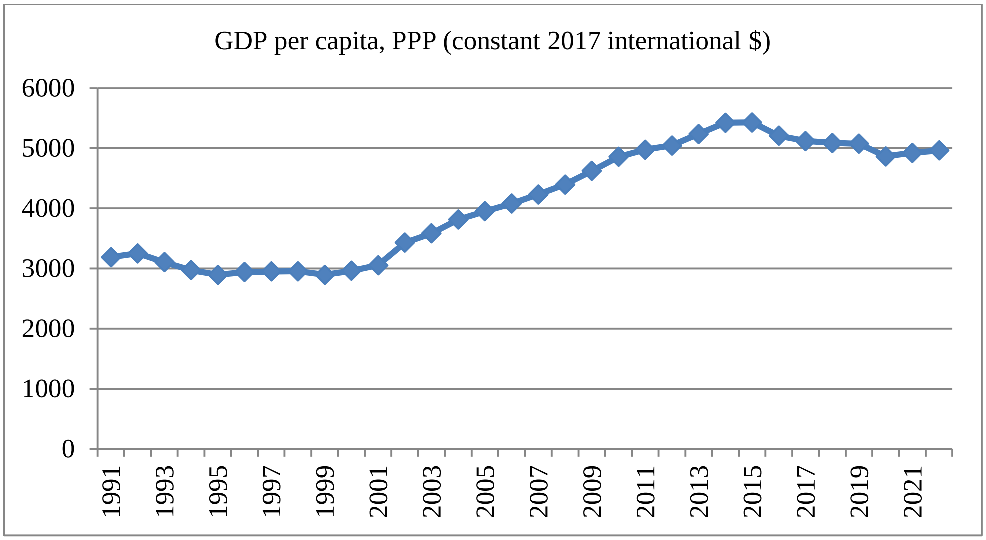
Figure 1. Trend of Agricultural credit in Nigeria

The trend in credit allocation to farmers in Nigeria from 1991 to 2022, as depicted in Figure 4.1, reflects significant fluctuations and an overall upward trajectory with some notable periods of decline.

In the early years of 1991 to 1996, agricultural credit in US Dollar shows a generally declining trend, hitting the lowest point in 1996 at 2221.58. This period could reflect an era of economic instability or stringent credit conditions which might have resulted unfavourable lending rates, or a lack of governmental focus on agricultural financing. From 1997 onwards, there is a noticeable increase in agricultural credit, peaking dramatically in 2008 at 62519.41. This increase correlates with periods of economic reform and government initiatives aimed at boosting agricultural productivity through enhanced financing. The significant jump in credit allocation from 2006 onwards can be associated with increased recognition of agriculture as a pivotal sector in Nigeria's economy, likely supported by various subsidy programmes and agricultural credit schemes introduced by the government and international donors.

However, post-2008, despite remaining significantly higher than in the early 1990s, the credit shows some instability and decline, particularly noticeable from 2014 to 2017. This could be attributed to the global financial crisis' aftershocks, fluctuations in global oil prices, and Nigeria's economic recessions, which likely tightened credit across all sectors due to increased risk aversion among banks.

The slight recovery and fluctuations in 2018 through 2022 suggest a stabilizing effect potentially brought about by renewed policy measures, and possibly increased investment in agritech and agricultural value chains. However, the decline in 2022 to 54672.709, while still high compared to early records, might indicate emerging challenges such as increased credit risk amid economic uncertainties or shifts in policy focus away from direct credit to market-driven financing models.



Source: Authors' own calculations

Figure 2. Trend of Economic Growth in Nigeria

Figure 2, presents the trend in economic growth in Nigeria from 1991 to 2022. Over the period, economic growth exhibited a general upward trend from 1991, starting at 3188.5103, reaching a peak in 2015 at 5429.0996. This growth pattern suggests a gradual strengthening of the economy, which is often associated with increased opportunities in various sectors, including agriculture. Key periods of rapid growth, such as from 2001 to 2015, coincide with initiatives and reforms in economic policy, global oil prices, and increased foreign investment, all of which likely contributed positively to agricultural financing and output.

