Lafia Journal of Economics and Management Sciences: Volume 7, Issue 2; 2022
ISSN: 2550-732X
Published by Department of Economics, Federal University of Lafia, Nigeria

Agricultural Credit Financing and Agricultural Output Performance in Nigeria

Chukwuemeka Micheal Ogbonnaya[1], Athanasius Chukwudi Nwachukwu[2] & Uwazie Iyke Uwazie[3]
[1&3]Department of Economics, Michael Okpara University of Agriculture, Umudike
[2]Department of Social Sciences, Federal Polytechnic, Nekede
Corresponding Email: athanchukspoly@gmail.com

Abstract
The study examined the connection between Nigeria's success in terms of agricultural output between 1981 and 2021 and the funding of agricultural credit. Assessment of the impacts of Nigeria's agricultural output performance on the Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, Money Supply, and Domestic Credit to the Private Sector was the specific goal of the study. The study employed an ex post facto research approach and estimated multiple regression analyses using the Vector Auto-regression estimation technique. According to pre-estimation tests such ADF unit root tests, all the variables under examination appear to be integrated to order 1, and the Johansen Cointegration test shows that there is no meaningful long-run relationship. Variance Decomposition, the VEC Granger Causality Test, and the performed residual diagnostic test are additional estimation tests. The study found that for every 1% increase in the agricultural credit guarantee scheme fund and commercial bank lending to agriculture, respectively, Nigeria's agricultural output performance increased by 0.07% and 0.04%. The findings also showed that while an increase in the money supply of one unit will lead to an increase in agricultural output performance of 2.8%, an increase in domestic credit to the private sector of one unit will result in a 2% decrease in agricultural output performance. The report recommends that policies be put in place to boost the stability and amount of money available to Nigerian farmers. The results indicated that financing for agricultural credit improved Nigeria's agricultural output performance.

Keywords: Agriculture, Credit Financing, Output
JEL Classification Codes: O13, O16, Q14

1. Introduction

In Nigeria, agriculture provides a path to prosperity and development. The foundation for a nation's economic and industrial development is implicitly embedded in an efficient agricultural production system (Adamgbe, Belonwu, Ochu & Okafor, 2020). Agriculture, a robust sector that has far too long kept Nigeria's population alive, contributes significantly to GDP growth and generates a sizeable portion of non-oil income (Odetola & Etumnu, 2013).

In Nigeria, agriculture provides a path to prosperity and development. The foundation for a nation's economic and industrial development is implicitly embedded in an efficient agricultural production system (Adamgbe, Belonwu, Ochu & Okafor, 2020). Agriculture, a robust sector that has far too long kept Nigeria's population alive, contributes significantly to GDP growth and generates a sizeable portion of non-oil income (Odetola & Etumnu, 2013).But studies have also showed that Nigeria had lost out on $10 billion in annual export prospects as a result of a persistent fall in the production of groundnuts, palm oil, cocoa, and cotton alone (National Bureau of Statistics [NBS], 2021). This indicates that a quicker rate of increase in agriculture production is anticipated given the underlying characteristics of the Nigerian economy.

Government support for the agricultural sector through budgetary allocation has grown over the past 20 years. For instance, in 2013 ₦ 83.20 billion, or 1.66% of the total budget, was allotted to agriculture. A total of ₦135.6 billion Naira, or 1.8% of the ₦7.44 trillion overall budget, was allocated to agriculture in 2017.In 2018, the sector saw yet another boost, totaling ₦203 billion, or 2.2% of the ₦9.12 trillion proposed budget for the year. Agriculture received a lower budget allocation in 2019 of ₦137.9 billion, or 1.5% of the total ₦8.8 trillion budget (Central Bank of Nigeria [CBN], 2022). These allocation records for agriculture, however, are a long way from the global average. The ratio of Nigeria's budget for agriculture to its total budget does not meet the minimum 10% allotment to agriculture set by the Maputo Declaration on Agricultural and Food Security in 2003, to which Nigeria is a member.

