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EFFECT OF CREDIT POLICIES ON AGRICULTURAL PRODUCTION IN NIGERIA (1980 - 2022)

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ABSTRACT

The purpose of study is to analyze the effect of credit policies on agricultural production in Nigeria. The study examined the effect of deposit money bank credit, government credit, agricultural credit and interest rate on agricultural production in Nigeria. Ex-post facto research method was used to explore the relationship between credit policies and agricultural production in Nigeria. The data used was sourced from Central Bank of Nigeria Statistical Bulletin and other secondary sources from 1980 to 2022. The study employs Augmented Dickey-Fuller unit root (ADF), Johansen co-integration test and Vector Error Correction Model (ECM) as method of data analysis. The findings reveal notable patterns in the dynamics of credit and agricultural production. Agricultural production (β = 1.000000) exhibits a strong positive long-term relationship with itself, suggesting persistent influences on future agricultural production based on historical values. Bank credit (β = 0.135818), to agriculture is identified to have a significant positive long-term relationship, gradually building over time. Conversely, credit by the government (β = -146.7930), though negatively related in the long run, lacks statistical significance, indicating a less well-defined influence. The agricultural credit guarantee fund scheme (β = 0.700015) demonstrates a significant positive long-term relationship, implying its potential to boost agricultural production. However, interest rates (β = -39543.53), while showing a negative relationship, were statistically insignificant in the long run, indicating a need for further investigation into their impact on agricultural production. It is concluded that bank credit and agricultural credit guarantee fund scheme positively have long-term significant effect on agricultural production. It is recommended among others that bank should implement proactive bank credit policies that support gradual and sustainable increases in credit to the agricultural sector. This includes regular reviews and adjustments to lending practices to ensure that credit to agriculture continues to build gradually over time, stimulating agricultural growth and development.

1.0 INTRODUCTION

Credit policies are crucial in regulating the distribution of credit to individuals and businesses, with the goal of promoting fiscal stability, economic growth, and responsible borrowing. These policies, often implemented by the Central Bank and government agencies, define the conditions, interest rates, and eligibility criteria for loans. In Nigeria, credit policies have faced challenges, particularly in the agricultural sector, where inadequate financing has hindered growth (Johnson and Smith, 2018). Despite efforts like the Agricultural Credit Guarantee Scheme Fund (ACGSF), the sector still struggles with low bank credit access, leaving farmers reliant on informal funding sources. Historical issues with inconsistent policies and bureaucratic inefficiencies have slowed progress, but the government has continued to provide credit through various agencies to support agricultural production (Udoka, Mbat, and Duke, 2016).

The relationship between the banking sector and agriculture in Nigeria has been contentious, despite agriculture's significant role in the economy. Agriculture provides food, raw materials, employment, and contributes to industrial growth (Ahmad, Chani, and Afzal, 2018). However, the banking sector's failure to meet the credit needs of farmers, especially small-scale producers, has limited agricultural development. Government credit programs have been introduced to address this gap, though political instability, corruption, and inefficiencies have undermined their effectiveness (Echo et al., 2022). The Agricultural Credit Guarantee Scheme Fund (ACGSF) was created in 1977 to encourage bank lending to farmers by offering loan guarantees. Since its inception, it has facilitated billions in loans, but the sector still faces numerous challenges, such as limited access to modern farming techniques and infrastructure.

Despite these challenges, agricultural credit remains essential for enhancing productivity and addressing food security. Access to formal credit enables farmers to purchase inputs, adopt modern technologies, and expand their activities. However, many Nigerian farmers struggle with complex loan application processes, high collateral requirements, and risk-averse banks, making it difficult for them to access credit (Central Bank of Nigeria, 2017). Government interventions like the ACGSF aim to bridge this gap, but systemic inefficiencies hinder their success. When farmers are able to access formal credit, studies have shown improvements in agricultural output, with higher yields and incomes (Adebisi et al., 2023).

. This highlights the potential for credit to drive growth in the sector, provided that access barriers are reduced and financial support is more effectively distributed. While past studies have highlighted challenges in agricultural finance, this research seeks to address the gap by evaluating how specific credit policies impact agricultural growth, identifying obstacles to credit access, and offering recommendations to strengthen financial support for the sector.

OBJECTIVES OF THE STUDY

The main objective of this study is to evaluate the effect of credit policies on agricultural production in Nigeria. The specific objectives are to:
examine the effect of deposit money bank credit on agricultural production in Nigeria
determine the effect of government credit on agricultural production in Nigeria
assess the effect of agricultural credit guarantee scheme fund on agricultural production in Nigeria.
examine the effect of interest rate on agricultural production in Nigeria
examine the factor that influence credit supply to beneficiaries in the study area.

This study is significant as it will provide Nigerian farmers, agribusiness professionals, and policymakers with a deeper understanding of government agricultural financing policies and their implications. It will highlight the current status of agricultural credit in Nigeria, its impact on agricultural production, and the need for increased funding. By examining small-scale farmers' access to credit, the study contributes to existing literature and offers valuable insights for future policy development. Additionally, it will serve as a resource for future research on agricultural credit's role in enhancing production at the state level.

2.0 LITERATURE REVIEW

THEORETICAL FRAMEWORK

THEORY OF FINANCIAL INTERMEDIATION

The Theory of Financial Intermediation, proposed by Eugene F. Fama and Michael C. Jensen, highlights the crucial role of financial intermediaries like banks and credit unions in channeling funds from savers to borrowers. These intermediaries aggregate savings and extend loans, promoting investment, consumption, and economic growth (Diamond and Dybvig, 1983). They also perform risk transformation, liquidity provision, and information aggregation, which enhances capital allocation and reduces information asymmetries. In the context of agricultural production in Nigeria, this theory helps explain how credit provision by intermediaries, influenced by interest rates, can impact agricultural output and identify opportunities to improve credit access for farmers.