However, the period following 2015 shows a notable decline in economic growth, bottoming out in 2020 at 4865.0868 before a slight recovery in subsequent years. This decline can be attributed to a combination of factors including lower global oil prices, economic recessions, and policy challenges. The decline in economic growth during these years could have had a stifling effect on the availability of agricultural credit, as financial institutions may have become more risk-averse, potentially leading to tighter credit conditions. This is particularly impactful in agriculture, where access to credit is crucial for purchasing inputs, investing in machinery, and other operational needs.

Moreover, the fluctuations in economic growth rates reflect broader macroeconomic stability or instability, which directly affects investment confidence among banks and other financial institutions. In periods of declining growth, banks may tighten lending criteria, reducing the availability of loans to sectors perceived as risky, such as agriculture which is often vulnerable to factors beyond economic trends such as weather conditions and global commodity price shifts.

For farmers in Nigeria, these economic conditions mean that access to necessary financial resources through bank credit can be highly variable, influenced by broader economic health. A robust economy typically enhances credit flow to agriculture, underpinning expansions and increased agricultural productivity. In contrast, economic downturns may force farmers to rely more on personal funds or informal credit sources, which may not be sufficient or sustainable.

4.2 Empirical Analysis

The first model captures the effect of agricultural credit on agricultural output in Nigeria. The result of analysis of the objective is presented as follows:

Table 5. Fully Modified Least Squares Estimates of Agricultural Credit on Agricultural Output

Dependent Variable: LOG(AOUT)				
Method: Fully Modified Least Squares (FMOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACR	1.43E-05	2.61E-06	5.475059	0.0000
BLR	-0.004200	0.017310	-0.242658	0.8101
FREX	0.002139	0.000610	3.507330	0.0016
C	8.406893	0.397926	21.12676	0.0000
R-squared	0.914955			
Adjusted R-squared	0.905505			
Long-run variance	0.064033			

Source: Authors' own calculations
Note: AOUT: agricultural output; CRFM: agricultural credit; BLR: banks lending rate; FREX: foreign Exchange Rate

The estimated coefficients from the Fully Modified Least Squares (FMOLS) shows that the coefficient for agricultural credit (ACR) (β = 1.43E-05; t = 5.475059; Pr(0.05) = 0.0000) is positive and statistically significant at the 5% level, indicating that an increase in agricultural credit is associated with higher agricultural output. The magnitude of the coefficient suggests a small but statistically significant positive relationship between credit availability and agricultural productivity. This finding underscores the crucial role of credit access in enabling farmers to invest in inputs, technology, and infrastructure, ultimately leading to increased agricultural output and potentially economic growth in the sector.

The coefficient for Banks' Lending Rates (BLR) (β = -0.004200; t = -0.242658; Pr(0.05) = 0.8101) is negative but statistically insignificant at the 5% level, suggesting that changes in lending rates do not have a significant impact on agricultural output in Nigeria during the period under study. The small magnitude of the coefficient implies that even if there were a significant relationship, it would be economically negligible.

The coefficient for foreign exchange rates (FREX) (β = 0.002139; t = 3.507330; Pr(0.05) = 0.0016) is positive and statistically significant at the 5% level, indicating that an increase in foreign exchange rates is associated with higher agricultural output. The size of the coefficient suggests a moderate positive relationship between exchange rate fluctuations and agricultural productivity. This result aligns with economic theory, as a higher exchange rate may lead to increased competitiveness of agricultural exports and reduced input costs, thereby stimulating agricultural output.