Additionally, there have recently been a number of issues with agricultural loans to farmers. Prior to the banking industry's 2005 consolidation, farm credit was generally subpar, ranging from ₦2.0 billion in 1987 to ₦67.0 billion in 2004 (CBN, 2005). In 2014, ₦478.91 billion in commercial bank loans—or 3.72% of total commercial bank loans—went to agriculture. In 2020, commercial bank lending to agriculture accounted for 5.15% of all loans, totaling $1,049.68 billion (CBN, 2021). Despite the advancements, Nigeria's private sector still

provides much less credit to agriculture than the global average of $80 billion per year invested across the value chain. Nigeria's agriculture sector, despite its critical place in the real sectors of the economy, is unable to finance its development since it is not in a strong competitive position relative to other sectors of the economy to obtain loans from financial institutions (Emenuga, 2019).

Furthermore, Nigeria's tractor density is estimated to be 0.27 horsepower per hectare, which is significantly less than the 1.5 horsepower per hectare recommended by the Food and Agriculture Organization [FAO], (2021). Nigeria is one of the least mechanized farming countries in the world as a result. This shows how little funding is given to Nigeria's agricultural industry. According to FAO, Nigeria is both the greatest producer of rice in Africa and the largest importer of rice worldwide (2020). The astonishingly high levels of food imports, which today total between $3 billion and $5 billion (NBS, 2021) are clear indications that the agriculture industry has fallen to the bottom rung among other economic sectors in terms of foreign exchange revenues. An enormous economic loss results from food importation. Agriculture has evident promise, but due to insufficient government funding and policy implementation, the sector's level of advancement and overall contribution to the growth of the Nigerian economy have been disappointing (Ogunlokun & Liasu, 2021).

Due to the country's enormous population and a horrendously ineffective input system that de-markets farming methods and exports at quality levels, Nigeria's agricultural sector is unable to meet local food needs (FAO, 2022). The various problems that have beset the agricultural sector are not ignored by the government. For increasing farmers' access to credit and their production efficiency, each succeeding administration has turned to financial assistance. To deliver mechanized farm services to rural communities, the Agricultural Equipment Hiring Enterprises-Mechanization Intervention Support Fund is a pure Public-Private Partnership model. SMEs, master bakers, and sizable commercial cassava flour mills are supported by the Cassava Bread Fund. Another illustration is the Nigeria Incentive-Based Risk Sharing System. The 50 billion agricultural credit support scheme is designed for active farmers and businesspeople in the agricultural sector (Oyaniran, 2020).

The Mass Agricultural Program was created as part of the Federal Government's Economic Sustainability Plan 2020 to help with the problems caused by the COVID-19 epidemic. With an estimated cost of $634 billion, the program was designed to cover the full agricultural value chain from field to table (CBN, 2021).The CBN launched the CBN/NIRSAL Agri-Business/MSME Investment Scheme to act as a buffer against the COVID-19 pandemic threat.

The expansion of the financial sector is anticipated to be a crucial prerequisite for higher agricultural production when analyzing the trends in the performance of the agricultural sector in Nigeria. The agricultural sector of the country has received credit from successive administrations through the employment of budgetary provisions, monetary policies, and fiscal policies. The agricultural sector performs appallingly poorly despite all subsequent government intervention efforts. Consequently, many think that Nigeria's agricultural sector still has limited access to financial services. The availability of financing as well as the degree of forward and backward linkages between agriculture and the country's industries determines how well the agricultural sector performs in an economy, particularly in emerging nations.

However, the question that needs to be addressed is why the expansion of agricultural credit financing through budgetary allocations from the government and commercial bank credit financing of the industry has not resulted in the anticipated expansion of agricultural inclusive growth. Do nations with more developed finance systems make better use of their agricultural resources? To this end, this study is poised to find out how agricultural credit financing affects performance indices in the agricultural sector in Nigeria.

2. Literature Review

2.1 Theoretical Review

2.1.1 Supply-Leading Hypothesis

Numerous pieces of literature have variously accepted Schumpeter (1911) as the supply-leading hypothesis's originator. Additionally, Gurley and Shaw (1967); King and Levine (1993); and McKinnon (1973); among others, all included the supply-leading hypothesis element in their studies. The idea goes that there are two different ways that financial development fosters growth: First off, a more developed financial sector may boost investment rates by pooling and dispersing risk. Second, financial development may improve investment efficiency by allocating funds to the most advantageous uses. Financial development has a large and positive impact on investment productivity.