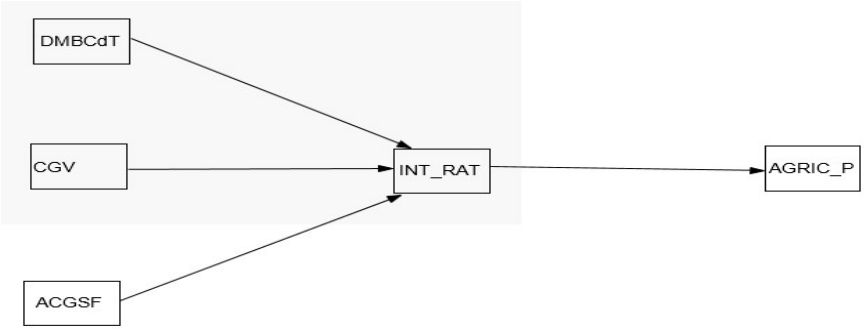
CREDIT CHANNEL THEORY

The Credit Channel Theory was introduced by Ben S. Bernanke and Mark Gertler, the Credit Channel Theory explores how changes in credit availability and conditions, such as interest rates and lending standards, influence economic activity.

The theory posits that tighter credit conditions can reduce borrowing, leading to lower investment and economic activity, while easier conditions can stimulate growth (Allen and Gale, 2000). In relation to agricultural production in Nigeria, this theory suggests that changes in credit availability, particularly from banks and government credit programs, directly affect farmers' ability to access funding for inputs and land, ultimately influencing their production decisions. The theory provides a framework for analyzing the impact of credit policies on agricultural output and rural development.

CONCEPTUAL FRAMEWORK

This subsection examine the concept of access to finance and the concept of agricultural production in Nigeria. Figure 1 shows a Schema which illustrates the relationship between the identified independent and the dependent variables of the study.



DMBCdT= Deposit money bank credit, CGV = Credit by government, ACGSF = Agricultural credit guarantee scheme fund, INT_RAT = Interest rate, AGRIC_P = Agricultural production

Figure 1: Conceptual Framework

In the schema, Deposit money bank credit, Government Spending, Agricultural Credit Guarantee Scheme Fund are the major independent variables while interest rate is the control variable which moderates the effects of these variables on the dependent variables which is agricultural production**.**

CONCEPT OF CREDIT

Credit is a crucial financial instrument that allows individuals, businesses, and governments to obtain funds for diverse purposes without making immediate payments (World Bank, 2018). It entails borrowing money or goods with a commitment to reimburse the lender at a later date, often with an additional fee or interest. The concept of credit is foundational to modern economies as it supports economic activities such as consumption, investment, and production. Credit comes in different forms, including loans, credit cards, mortgages, and lines of credit, each customized to fulfil specific financial needs and goals (Armendáriz and Morduch, 2010). Businesses rely on credit to finance operations, expand production capacities, and invest in research and development (Beck, Demirgüç-Kunt and Levine, 2007). Additionally, credit supports consumption by enabling individuals to make purchases beyond their immediate means, thereby fueling demand and fostering economic growth. However, it is essential to balance the availability of credit with responsible lending practices to avoid excessive debt accumulation and financial instability.

CONCEPT OF CREDIT POLICIES

Credit policies are the fundamental rules and principles set by financial institutions and government entities to regulate the disbursement of credit to individuals and businesses within a specific economy. These policies define the parameters for loan provision, including elements such as the setting of interest rates, eligibility requirements, and risk assessment systems. The primary goal of these entities is to encourage the adoption of responsible and sustainable lending practices while simultaneously promoting financial stability and stimulating economic growth (Beck and Cull, 2014). Credit policies are typically formulated through collaborative efforts with governmental bodies to ensure alignment with overarching economic goals. Government involvement ensures that credit policies are designed to effectively serve social and economic objectives, with a specific focus on promoting equitable access to credit for marginalized segments of the population

AGRICULTURAL FINANCING

A) AGRICULTURAL CREDIT GUARANTEE SCHEME FUND (ACGSF)

The Agricultural Credit Guarantee Scheme Fund (ACGSF), established by Decree No. 20 of 1977 and commenced operations in April 1978, had an original share capital and paid-up capital of One Hundred Million naira (N100 million) and N85.6 million, respectively. The Federal Government holds 60 percent of the shares, and the Central Bank of Nigeria holds 40 percent (Isiorhovoja and Chukwuji, 2009). In March 2001, the capital base of the scheme was increased to N3 billion. The fund guarantees credit facilities extended to farmers by banks, covering up to 75 percent of the amount in default net of any realized security.

B) DEPOSIT MONEY BANK CREDIT

Throughout history, commercial banks have served the role of obtaining funds either through acquisition of deposits or direct capital accumulation, on the one hand and making such funds available by sending them to users for productive purposes on the other (Okorji and Mejeha, 2018). In doing so, the commercial banks charge a differential between acquisitions and lending, which in the aggregate is sufficient to compensate for business expenses, such as losses that may be incurred, and an adequate return in capital investment. In a real sense, the commercial banks are involved in the redistribution of wealth and a fundamental form of resources allocation. Bank plays an intermediate role in the economic growth and development of any nation. This involves deposit mobilization and credit allocation.

C) CREDIT BY GOVERNMENT

Investing in agriculture is widely recognized as one of the most effective strategies for reducing poverty and hunger while promoting sustainability, as highlighted in the State of Food and Agriculture 2012 report (FAO, 2012). Despite this recognition, the share of agriculture in government expenditure is declining in many countries, indicating a concerning trend. The agriculture orientation index (AOI), as mentioned by UNCTAD in 2016, serves as a measure to assess the extent to which government expenditures on agriculture reflect the importance of agriculture in the overall economy. This index is a valuable tool for evaluating the government's prioritization of agriculture in national budgets and expenditure. Between 2001 and 2019, data from the Food and Agriculture Organization (FAO) demonstrates a steady increase in the global share of agriculture in government expenditure, rising from 1.63 percent in 2001 to 1.71 percent in 2010 and 2.12 percent in 2019. The total government spending on agriculture is estimated to be about USD 413 billion in 2010 and USD 613 billion in 2019, equivalent to roughly 18 percent of the global agriculture value added.