The constant term (C) (β = 8.406893; t = 21.12676; Pr(0.05) = 0.0000) is positive and highly statistically significant at the 5% level, indicating that even in the absence of credit, lending rates, or exchange rate fluctuations, there is a substantial baseline level of agricultural output in Nigeria. This constant represents the intercept of the regression line and captures other factors not included in the model that contribute to agricultural output, such as technological advancements, weather conditions, and government policies.

The R-squared value of 0.914955 indicates that approximately 91.5% of the variation in agricultural output can be explained by the independent variables included in the model. The adjusted R-squared value of 0.905505, which accounts for the number of predictors in the model, suggests that the model's explanatory power remains high even after adjusting for degrees of freedom. The long-run variance of 0.064033 represents the variance of the regression coefficients, indicating the stability of the estimates over time.

Overall, these results underscore the importance of credit access and foreign exchange rate stability in driving agricultural output in Nigeria. Policymakers should focus on enhancing credit availability to farmers and maintaining stable exchange rates to promote sustained agricultural productivity and economic growth in the country.

The second model estimates the effect of agricultural credit on agricultural output. The result of analysis of the objective is presented as follows:

Table 6. Fully Modified Least Squares Estimates of Agricultural Credit on Economic Growth

Dependent Variable: LOG(GR)				
Method: Fully Modified Least Squares (FMOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRFM	8.40E-06	9.90E-07	8.480264	0.0000
BLR	0.004526	0.006563	0.689653	0.4963
FREX	0.000326	0.000231	1.409946	0.1700
C	7.897722	0.150862	52.35050	0.0000
R-squared	0.908310			
Adjusted R-squared	0.898123			
Long-run variance	0.009204			

Source: Authors' own calculations

Note: GR: economic growth; ACR: agricultural credit; BLR: banks lending rate; FREX: foreign Exchange Rate

As displayed in Table 6, the coefficient for agricultural credit (CRFM) (β = 8.40E-06; t = 8.480264; Pr(0.05) = 0.0000) is positive and highly statistically significant, indicating a robust relationship between agricultural credit and economic growth. This positive coefficient suggests that an increase in agricultural credit is linked to enhanced economic growth, reflecting the pivotal role of the agricultural sector in driving economic development in Nigeria. The statistical significance and size of this coefficient highlight the importance of facilitating access to credit for farmers to stimulate broader economic activity and growth.

The coefficient for Banks' Lending Rates (BLR) (β = 0.004526; t = 0.689653; Pr(0.05) = 0.4963) is positive but not statistically significant at the 5% level. This insignificance suggests that variations in banks' lending rates does not have a meaningful direct impact on economic growth within the period analyzed. The coefficient for Foreign Exchange Rates (FREX) (β = 0.000326; t = 1.409946; Pr(0.05) = 0.1700) is positive but statistically insignificant at the 5% significance level, suggesting that fluctuations in the foreign exchange rate does not have a statistically robust impact on economic growth.

: The constant term (C) (β = 7.897722; t = 52.35050; Pr(0.05) = 0.0000)is significantly positive, indicating a strong baseline level of economic growth independent of the variables included in the model. This suggests that other unmodeled factors, such as government policies, global economic conditions, and technological advancements, play a crucial role in driving economic growth in Nigeria.

The R-squared value of 0.908310 indicates that about 90.8% of the variability in economic growth is explained by the model, which is quite high, demonstrating the strong explanatory power of the included variables. The adjusted R-squared of 0.898123 adjusts for the number of predictors and still shows a high value, confirming that the model effectively captures the dynamics influencing economic growth. The long-run variance of 0.009204 signifies a stable estimate variance, ensuring confidence in the long-term applicability of the model findings.

Overall, the analysis suggests that increasing agricultural credit significantly contributes to economic growth in Nigeria, highlighting the importance of supporting the agricultural sector through targeted financial policies. Despite the minimal direct impacts of lending rates and exchange rates, the overarching influence of agricultural credit on economic growth underscores its importance in policy formulations aimed at economic development.