According to Ohwofasa and Aiyedogbon (2013), the supply-leading hypothesis is based on the idea that effectively run financial institutions can increase overall economic efficiency, generate and increase liquidity, mobilize savings, encourage qualified entrepreneurs in a variety of economic sectors, and transfer resources from non-growth sectors to more modern growth-inducing sectors. What's more, the Supply-Leading theory demonstrates exactly how financial intermediaries promote efficiency and economic growth by assisting in

the most effective use of capital allocation. Agricultural financing is fundamentally a development strategy in a number of ways since it promotes agricultural investment and the adoption of technology necessary to hasten the sector's growth (Udoka, 2015).

One of the main advantages of the supply-leading method is that when entrepreneurs have more access to the supply-leading funds, their expectations rise and new vistas (or prospective alternatives) open up, forcing them to "dream big" and take risky actions. It also assumes that persons who borrow money are closely monitored by the financial sector, especially the banking business. In reality, however, the banking sector does not function as a proactive monitor; rather, the success of the lending bank depends more on how well it screens out risky borrowers than on the efficiency of this procedure. The theoretical literature also describes the relationship between financial progress and creative effort. The effects of financial development on productivity are not explained.

2.1.2 Demand-Following Hypothesis

The demand-following hypothesis was invented by Robinson (1952). By extension, Patrick (1966) acknowledged the demand-following theory as one of the two possible causal linkages between financial development and economic growth. The economic expansion and other causes, not financial ones, are the main drivers of financial development, according to the demand-following hypothesis. Therefore, it is anticipated that as the real sector of the economy grows, so will demand for financial products. In other words, as the economy expands, so does the need for financial services, which in turn spurs additional financial growth.

Rising rural or agricultural sector revenues supply the funds that financial intermediaries handle. Economic growth creates the necessity that the finance sector satisfies. The primary responsibility of intermediaries is to transmit funds from excess units to deficit ones. Supporters of the demand-following hypothesis contend that as macroeconomic outcomes improve, the expansion of the real sector promotes the expansion of the financial sector. Ndebbio (2004) and other researchers used metrics like the M2 to GDP ratio and the growth rate of per capita real money balances in numerous studies that focused on the "demand following hypothesis.". Furthermore, the demand-following hypothesis and the supply-leading hypothesis are two perspectives on the same issue. Based on a causal connection, each propagates the tracking channel of the interrelationship between finance and growth. Both theories become unworkable when there is no clear causal link between finance and growth, which makes the inclusion of the Neo-Classical theory of growth in this study necessary.

2.1.3 Neo-Classical Theory of Growth

In addition to the contributions made by some economists like Meade (1961); Phelps (1962) and Johnson (1962), the neoclassical theory of growth may be linked to the work of Marshall (1898); Ramsey (1928); Solow (1956); Swan (1956); Cass (1965) and Koopmans (1965). The combination of labor, capital, and technology results in a stable economic growth rate, according to the neo-classical growth model. Economic growth is dependent on labor productivity, technological advancements, and the total amount of capital assets, and there must be a falling return on every input, notably labor and capital, as well as a smooth elasticity of substitution between inputs, according to this theory (Anyanwu & Oaikhenan, 1995).

If technological progress is kept constant and the labor force is growing continuously, then follows that per capita production is dependent on the capital stock. When this results, the law of falling marginal returns predicts that output would decline as capital stock is depleted. This is due to the perception that increases in per-worker output can be sustained over the long run with productivity growth alone. This hypothesis states that long-run growth is determined by exogenous (to the model entirely) or explanatory factors. The theory also makes a variable capital-to-output ratio assumption (coefficient). The neoclassical growth model is based on the idea that the direction and rate of economic growth are endogenous policy factors that are within the control of policymakers, according to Anyanwu and Oaikhenan (1995).