AGRICULTURAL PRODUCTIVITY

Agricultural productivity refers to the output of agriculture in terms of inputs, such as capital and labor, and is essentially the efficiency of the farm. It can be measured as the ratio of agricultural outputs to agricultural inputs, as explained by Zepeda (2007). While individual products are typically measured by weight, the differing densities make measuring overall agricultural output challenging. As a result, market value of final output is often used as the measure of output, excluding intermediate products such as corn feed used in the meat industry. This output value may be compared to various types of inputs, such as labor and land (yield), resulting in partial measures of productivity. Another way to measure agricultural productivity is through total factor productivity (TFP), which compares an index of agricultural inputs to an index of output. TFP was developed as a method to address the limitations of partial measures of productivity, and changes in TFP are often attributed to technological improvements (Zepeda, 2007).

REVIEW OF RELATED EMPIRICAL STUDIES

EFFECT OF DEPOSIT MONEY BANK CREDIT ON AGRICULTURAL PRODUCTION IN NIGERIA

Anyebe (2007) carried out a study on commercial bank lending and agricultural development in Benue State with particular reference to Union Bank of Nigeria Plc Makurdi. The objective of the study was to determine the impact of commercial bank lending on the growth of agriculture in Benue State. Both primary and secondary sources were used for data collection. Regression analysis was used for the establishing the relationship between the dependent and the independent variables of the study. The finding of the research revealed that commercial bank credits contribute to the growth of agriculture in the study area in the area of production and increase in output. It was recommended that commercial banks should allocate more of their funds as credit to the agricultural sector since leads to increase in output and the overall production.

Otu and Balogun (1991) examined credit policies and agricultural development in Nigeria tested two hypotheses that credit policies influence to a large extent the behaviour of both constitutional lenders and borrowers that is credit policies can influence favourably the supply and demand for agricultural credit. Secondly, that a positive relationship exists between agricultural credit and a host of other variables such as output and use of modern inputs. Empirically they concluded that credit policies play very little role in influencing both lenders and borrowers' behaviour. Credit subsidies are also major sources of production disincentive. They further contended that there is need to examine the overall objective of agricultural credit policies largely because it will be erroneous to infer that finance plays little role in agricultural development of the economy.

EFFECT OF GOVERNMENT SPENDING ON AGRICULTURAL PRODUCTION IN NIGERIA

Using time series data, Lawal (2011) determined the amount of federal government expenditure on agriculture in the thirty-year period (1979 – 2007). Using trend analysis and a simple linear regression, the study showed that agricultural spending does not follow a regular pattern and that the contribution of the agricultural sector to the GDP is in direct relationship with government funding to the sector. The simple linear equation approach he used may not be able to handle the complex relationship between government expenditure and agricultural productivity

Ihugba *et al* (2013) empirically analyzed the relationship between Nigeria government expenditure on the agricultural sector and its contribution to economic growth, using time series data from 1980 to 2011. They employed the Engle-

Granger two step modeling (EGM) procedure to co-integration based on unrestricted Error Correction Model and Pair wise Granger Causality tests. From the analysis, their findings indicated that agricultural contribution to Gross Domestic Product and total government expenditure on agriculture are cointegrated. Therefore, they concluded that any reduction in government expenditure on agriculture would have a negative repercussion on economic growth in Nigeria. The relationship between government expenditure and GDP may occur through many links. Therefore, single equation model as specified in this study may not be able to capture the various links (Greene, 2012). This may also cast doubt on the estimated results from this study.

Anthony (2010) carried out an empirical analysis of credit supply and agricultural output in Nigeria. The study uses time series data that span a period of twenty-three years (1986-2008). The study specifies a multiple regression Longliner Model (based on the theoretical framework of Cobb-Douglas production function) with four explanatory variables, these are; Bank loans and advances, Government capital expenditure on agriculture and Agricultural credit guarantees scheme and foreign investment on agriculture. The study also made use of the OLS method to test the significance of the explanatory variable on output of agricultural sector in Nigeria. The result revealed that except the foreign direct investment, other variables expressed significant influence on agricultural output in Nigeria; the researcher concludes that, there is need to enhance and monitor credit supplied for agricultural purpose to effectively attain the expected growth in the sector.

EFFECT OF AGRICULTURAL CREDIT GUARANTEE SCHEME FUND ON AGRICULTURAL PRODUCTION IN NIGERIA.

Akaninyene and Sunday (2017), used multiple linear regression of ordinary least squares to examine the relationship between the ACGSF and the output of the crop sector in Nigeria, livestock and fishery measured by respective gross domestic product. Findings revealed a positive and significant relationship between ACGSF and the agricultural sector development evaluated by the sustained rise in its contribution to GDP and that the scheme has given more funds and impacted more in the crop sector over the livestock and fishery sector. The study recommended that the scheme should be sustained and the government should invest more in agricultural development and measures should be put in place by the management of the scheme to reduce default in payment arising from borrowers.

Zakaree (2014) studied on the impact of agricultural credit guarantee scheme fund (ACGSF) on domestic food supply in Nigeria using secondary data and the ordinarily least square approach to test the hypothesis, revealed that there had been an increase in the trend of agricultural credits guarantee funds to the farmers and changes in the agricultural credit guarantee fund to the farmers has a positive and significant impact on domestic food supply. The study recommended that government should encourage agri-business and graduates be equipped to practice scientific farming. The weakness of this study lies in the fact that it is limited to only domestic food.

Onwumere, Imo and Ihegboro (2012) looked at the impact of ACGSF on the productivity of three agricultural sub-activities (i.e. Crops, livestock and fishing) and found out that, there exist a positive impact between the scheme and the productivity of the three sub-activities mentioned using multiple regression analysis. The study determined the effect of ACGSF extended to the three agricultural sub sectors on the output of crops, livestock, and fishing, leaving out forestry. Studies abound on the impact of agricultural Credit Guarantee Scheme Fund (ACGSF) extended to agricultural sub sectors on Agricultural productivity, but there is no consensus as regards the relationship between the two variables because most researchers have ascertained that the Scheme have impacted positively on the productivity of crop production only while having a negative impact on Livestock and fishery production.