In the analysis of the causality relationship among agricultural credit, agricultural output and economic growth, the following Table presented the Granger causality test result.

Table 7. Causality among Agricultural Credit, Agricultural Output and Economic Growth

Pairwise Granger Causality Tests			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
ACR does not Granger Cause GR	30	0.77826	0.4700
GR does not Granger Cause ACR		7.72248	0.0024
AOUT does not Granger Cause GR	30	0.89828	0.4200
GR does not Granger Cause AOUT		1.19725	0.3188
AOUT does not Granger Cause ACR	30	2.67483	0.0886
ACR does not Granger Cause AOUT		0.19369	0.8251

Source: Authors' own calculations.
Note: GR: economic growth; CRFM: agricultural credit; AOUT: agricultural output

The Granger causality tests presented in Table 7 captures the relationships among agricultural credit (ACR), agricultural output (AOUT), and economic growth (GR) in Nigeria. The test of causality between agricultural credit CRFM and economic growth GR(Obs = 30; F-Statistic = 0.77826; Prob. = 0.4700) suggests that fluctuations in agricultural credit do not statistically predict changes in economic growth. The probability value indicates that the null hypothesis cannot be rejected at conventional significance levels, implying that, historically, credit provision to farmers does not predict economic growth over the observed period. The test of causality between economic growth GR and agricultural credit CRFM (F-Statistic = 7.72248; Prob. = 0.0024): In contrast, economic growth significantly predicts changes in agricultural credit. The low probability value leads to rejecting the null hypothesis, indicating a unidirectional causality from economic growth to agricultural credit. This suggests that as the economy grows, more resources or better conditions leading increased credit availability for farmers.

The test of causality between agricultural output AOUT and economic growth GR (Obs = 30; F-Statistic = 0.89828; Prob. = 0.4200) indicates that agricultural output does not predict economic growth. The probability value is high, suggesting that increases or fluctuations in agricultural output do not lead to detectable changes in the broader economic growth. Similarly, the test of causality between economic growth GR and agricultural output AOUT (F-Statistic = 1.19725; Prob. = 0.3188) revealed that economic growth does not predict changes in agricultural output. The relationship appears to be non-causal.

The test of causality between agricultural output AOUT and agricultural creditACR (Obs = 30; F-Statistic = 2.67483; Prob. = 0.0886) shows that while the probability value is somewhat lower, suggesting a closer relationship, it still does not reach conventional levels of statistical significance ($p < 0.05$). This result implies that agricultural output does not sufficiently predict changes in credit provided to farmers.

The test of causality between agricultural creditACR and agricultural output AOUT (F-Statistic = 0.19369; Prob. = 0.8251) shows that the probability value strongly supports the null hypothesis, indicating that agricultural credit does not predict agricultural output.

The causality test results underscore the complex interplay between economic growth, agricultural credit, and agricultural output. The significant unidirectional causality from economic growth to credit suggests that improving the general economic conditions indirectly benefit the agricultural sector by increasing credit availability. However, the absence of causality from credit to economic growth or agricultural output indicates that simply increasing credit might not be sufficient to boost growth or output without addressing other limiting factors in the agricultural sector.

5. Discussion, Conclusion and Recommendations

This study employed the Fully Modified Ordinary Least Squares (FMOLS) estimation technique and Granger causality analysis after conducting preliminary tests, including descriptive statistics, multicollinearity checks, and stationarity tests. The first objective of the study, which examines the impact of agricultural credit on agricultural output in Nigeria, reveals that agricultural credit (β = 1.43E-05; t = 5.475059; p-value = 0.0000) has a positive and statistically significant effect at the 5% level. This indicates that an increase in agricultural credit is associated with a higher agricultural output. On the other hand, banks' lending rates (β = -0.004200; t = -0.242658; p-value = 0.8101) show a negative but statistically insignificant effect at the 5% level, suggesting that changes in lending rates do not significantly affect agricultural output in Nigeria. Foreign exchange rates (FREX) (β = 0.002139; t = 3.507330; p-value = 0.0016) have a positive and statistically significant effect, implying that higher foreign exchange rates are associated with increased agricultural output.