2.2 Empirical Review

Liu, Ji, Zhang, An and Sun (2021) in China examined the effects of rural financial scale and rural finance efficiency on agricultural technical innovation in 31 provinces between 2003 and 2015 using panel data. Additionally, it examined how a region's level of marketization and economic development affected the financial growth of rural areas. The study used an ordinary linear squares regression model to calculate the GDP per capita, rural financial development, financial support for agriculture, level of the agricultural labor force, and the proportion of people under the age of 15 to people over the age of 65. The empirical results demonstrated that an improvement in rural finance has a significant and positive impact on the level of agricultural technology innovation. Rural financial scale has a significant positive impact on technological innovation in regions with a high degree of marketization whereas the efficiency of rural finance has a significant positive impact on innovation in regions with a low level of marketization. According to

more research, improving agricultural technology innovation is good for the development of the rural economy.

Using a yearly dataset from 1992 to 2017, Ogunlokun and Liasu (2021) assessed the relationship between bank financial intermediation and the performance of the agriculture industry in Nigeria. The estimated model's explanatory variables were commercial bank credits to the agricultural sector, commercial banks' gross saving deposits, microfinance bank credits to the agricultural sector, microfinance banks' gross saving deposits, and deposit interest rate. The agricultural sector output, a proxy for the performance of the agricultural sector, served as the model's dependent variable. The study came to the conclusion that bank financial intermediation using the Autoregressive Distributed Lag Model has no impact on the performance of Nigeria's agricultural sector. The study found data showing that changes in the agricultural sector's performance and bank financial intermediation occurred simultaneously throughout time. The results also revealed a slight but positive association between the agricultural sector's performance and the loans that commercial banks extended to it. Additionally, a slight but positive correlation between the gross saving deposits of commercial and microfinance banks and the short- and long-term performance of Nigerian agriculture was found. The results of the ECM revealed that while the majority of characteristics of bank financial intermediation were advantageous over the long term, they had little impact on improving the performance of Nigeria's agricultural sector.

Agbenyo, Jiang and Anthony (2019) looked into the connection between Ghana's agricultural expansion and the period of financial inclusion in the nation. Using the Johansen Cointegration methodology and the Fully Modified Ordinary Least Square method, the dataset on the variables utilized in the model from 1980 to 2014 was estimated (FMOLS).According to the study, there is a weak but substantial link between financial inclusion and agricultural growth. The predicted lending interest rate was also high and advantageous according to the projected model. This demonstrates how the availability of financial services to farmers has a favorable impact on the growth of agriculture in Ghana.

Using data from the years 1973 to 2015, Zakaria, Jun and Khan (2019) investigated the likelihood of a connection between financial development and agricultural productivity in South Asia. Factors include physical capital, human capital, trade openness, and income level. The study employed the fully modified OLS (FMOLS) and dynamic OLS (DOLS) approaches to estimate the model. It was found that every variable exhibited cross-sectional dependency and was stationary at initial differences. The long-term cointegration of the variables was also

found to be valid. A rise in agricultural production went hand in hand with growth in both physical and human capital. Agricultural productivity increased together with trade openness and income level. A robustness analysis shows that trade terms reduce agricultural productivity. Agricultural productivity is negatively impacted by carbon emissions and the labor force in rural areas, whereas industrialisation has positive effects.

Tekilu, Wondaferahu and Jibril (2018) examined Ethiopia's economic development between 1975 and 2016 to see whether there was a connection between the two. The study found a long-term relationship between growing sectoral output and financial development. The study also discovered that, in contrast to the industrial sector, the impact of financial development on the expansion of the agricultural and service sectors' output was less substantial. In addition, the Granger causality test using the Vector Error Correction Model did not reveal any correlation between financial development and agriculture sector output. Egwu (2016) investigated how agricultural funding in Nigeria affects agricultural output, economic growth, and poverty alleviation. He used the ordinary least square regression technique. The study discovered that different agricultural financing strategies, including Agricultural Credit Guarantee Scheme Fund Loan (ACGSF) and Commercial Bank Credit to Agricultural Sector (CBCA), significantly impacted the contribution of the agricultural sector to Nigeria's GDP and reduced poverty rates (ASOGDP).