Isijola (2018) using Pearson Correlation Coefficient revealed a significant relationship between credit supply and agricultural productivity in Nigeria. He identified commercial banks' loans and advances, Agricultural Credit Guarantee Scheme as the determinant of agricultural credit supply in Nigeria. The study could not explain the level of impact the credit from this scheme has on the output of the four major sub activities of agriculture.

Ayunku and Etale (2015) investigated the effect of agriculture spending on economic growth in Nigeria from 1977 to 2010 with particular focus on sectoral expenditure analysis. The study employed Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root tests, as well as Johansen Cointegration and followed by Error Correction Model (ECM) tests. Their empirical results indicated that Real GDP was particularly influenced by changes in Agriculture Expenditure (AGR), Inflation Rate (INF), Interest Rate (INT) and Exchange Rate (EXR), these variables as they stand contribute or promote economic growth in Nigeria. Accordingly, they recommended amongst others things that government should increase spending on agriculture. However, in their study they failed to account for the fact that the impact of agricultural public expenditure may not be instantaneous (it may materialize with lag) and this may cast doubt on the estimates derived from the study.

3.0 METHODOLOGY

RESEARCH DESIGN

The study adopted ex-post facto research design to determine effect of access to finance on agricultural production in Nigeria. Ex post facto research design uses secondary data to evaluate events that had already taken place in the past which the researcher has no power to manipulate and is interested in investigating.

STUDY AREA

Nigeria, being the study area, is one of the 54 countries in Africa, located in the West African region (World Bank, 2023). It lies between latitudes 4° and 14° North and longitudes 2°02′ and 14°30′ East of the Greenwich Meridian (NPC, 2022). The country has 36 states and FCT Abuja; with an area of 923,768 square km (356,669 square miles), a coastal state on the shores of the Gulf of Guinea with Benin to the west, Niger to the north, Chad to the northeast, and Cameroon to the east and southeast (National Bureau of Statistics [NBS], 2023).

SOURCE OF DATA

Data was sourced from secondary sources; mainly from Central Bank of Nigeria Statistical Bulletin 2022, Nigeria Exchange Group sources and Central Bank of Nigeria Annual Report, 1980-2022 and National Bureau of Statistics.

METHOD OF DATA COLLECTION

The study used only secondary data that was extracted from the annual report and statement of account of commercial banks, CBN and from the Nigeria Bureau of Statistics using content analysis from 1980 – 2022

VARIABLE SPECIFICATION

A. INDEPENDENT VARIABLE

i. Deposit money bank credit to the agricultural sector: Total funds extended to the agricultural sector by the deposit money banks within the period under study. It is also known as the aggregate funding given by government to the agricultural sector in naira by the deposit money banks within the period under study.

ii. Agricultural Credit Guarantee Scheme Fund: Total funds extended to the agricultural sector by Agricultural Credit Guarantee Scheme Fund within the period under study. The total fund was measured in Naira.

B. DEPENDENT VARIABLES: AGRICULTURAL PRODUCTION

Agricultural production is proxied as the total output of crops and livestock in naira of all the agricultural production in Nigeria with a given year (1982-2022).

MODEL SPECIFICATION

Guided by the functional relationship between the variable of the study, the following implicit relationship exist between them as shown in equation (1) and (2):

AGP =*f* (Credit Policies)

AGP =*f* (BNC, CGV, ACG, INR) (1)

Where,

AGP = Agricultural Production (in naira)

BNC = Credit by deposit money banks (naira)

CGV = Credit by government to Agriculture (naira)

ACG = Agricultural Credit Guarantee Scheme Funds (naira).

INR = Interest Rate (%)

The explicit form of the model is as shown follows:

$AGP = b_0 + b_1CDB + b_2CGV + b_3ACG + b_4INR + U_t$ (2)

Where,

b_0 = Constant

b_1-b_4 = Regression coefficients

U_t = Stochastic error term

A priori expectations

Credit by deposit money banks, Credit by government and Agricultural Credit Guarantee Scheme Funds are expected to have a positive effect on agricultural production in Nigeria. This is based on theoretical and empirical evidences. As such, we expect our parameter estimates to be positively signed. Interest rate is also expected to have a positive effect on agricultural production. This implies that lower interest rates would stimulate agricultural production by reducing the cost of borrowing for farmers. As regards the magnitude of the effect, there is no empirical or theoretical consensus on it, but we expect a greater effect of 50% and above.

DATA ANALYSIS TECHNIQUES

The study utilized descriptive statistics, including mean, median, and standard deviation, to explore the data's key features. For time series analysis, the research employed unit root tests, cointegration tests, and error correction analysis to model the variables' behavior accurately. E-views 10.0 software was used for data analysis. The unit root test, particularly the Augmented Dickey-Fuller (ADF) test, was conducted to check whether the time series data was non-stationary. The cointegration analysis, using Johansen's methodology, was applied to identify long-run relationships between variables. If the data was stationary at the first difference, co-integration was applied; if stationary at levels, ordinary least squares (OLS) was used for estimation.

Additionally, the Vector Error Correction Model (VECM) was applied to estimate short-term dynamics and assess how dependent variables return to equilibrium. Several diagnostic tests were carried out to ensure the model's reliability. These included the Jarque-Bera normality test, multicollinearity detection using tolerance and variance inflation factor (VIF), and auto-correlation tests using serial correlation. Furthermore, heteroskedasticity was tested using the Breusch-Pagan test to evaluate if the variance of the error terms remained constant, assuming normal distribution. These diagnostic tests ensured the robustness and accuracy of the model used in the study.

4.0 RESULTS AND DISCUSSION

This chapter presents the result of the study on the nexus between access to credit (proxied by bank credit, credit by government, agricultural credit guarantee fund scheme, interest rate) and agricultural production in Nigeria.