These findings on agricultural credit align with previous research, such as Ekwere and Edem (2014), who found that access to agricultural credit positively influences agricultural production, and Ita, Owui, Dunsin, and Ita (2020), who demonstrated the significant impact of loans and advances on agricultural output. Similarly, Uremadu, Ariwa, and Uremadu (2017) highlighted that agricultural output in Nigeria is responsive to changes in government agricultural expenditure, exchange rates, and banking sector credit to agriculture.

The second objective, which explores the effect of agricultural credit on economic growth in Nigeria, shows that agricultural credit (ACR) (β = 8.40E-06; t = 8.480264; p-value = 0.0000) has a positive and statistically significant impact on economic growth, suggesting a strong relationship between agricultural credit and economic growth. However, banks' lending rates (BLR) (β = 0.004526; t = 0.689653; p-value = 0.4963) and foreign exchange rates (FREX) (β = 0.000326; t = 1.409946; p-value = 0.1700) are positive but statistically insignificant at the

5% level, indicating that fluctuations in lending rates and foreign exchange rates do not significantly affect economic growth during the study period. The positive relationship between agricultural credit and economic growth is consistent with the findings of Hussain and Junaid (2012), who observed a significant positive impact of past credit growth on bank credit growth in Cuba. Similarly, Mukasa, Simpasa, and Salami (2016) showed that relaxing credit constraints in Ethiopia's agricultural sector could lead to significant productivity gains. Zakaria, Jun, and Khan (2019) also demonstrated that financial development positively impacts agricultural productivity in South Asia.

The third objective, which examines the causality between agricultural credit, agricultural output, and economic growth in Nigeria, reveals a significant unidirectional causality running from economic growth to agricultural credit (F-statistic = 7.72248; p-value = 0.0024). This suggests that improvements in the general economy increase the availability of agricultural credit. The absence of causality from agricultural credit to economic growth or agricultural output implies that increasing credit alone is insufficient to stimulate growth or output without addressing other constraints within the agricultural sector. This finding is consistent with Hussain and Junaid (2012), who found that GDP growth and past credit growth significantly impact the growth of bank credit.

This study provides a robust analysis of the effects of agricultural credit on agricultural output and economic growth in Nigeria, emphasizing the essential role of agricultural credit in fostering economic development. The FMOLS analysis indicates that agricultural credit has a positive and significant effect on both agricultural output and economic growth. However, while the effect of banks' lending rates on these variables was negative, it was statistically insignificant. The Granger causality tests suggest a unidirectional causality from economic growth to agricultural credit, implying that a stronger economy results in increased credit availability for farmers. Based on these findings, the study recommends policies aimed at improving access to agricultural credit. For example, the Nigerian government could implement subsidy programs to reduce interest rates on agricultural loans, making borrowing more attractive for farmers. Establishing credit guarantee schemes, like those in the United States, could protect banks from defaults and encourage lending to the agricultural sector. Expanding agricultural insurance programs to mitigate farming risks and promoting financial literacy among farmers, as seen in South Korea, could enhance farmers' creditworthiness and their ability to effectively use borrowed funds. Additionally, flexible repayment terms aligned with agricultural cycles, as implemented in Kenya and Uganda, could help farmers manage loan repayments, reduce defaults, and encourage greater loan uptake.

Future research could explore the long-term impacts of agricultural credit on productivity and economic growth using panel data to capture changes over time and across different agricultural sectors. Comparative studies of various credit facilities, such as microfinance versus commercial bank loans, could provide valuable insights into the most effective credit structures for the agricultural sector. Furthermore, investigating the role of microfinance institutions in agricultural financing, compared to traditional banks, could offer important policy insights for enhancing access to agricultural credit.

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