Aniekan, Anthony, Daniele, Ionel-Mugurel and Alex (2015) have looked at how financial sector reforms in Nigeria from 1970 to 2009 have affected agricultural growth. The correlations were estimated using vector error correction models, variance decomposition, and impulse response functions (IRF). The models took into account information on total savings, financial sector RGDP, real gross domestic product growth rate, foreign private investment (FPI) in the sector, credit to agriculture, currency rate, interest rate, labor force in agriculture, and per capita income. The results indicated that, in both the baseline and sensitivity models, changes in the banking sector had a significant impact on agricultural growth. The study confirmed that the credit markets in the Nigerian economy are weak and unstable as a result of banking sector changes. The sensitivity model's estimate of the shock brought on by banking sector reforms had a 0.60 percent lower effect on growth in agricultural output compared to the baseline model. It was concluded as a result that financial sector reforms may increase agricultural production levels and result in more advantageous investments in the sector as a whole than in the sensitivity result.

The majority of the empirical studies under evaluation offer support for the claim that the performance of the agriculture sector is influenced in varied degrees by factors affecting financial development. The degree to which the influence was felt, however, varied depending on the nation, methodology, variables chosen to measure financial success, duration of the empirical study, and other factors. In other words, study on the link between financial development and the performance of the agriculture sector has grown significantly, despite the fact that the connections between the two seem to be weaker. One issue at hand is the choice of variables. The majority of investigations produced a range of results based on the variables they used. The scope and effectiveness of the financial sector services currently offered to Nigeria's agriculture sector cannot be fully captured by all of the factors that influence financial growth. In the evaluation of the private sector, manufacturing, construction, and services regularly beat agriculture. Therefore, even while the trickle-down effect is anticipated from the sectors as a whole, it is not desirable to use private sector credit as a sole proxy for financial development as it relates to her relationship with agriculture, as found. Most studies (Tekilu, *et al*., 2018; Agbenyo, *et al*., 2019; Zakaria*et al*., 2019) did not address the challenges specific to Nigeria. Most studies used information from countries whose economies couldn't possibly be compared to Nigeria's. It is so challenging to extrapolate their findings to Nigeria. Every issue that was discovered was fixed in this research effort.

In Nigeria's financial industry, changes have been ongoing to the scope, organizational layout, and policy directions controlling the creation and accessibility of investment funds. The performance of the agricultural sector is rarely examined in relation to these alterations in the financial sector. This implies that the findings of the few studies are probably not trustworthy. The majority of the research's conclusions might also have been overtaken by time and events, making it difficult to execute their recommendations under the current system.

3. Methodology

3.1 Model Specification

The model used in this study is built to faithfully capture the dynamic nature of the link between agricultural credit finance and agricultural output performance. Numerous studies show a wide range of models. In order to improve upon and learn from Egwu (2016)'s model, this study updated it. The study included five variables in total. The factors are: domestic credit to the private sector, money supply, commercial bank lending to agriculture, and Agricultural Credit Guarantee Scheme Fund (M3GDP). Secondary time series annual data

that spanned from 1981 to 2021 were employed in this study. The data were extracted from the web-based Central Bank Statistical Bulletin of 2022 version and the World Bank database of 2022.

The theory holds that agricultural performance can be accelerated by a mix of extensive government intervention and monetary policies relevant to agricultural development and growth. The loan channel is a significant means of communicating monetary policy to the real sector (McKinnon, 1973; Shaw 1973). Therefore, domestic credit to the private sector (CPSGDP), commercial bank lending to agriculture (CBLA), Agricultural Credit Guarantee Scheme Fund (ACGSF), and Money supply (M3GDP) are important factors influencing agricultural performance. In this study, the Vector Autoregression (VAR) method will be used.

Agricultural contribution to GDP, Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, Domestic Credit to Private Sector, and Money Supply are all simultaneously interrelated in the model, which is designed to encapsulate the essence and aims of this study. The variables were transformed using logarithms to produce more insightful results. Thus, the VAR model specified as:

$$LACGDP_t = \delta_0 + \alpha_1 LACGPD_{t-1} + \beta_2 LACGSF_{t-1} + \varphi_3 LCBLA_{t-1} + \theta_4 M3GDP_{t-1} + \gamma_5 CPSGDP_{t-1} + u_{1t} \quad \ldots\ldots\ldots\ldots 1$$

$$LACGSF_t = \delta_0 + \alpha_1 LACGSF_{t-1} + \beta_2 LACGDP_{t-1} + \varphi_3 LCBLA_{t-1} + \theta_4 M3GDP_{t-1} + \gamma_5 CPSGDP_{t-1} + u_{2t} \quad \ldots\ldots\ldots\ldots 2$$