RESULTS

This section present the result of the diagnostic test and the error correction model analysis. The discussion of the result was presented subsequently.

DESCRIPTIVE AND TREND ANALYSIS

Table 1: Summary Statistics

	AGP (₦)	**BNK (₦)**	**CGV (₦)**	**AGF(₦)**	**INT(%)**
Mean	2597571	12242482	103342.9	4127217	17.15721
Median	145225.3	48561.50	4251.520	728545.4	17.50000
Maximum	24636684	98644226	2186405.	18326743	29.80000
Minimum	10011.50	462.2000	17.05000	24654.90	7.500000
Std. Dev.	5600821.	26758207	405760.2	5277959.	4.727526
Skewness	2.866210	1.921751	4.425442	1.057879	0.143495
Kurtosis	10.38958	5.269119	21.29710	2.968217	3.540084
Jarque-Bera	156.7110	35.69252	740.1769	8.022087	0.670180
Probability	0.145673	0.093226	0.526847	0.181014	0.715274
Observations	43	43	43	43	43

Legend: **AGP** = Agricultural Production, **BNK** = Bank Credit, **CGV** = Credit by Government, **AGF**= Agricultural Credit Guarantee Scheme Fund, **INT** = Interest Rate

The summary statistics in Table 1 offer a comprehensive overview of five variables: Agricultural Production (AGP), Bank Credit (BNK), Credit by Government (CGV), Agricultural Credit Guarantee Scheme Fund (AGF), and Interest Rate (INT). All five variables have positive means, with Bank Credit (BNK) having the highest mean, followed by Agricultural Production (AGP), Agricultural Credit Guarantee Scheme Fund (AGF), Credit by Government (CGV), and Interest Rate (INT). Similarly, the median values are also positive, with the lowest median observed in Interest Rate and Credit by Government. Bank Credit shows the highest maximum value, suggesting it holds the greatest potential, while Interest Rate has the lowest minimum value, indicating the least potential. The standard deviation is highest for Bank Credit, followed by Agricultural Production, Agricultural Credit Guarantee Scheme Fund, Credit by Government, and Interest Rate, suggesting the highest variability in Bank Credit.

Further analysis reveals that the skewness of Credit by Government (CGV) is the highest, followed by those of Agricultural Credit Guarantee Scheme Fund (AGF), Agricultural Production (AGP), Bank Credit (BNK), and Interest Rate (INT),

indicating that Credit by Government is the most skewed variable. The kurtosis values follow a similar pattern, with Credit by Government showing the highest kurtosis, suggesting a leptokurtic distribution. The Jarque-Bera test for normality, which tests the null hypothesis that data is normally distributed, yielded p-values greater than 0.05 for all variables, indicating that the data in each variable follows a normal distribution.

DIAGNOSTIC TEST

I) RESULT OF UNIT ROOT (ADF-TEST)

Table 2a: Augmented Dickey-Fuller Test (ADF)

Variables	ADF	5% Critical Value	Prob	Order of Integration
AGP	0.382959	-2.933158	0.9799	I (0)
BNK	0.792658	-2.951125	0.9924	I (0)
CGV	2.160987	-2.941145	0.9999	I (0)
AGF	4.036362	-2.954021	1.0000	I (0)
INT	-3.605050	-2.933158	0.0098	I (1)

Legend: **AGP** = Agricultural Production, **BNK** = Bank Credit, **CGV** = Credit by Government, **AGF**= Agricultural Credit Guarantee Scheme Fund, **INT** = Interest Rate

Source: Researcher's Computation, 2023.

The Augmented Dickey-Fuller Test (ADF) is a critical tool for assessing the stationarity of time series data. This is a fundamental assumption for many analyses. In this ADF result, each variable (AGP, BNK, CGV, AGF, and INT) is evaluated for stationarity using their respective ADF statistics. For AGP, BNK, CGV, and AGF, the ADF statistics are all greater than the 5% critical values, indicating that these series are not stationary (I(0)). On the other hand, the ADF statistic for INT is -3.605050, which is less than the critical value, suggesting that INT is stationary (I(1)). The next course of action would involve appropriate transformations to achieve stationarity for the non-stationary series (AGP, BNK, CGV, and AGF). Common transformations include differencing the series to make them stationary. After achieving stationarity, these time series data can be used for further analysis, such as modelling or forecasting, ensuring the fundamental assumption of stationarity is met.

Table 2b: Augmented Dickey-Fuller Test (ADF) at first difference

Variables	ADF	5% Critical Value	Prob	Order of Integration
AGP	-5.643763	-2.935001	0.0000	I (1)
BNK	-16.17983	-2.951125	0.0000	I (1)
CGV	-2.951125	-0.255414	0.0122	I (1)
AGF	-6.757146	-2.935001	0.0000	I (1)
INT	-6.263414	-2.936942	0.0000	I (1)

Legend: **AGP** = Agricultural Production, **BNK** = Bank Credit, **CGV** = Credit by Government, **AGF** = Agricultural Credit Guarantee Scheme Fund, **INT** = Interest Rate

Source: Researcher's Computation, 2023.

The Augmented Dickey-Fuller (ADF) test at first difference assesses the stationarity of the time series data for variables such as Agricultural Production (AGP), Bank Credit (BNK), Credit by Government (CGV), Agricultural Credit Guarantee Scheme Fund (AGF), and Interest Rate (INT). The results show highly negative ADF statistics and p-values of zero (0.0000) for all variables, strongly rejecting the null hypothesis of non-stationarity, confirming stationarity at the first difference (I(1)). This ensures reliable analysis and predictions for the study. At this stage, the Johansen co-integration test, was then applied using the Full Information Maximum Likelihood (FIML) method, to explore long-term co-integrating relationships among the variables, with the results presented through the Trace and Maximum Eigenvalue statistics.