$$LCBLA_t = \delta_0 + \alpha_1 LCBLA_{t-1} + \beta_2 LACGDP_{t-1} + \varphi_3 LACGSF_{t-1} + \theta_4 M3GDP_{t-1} + \gamma_5 CPSGDP_{t-1} + u_{3t} \quad \ldots\ldots\ldots\ldots 3$$

$$M3GDP_t = \delta_0 + \alpha_1 M3GDP_{t-1} + \beta_2 LACGDP_{t-1} + \varphi_3 LACGSF_{t-1} + \theta_4 LCBLA_{t-1} + \gamma_5 CPSGDP_{t-1} + u_{4t} \quad \ldots\ldots\ldots\ldots 4$$

$$CPSGDP_t = \delta_0 + \alpha_1 CPSGDP_{t-1} + \beta_2 LACGDP_{t-1} + \varphi_3 LACGSF_{t-1} + \theta_4 LCBLA_{t-1} + \gamma_5 M3GDP_{t-1} + u_{5t} \quad \ldots\ldots\ldots\ldots 5$$

Explicitly, the model is specified thus

$$V_t = a + A_i V_{t-1} + U_t \quad \ldots\ldots\ldots\ldots 6$$

Where;

V= (LACGDP, LACGSF, LCBLA, M3GDP, CPSGDP), is the vector of the logarithms of Agricultural contribution to GDP, Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, Domestic credit to private sector, and Money supply

a = intercepts

A_i = 5X5 matrix of coefficients of all the lagged endogenous variables in the model

V_{t-1}= vector of the lagged endogenous variables

U_t = vector of the stochastic error terms

With the exception of the ratio variables CPSGDP and M3GDP, all model variables were logged. By changing the distribution into a normal distribution, logging the variables enhances the model's fit. The supply-leading theory serves as the theoretical basis for the model. The a priori assumption is that an increase in agricultural credit financing (variables like the log of commercial bank lending to agriculture, the log

of credit to the private sector, the log of money supply, and the log of the Agricultural Credit Guarantee Scheme Fund) would attract credit to the agricultural sector, which would then translate into improved agricultural performance. So, it stands to reason that would have a favorable effect on the Log of Agricultural Contribution to GDP.

4. Results and Discussion

4.1. Unit root Test (Stationary) Analysis

The justification behind the test was to ascertain the unit root property of the series in terms of the order of integration. This study used the Augmented Dickey-Fuller (ADF) unit root test as shown in Table 1 below. The outcome of the test showed that the variables are integrated into order one.

Table 1: Augmented Dickey-Fuller Unit Root Test (Trend and Intercept)

	ADF @ Levels			ADF @ First Difference.		
Series	ADF Test Statistic	5% Critical values	Remark	ADF Test Statistic	5% Critical values	Remarks
LACGDP	-2.173754	-3.526609	NS	-5.884455	-3.529758	I(1)
LACGSF	-1.163044	-3.533083	NS	-5.687117	-3.529758	I(1)
LCBLA	-2.622079	-3.526609	NS	-7.090561	-3.529758	I(1)
M3GDP	-2.197906	-3.526609	NS	-5.707967	-3.529758	I(1)
CPSGDP	-3.033249	-3.529758	NS	-5.785540	-3.533083	I(1)

Source: Researcher's compilation, 2022 from Eviews 10

As shown in table 1, all variables of interest (Agricultural Contribution to GDP, Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, Money Supply and Domestic Credit to private sector) contained unit root and were differenced once to make up for stationarity. Since all the series are integrated with the same order I (1), the Johansen Co-integration test became expedient.

4.2. Johansen Co-integration Test

To determine if the computed model parameters exhibit long-term mutual association, the Johansen method of estimating cointegration was used. The maximum eigenvalue test statistic and the trace test statistic are the two test statistics used in this co-integration

test. Using this method is therefore only practical when the series have the same order of integration.