B) RESULT OF CO-INTEGRATION TEST (TRACE AND MAXIMUM EIGEN VALUE)

Table 3a: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.747261	100.5276	69.81889	0.0000
At most 1	0.422890	44.13628	47.85613	0.1072
At most 2	0.194497	21.59767	29.79707	0.3214
At most 3	0.160670	12.72987	15.49471	0.1251
At most 4 *	0.126575	5.548643	3.841466	0.0185

Table 3b: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.747261	56.39132	33.87687	0.0000
At most 1	0.422890	22.53861	27.58434	0.1940
At most 2	0.194497	8.867801	21.13162	0.8430
At most 3	0.160670	7.181224	14.26460	0.4679
At most 4 *	0.126575	5.548643	3.841466	0.0185

POST DIAGNOSTICS TESTS
A) MULTICOLLINEARITY TEST

Table 4a: Correlation Matrix

	BNK	CGV	AGF	INT
BNK	1			
CGV	-0.0930	1		
AGF	-0.2491	-0.2053	1	
INT	0.0303	-0.1937	-0.1211	1

Source: Researcher's Computation, 2023.

Table 4a: Correlation Matrix: The correlation matrix presents the pairwise relationships between Bank Credit (BNK), Credit by Government (CGV), Agricultural Credit Guarantee Scheme Fund (AGF), and Interest Rate (INT). The coefficients show generally weak correlations, ranging from -0.2491 to 0.0303. The highest correlation is a weak negative relationship of -0.2491 between AGF and BNK. The low correlation coefficients indicate that the variables do not exhibit strong linear relationships, suggesting that multicollinearity is not a major issue. However, while the correlation matrix reveals linear relationships, it does not account for potential non-linear interactions between the variables, which warrants further investigation through other diagnostic tests like the Variance Inflation Factor (VIF).

Table 4b: Variance Inflation Factors

	Coefficient	**Uncentered**	**Centered**
Variable	Variance	VIF	VIF
BNK	0.001270	3.400726	2.800540
CGV	3.052652	1.650405	1.547625
AGF	0.027629	3.853714	2.370000
INT	0.051321	1.921120	1.030128

Table 4b: Variance Inflation Factors (VIF): The VIF values, both uncentered and centered, are used to assess multicollinearity in the regression model. The uncentered VIF values for BNK, AGF, and INT are relatively high, exceeding 2.0, indicating some level of multicollinearity. However, after centering the variables, the VIF values decrease, with none exceeding 3.0, suggesting that multicollinearity has been reduced. This reduction in VIF values after centering enhances the stability and reliability of the regression model's coefficient estimates. Since the centered VIF values are below the threshold of 5.0, it indicates that multicollinearity is not a serious concern, allowing for more confident and accurate regression analysis.

B) TEST FOR AUTOCORRELATION

Table 5: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	35.30590	Prob. F(2,36)	0.1932
Obs*R-squared	28.48003	Prob. Chi-Square(2)	0.0740

The Breusch-Godfrey Serial Correlation LM Test in Table 5 is used to detect autocorrelation in the residuals of a regression model. The test produces an F-statistic of 35.30590 with a p-value of 0.1932, and an Obs*R-squared value of 28.48003 with a p-value of 0.0740. Since both p-values are greater than the 0.05 significance level, we fail to reject the null hypothesis, indicating that there is no significant evidence of serial correlation in the residuals. This suggests that the assumption of independent errors holds, affirming the model's validity and reliability for making predictions without autocorrelation distorting the results.

C) TEST FOR HETEROSCEDASTICITY

Table 6: Breusch-Pagan-Godfrey Test

F-statistic	14.65564	Prob. F(4,38)	0.3555
Obs*R-squared	26.08884	Prob. Chi-Square(4)	0.1052
Scaled explained SS	75.17929	Prob. Chi-Square(4)	0.0921

The Breusch-Pagan-Godfrey test in Table 6 assesses heteroskedasticity, which occurs when the variance of the error term is not constant across observations. The test produces an F-statistic of 14.65564 with a p-value of 0.3555, an Obs*R-squared value of 26.08884 with a p-value of 0.1052, and a scaled explained SS of 75.17929 with a p-value of 0.0921. All p-values exceed the typical 0.05 significance level, leading to the conclusion that there is no strong evidence of heteroskedasticity. This result supports the assumption of homoskedasticity, implying that the variance of the error term is constant, which ensures the reliability and accuracy of the regression model's standard errors and coefficient estimates.

The Johansen cointegration analysis identifies the presence of a long-term equilibrium relationship among the variables (AGP, BNK, CGV, AGF, and INT) over the period from 1982 to 2022. Both the Trace and Maximum Eigenvalue tests reject the null hypothesis of no cointegration at the 0.05 significance level, with the results indicating at least one cointegrating equation, suggesting a long-term relationship among the variables. The consistent findings from both tests point to a single cointegrating relationship, which forms the basis for further analysis. Future research should focus on understanding this relationship for better policy-making and predictions, as well as examining short-term dynamics using Vector Error Correction Modeling (VECM) to assess how the system adjusts towards the long-term equilibrium.

RESULT OF ERROR CORRECTION MODEL ESTIMATES

Table 7: Longrun and Shortrun ECM Estimates

Longrun estimate			**Shortrun estimate**	
Cointegrating Eq:	CointEq1			
AGP(-1)	1.000000		CointEq1	-0.646200
				(0.18157)
BNK(-1)	+ 0.135818			[-6.3559]
	(0.01518)			
	[8.94724]		D(AGP(-1))	0.212452
				(0.40662)
CGV(-1)	-146.7930			[0.52248]
	(92.4163)			
	[-1.58839]		D(BNK(-1))	-0.071603
				(0.08565)
AGF(-1)	+ 0.700015			[-0.83594]
	(0.15936)			
	[4.39278]		D(CGV(-1))	-0.719923
				(26.7746)
INT(-1)	-39543.53			[-0.02689]
	(47265.6)			
	[-0.83662]		D(AGF(-1))	0.590384
				(0.53602)
				[1.10142]
			D(INT(-1))	0.153463
				(0.10333)
				[1.48514]

R-squared	0.895539
Adj. R-squared	0.658073
Log likelihood	-646.2803
Akaike information criterion	32.91401
Schwarz criterion	33.42068

Source: Researcher's Computation, 2023.