Table 2: **Trace Test for the Series: LACGDP, LACGSF, LCBLA, M3_GDP , CPS_GDP**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.534199	83.62151	95.75366	0.2540
At most 1	0.464194	53.82565	69.81889	0.4691
At most 2	0.332515	29.49032	47.85613	0.7446
At most 3	0.234095	13.72504	29.79707	0.8557
At most 4	0.077799	3.323863	15.49471	0.9503
At most 5	0.004227	0.165183	3.841466	0.6844

* denotes rejection of the hypothesis at the 0.05 level
Source: Researcher's compilation, 2022 from Eviews10

Table 3: **Maximum Eigenvalue Test: LACGDP, LACGSF, LCBCA, CPS_GDP, M3GDP**

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.485990	25.95498	33.87687	0.3235
At most 1	0.350999	16.86053	27.58434	0.5920
At most 2	0.178729	7.679191	21.13162	0.9223
At most 3	0.081513	3.316085	14.26460	0.9235
At most 4	0.038137	1.516444	3.841466	0.2182
None	0.485990	25.95498	33.87687	0.3235

* denotes rejection of the hypothesis at the 0.05 level
Source: Researcher's compilation, 2022 from Eviews 10

The MacKinnon-Haug-Michelis (1999) p-values served as the foundation for the trace statistic and Max-Eigenvalue in rejecting the null hypothesis of no cointegration at a 5% level of significance or otherwise. The outcome demonstrated that the probability value of the Hypothesized CE(s) was greater than 0.05 for both the trace statistic and Max-Eigenvalue. The important thing is that none of the equation's variables appear to be major co-integrating equations at a 5% level. This suggests that the GDP contribution of agriculture and the financing of

agricultural credit, including the Agricultural Credit Guarantee Scheme Fund, commercial bank lending to agriculture, the money supply, and domestic credit to the private sector, are not co-integrated. As a result, Nigeria's financial development and agricultural sector performance remain static over time.

4.3. Vector Autoregression Test

The vector autoregression test was initiated due to the failure to identify the long-run relationship among the variables.

Table 4: VAR Estimation Results Describing Dynamic Evolution of LACGDP, LACGSF, LCBLA, CPS_GDP and M3_GDP

Regressors	LACGDP	LACGSF	LCBLA	CPS_GDP	M3_GDP
LACGDP(-1)	0.617958**	0.003845	0.415654	1.934978	4.396906
LACGSF(-1)	0.072378**	0.916079**	-0.068355	0.349961	-0.304125
LCBLA(-1)	0.043889**	0.097653	0.907079**	-0.379207	-0.462418
CPS_GDP(-1)	-0.019764*	-0.036861	-0.022531	0.506105*	0.163005
M3_GDP(-1)	0.027578**	0.018577	0.026829	0.237871	0.527460*
C	2.084736	1.013157	-2.362362	-18.08579	-27.20114
R-squared	0.992587	0.970773	0.988269	0.877892	0.908417
Adjusted R-squared	0.991497	0.966475	0.986544	0.859935	0.894949
F-statistic	910.4757	225.8598	572.8794	48.88838	67.44993
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000

Notes: * and ** represent 5% and 1% level of significance respectively.
Source: Researcher's compilation, 2022 from Eviews 10

The outcome provided in table 4 demonstrated that LACGDP significantly affects itself. Additionally, LACGDP is well predicted by LACGSF, LCBLA, CPS GDP, and M3 GDP. From the estimates of the VAR result, it is clear that the money supply, commercial bank lending to agriculture, and the Agricultural Credit Guarantee Scheme Fund have a positive and significant relationship with the agricultural contribution to Nigeria's GDP. As a result, it is predicted that the log of agriculture's contribution to GDP will increase by 0.07% for every percentage point increase in the log of the Agricultural Credit Guarantee Scheme Fund (LACGSF). The log of agricultural contribution to GDP will also grow by 0.04 percent for every 1% increase in commercial bank lending to agriculture (LCBLA). Additionally, it can be observed that a unit

increase in the money supply (M3GDP) will result in an increase of 2.8% in the Nigerian economy's log of agricultural GDP (LACGDP).