A) EFFECT OF DEPOSIT MONEY BANK CREDIT ON AGRICULTURAL PRODUCTION IN NIGERIA

The findings examining the effect of commercial bank credit on agricultural production indicates that in the longrun a positive and lasting relationship between bank credit and its lagged value implies that bank credit tends to accumulate gradually over time. This aligns with the findings of Otu and Balogun (1991), Anyebe (2007). In their studies, they emphasized the role of commercial bank credit in economic growth and agricultural development. The assertion that commercial bank credits contribute to economic growth aligns with the positive long-term relationship we observe in BNK(-1). However, it is important to acknowledge the contrasting short-run impact identified in the ECM, where an increase in BNK leads to a decrease in the current period's BNK, implying an adjustment phase. This is a noteworthy distinction from the long-run view and emphasizes the dynamics of short-term responses to changes in bank credit. Such dynamics are crucial to consider when interpreting the results in the context of policy interventions. It is possible that in the short run, an increase in bank credit might trigger adjustments or repayment dynamics before reflecting a steady increase in the subsequent periods, as indicated by the long-run relationship.

B) EFFECT OF GOVERNMENT CREDIT ON AGRICULTURAL PRODUCTION IN NIGERIA

In examining the results of the Error Correction Model (ECM) regarding Credit by Government (CGV) and relating them to the empirical studies, we find both agreement and disagreement. The ECM results indicate a negative and statistically insignificant long-term relationship between CGV and its lagged value, suggesting that the influence of government credit on itself over time is unclear. This aligns with studies like Lawal (2011), which highlights the irregular pattern of government expenditure on agriculture, implying a lack of a direct and consistent relationship between government funding (as a form of credit) and agricultural productivity. On the other hand, Ihugba et al (2013) suggest a cointegrated relationship between government expenditure on agriculture and economic growth in Nigeria. This contradicts the ECM's long-term result of a negative relationship, emphasizing the need for intricate understanding and possibly highlighting contextual variations. Regarding the short-run impact of CGV on itself, the ECM results indicate a non-significant decrease in the current CGV following an increase in its lagged first difference. While the short-run ECM result aligns with the lack of statistical significance, it does not entirely agree with the finding of Anthony (2009), who demonstrated a significant influence of government capital expenditure on agricultural output. Anthony's study suggests a positive impact of government credit (capital expenditure) on the agricultural sector, which implies a possible disagreement with the observed short-run impact in the ECM.

C) EFFECT OF AGRICULTURAL CREDIT GUARANTEE SCHEME FUND ON AGRICULTURAL PRODUCTION IN NIGERIA

There is a positive and significant long-term relationship between Agricultural Credit Guarantee Scheme Fund (AGF) and its lagged value, as evidenced by the coefficient of 0.7000 with a t-statistic of 4.3928 in the long run. This implies that the influence of AGF on itself over time is well-defined and points to a potential positive impact of AGF on the agricultural sector in the long term. In the short run, a one-unit increase in the lagged first difference of AGF leads to a 0.5904 unit increase in the current AGF, although this coefficient is not statistically significant due to a high standard error.

Several studies resonate with the positive long-term relationship observed in the ECM. Akaninyene and Sunday (2017) found a positive and significant relationship between ACGSF and the agricultural sector's development, suggesting that the scheme has a positive impact on the agricultural sector's output and growth. Similarly, Zakaree (2014) found that changes in the agricultural credit guarantee fund had a positive and significant impact on domestic food supply. These findings align with the positive long-term relationship between AGF and its lagged value observed in the ECM. However, some studies presented conflicting views. Isijola (2018) highlighted a significant relationship between credit supply and agricultural productivity but could not quantify the level of impact AGF specifically had on different agricultural sub-activities. Onwumere, Imo, and Ihegboro (2012) found a positive impact between ACGSF and crop production but suggested a negative impact on livestock and fishery production.

D) EFFECT OF INTEREST RATE ON AGRICULTURAL PRODUCTION IN NIGERIA

The results of the Error Correction Model (ECM) show a negative but statistically insignificant long-term relationship between interest rate (INT) and its lagged value (see Table 4). Specifically, in the long run, the interest rate's coefficient is -39543.53 with a low t-statistic of -0.8366, suggesting that the influence of interest rate on itself over time is not well-defined. In the short run, there is a positive relationship, with a one-unit increase in INT resulting in a 0.1535 unit increase in the current INT, although this coefficient is not statistically significant due to a high standard error. In the context of the empirical study by Ayunku and Etale (2015), their findings indicated that Real GDP was influenced by changes in Interest Rate (INT), among other variables. This implies that they agree with the short-term positive relationship observed in the ECM, where an increase in INT leads to a corresponding increase in the current INT. However, it is important to note that

Ayunku and Etale's study focused on the influence of interest rate on economic growth (Real GDP) rather than the specific dynamics captured in the ECM. While their study supports a positive relationship between INT and economic growth, the ECM results shed light on the complex short-term dynamics of this relationship, acknowledging the lack of statistical significance and emphasizing the need for further investigation into the long-term effects of interest rate on itself.

5.0 CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The study looked at how different types of credit affect agricultural production in Nigeria. It focused on bank credit, government credit, agricultural credit guarantee fund scheme, and interest rates. The results showed that bank credit and the agricultural credit guarantee fund scheme had a positive and significant long-term impact on agricultural production. This means that changes in these types of credit persist and influence future agricultural production values. However, government credit and interest rates did not have a significant long-term impact on agricultural production. In conclusion, the study found that bank credit and the agricultural credit guarantee fund scheme have a positive and significant long-term effect on agricultural production in Nigeria.

RECOMMENDATIONS

From the findings of the study, the following recommendations were made;

Government are encouraged to carry out the development and implementation of long-term agricultural production strategies that align with the observed positive long-term relationship within agricultural production. This could involve targeted investments, technological advancements, and capacity building initiatives to enhance agricultural productivity and sustainability over time.

It is recommended that bank should implement proactive bank credit policies that support gradual and sustainable increases in credit to the agriculture sector. This includes regular reviews and adjustments to lending practices to ensure that credit to agriculture continues to build gradually over time, stimulating agricultural growth and development.

It is recommended that a thorough review of existing government credit programs aimed at supporting agriculture to identify areas for improvement should be conducted. Streamline these programs to ensure their effectiveness and better alignment with the needs of the agricultural sector, addressing the observed lack of statistical significance in the long-term relationship with credit by the government

A wider participation in the Agricultural Credit Guarantee Fund Scheme and raise awareness among stakeholders about its positive long-term relationship with agricultural production is to be encouraged by the government. Additionally, it is important to consider scaling up the scheme and exploring partnerships to further strengthen its impact on agricultural productivity.

Government should align interest rate policies with the objective of promoting agricultural development. While the observed long-term relationship between interest rates and agricultural production is statistically insignificant, policymakers should consider carefully designed interest rate interventions that directly target the agriculture sector to ensure optimal borrowing conditions and promote investment in agriculture.

CONTRIBUTION TO KNOWLEDGE

The estimated error correction term (CointEq1) of approximately -0.6462 suggests a robust mechanism for adjusting deviations from long-run equilibrium, with adjustments occurring at a speed of -0.6462 units per period (see Table 5). This finding contributes to our understanding of how agricultural production responds to short-term fluctuations and deviations from its equilibrium level.

REFERENCES

1. Ahmad, D, Chani, M. I, and Afzal, A. (2018). Impact of Formal Credit on Agricultural Output: Empirical Evidence from Pakistan. *Sarhad Journal of Agriculture*, 34(3): 640-648.
2. Akaninyene, N. and Sunday, O. (2017). Examining the Relationship Between ACGSF and Crop Sector, Livestock, and Fishery Output in Nigeria: A Multiple Linear Regression Analysis. *Journal of Agriculture and Social Research (JASR)*, 8(2): 45-66.
3. Allen, F. and Gale, D. (2000). Financial Contagion. *Journal of Political Economy*, 108(1):1–33.
4. Anthony, E. (2010). Agricultural Credit and Economic Growth in Nigeria: An Empirical Analysis. *Business and Economics Journal*, 14: 1-7.
5. Anyebe, A. A. (2007). Commercial Bank Lending and Agricultural Development in Benue State: A Case Study of Union Bank of Nigeria Plc Makurdi. Unpublished Master's Thesis, Department of Agricultural Economics, University of Agriculture, Makurdi, Nigeria.
6. Armendáriz, B. and Morduch, J. (2010). *The Economics of Microfinance* (2nd ed.). Cambridge, MA: MIT Press.
7. Ayunku, P. E. and Etale, L. M. (2015). Effect of Agriculture Spending on Economic Growth in Nigeria: Empirical Evidence. *Research Journal of Finance and Accounting*, 6(2). https://iiste.org/Journals/index.php/RJFA/article/view/19186.
8. Beck, T. and Cull, R. (2014). SME finance in Africa. *Journal of African Economies*, 23(5): 583–613. https://doi.org/10.1093/jae/eju016
9. Beck, T. Demirgüç-Kunt, A. and Levine, R. (2007). Finance, Inequality and the Poor. *Journal of Economic Growth*, 12(1): 27-49.

10. Central Bank of Nigeria (2017). Agricultural Credit Guarantee Scheme Fund of Nigeria *Researcher*, 2(2).
11. Diamond, D. W. and Dybvig, P. H. (1983). Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy*, 91(3): 401–419.
12. FAO (2012). The State of Food and Agriculture (SOFA). Investing in Agriculture for a better future. Rome. http://www.fao.org/3/i3028e/i3028e.pdf
13. Isijola. Y. (2018). Economic Evaluation of Credit Requirements Of Small-Scale. *Journal of Financial Management,* 14(7): 11-23.
14. Isiorhovoja, R. A and Chukwuji, C. O. (2009). Effects of the Operations of the Agricultural Credit Guarantee Scheme Fund on Cash Crops, *International Journal of Rural Studies(IJRS)* 16(1): 1-7.
15. Ma-Azu, A. (2015). Determinants of Access to Credit and its Impact on Household Food Security in Karaga District of the Northern Region of Ghana. A published thesis submitted to the Department of Agricultural Economics, Agribusiness and Extension, Kwame Nkrumah University of Science and Technology, Online @ http://dspace.knust.edu.gh/bitstream/123456789/8049/1/ma-Az%20Abdul-Jalil.pdf
16. Okorji, E. C. and Mejeha, R. O. (2018). The Formal Agricultural Loan in Nigeria: The Demand for Loans and Delinquency Problems of Small Holder Farmers in Owerri Agricultural Zone of Imo State, Nigeria. *Int. J. Tropical Agriculture* 1*:* 11 - 13.
17. Onwumere, J. U. J. Imo, G. E. and Ihegboro, I. (2012). Has the Agricultural Credit Guarantee Scheme Fund (ACGSF) Any Impact on Agricultural Productivity in Nigeria? A Look at Empirical Evidence. *Global Journal of Agricultural Research*, 1(1): 1-10.
18. Otu, M. F. and Balogun, E. D. (1991). Credit Policies and Agricultural Development in Nigeria. *Economic and Financial Review*, 29(2): 138-156
19. Udoka, C. O. Mbat, D. O. Duke, S. B. (2016). The Effect of Commercial Banks' Credit on Agricultural Production in Nigeria. *Journal of Finance and Accounting,* 4(1): 1-10*.* Available online at http://pubs.sciepub.com/jfa/4/1/1
20. World Bank. (2018). Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. Washington, DC: World Bank Group.
21. Zepeda, L. (2007). Agricultural investment, production capacity and productivity. In L. Zepeda (Ed.), Agricultural investment and productivity in developing countries (pp. 1-15). Food and Agriculture Organization.