Additionally, a direct but unfavorable relationship between domestic credit to the private sector (CPS GDP) and the log of agricultural contribution to GDP (LACGDP) could be seen. In Nigeria, the log of agricultural GDP contribution (LACGDP) will decrease by 1.9 percentage points for every unit increase in domestic credit to the private sector (CPSGDP). Also according to the result in table 4, each of LACGSF, LCBLA, CPS_GDP and M3_GDP is significantly and positively influenced only by itself. Thus, a percentage increase in LACGSF is associated with 0.92% increase in LACGSF; 1% increase in LCBLA is associated with 0.9% increase in LCBLA; 1-unit increase in CPS_GDP and M3_GDP result in 0.51% and 0.52% increase in CPS_GDP and M3_GDP respectively.

Overall, the coefficients are largely statistically significant with a fairly good fit (judging from the R^2 and the adjusted R^2 of each of the regressors). The result showed that R^2 in this model and its adjusted counterpart are above 80% each. This suggests that changes in the agricultural credit financing factors account for about 80% of the fluctuations in the performance rating of the agricultural sector (ie explanatory variables). This suggests that the model's unexplained variation is only approximately 1%. Even at the 1% level, the F-statistic, a statistic that gauges the model's R^2 significance, has a reasonable high value and is statistically significant. As a result, we accept the hypothesis that the model's overall slope coefficients are significant in explaining changes in agricultural output performance in Nigeria over the sample period because they are simultaneously significantly different from zero.

4.4. Post Estimation Tests

The model is further assessed using a series of diagnostic and stability checks to ensure the independence of the residuals from the fitted model, in addition to the individual test of significance and other statistical criteria applied. The residuals must display the necessary independence during the checks for a model to be robust.

4.4.1. Serial Correlation Test

Table 5: Serial Correlation Test

VAR Residual Serial Correlation LM Tests		
Lags	LM-Stat	Prob
1	32.82546	0.1355
Probs from chi-square with 25 df.		

Source: Researcher's compilation, 2022 from Eviews 10

As shown in Table 5 above, the probability value of 0.13 is greater than the acceptance critical value of 0.05. The implication is that serial correlation does not exist in the model. Hence, the null hypothesis of no serial correlation cannot be rejected.

4.4.2. Heteroscedasticity Test

The VAR Residual Heteroskedasticity Tests were conducted and the result is shown in Table 6 below:

Table 6: Heteroskedasticity Test

VAR Residual HeteroskedasticityTests		
Chi-sq	Df	Prob
167.2798	150	0.1587

Source: Researcher's compilation, 2022 from Eviews 10

Estimates emanating from the Heteroskedasticity Tests show that the probability value of 0.1587 is greater than the 0.05 critical value. Thus, concerning the result, the study accepts the null hypothesis and concludes that heteroskedasticity does not exist in the estimated model.

4.4.3. Normality Test

Jarque-Berra test statistic was used to examine whether the variables in the model are normally distributed. The outcome of the test statistic is shown in figure 1 below:

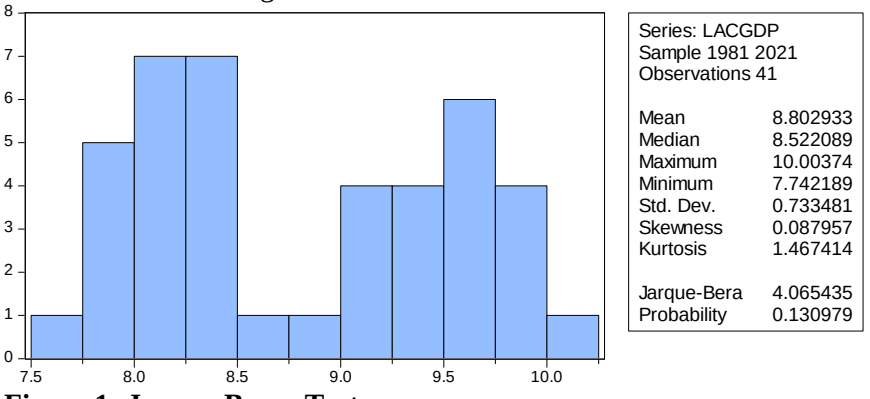

Figure 1: Jarque-Berra Test

Source: Researcher's compilation, 2022 from Eviews 10

The calculated Jarque-Bera statistics is 4.07 with a probability value of 0.131which is above the 0.05 critical value. Thus, evidence abounds that the null hypothesis of multivariate normal distribution will be accepted at the 5% significance level, meaning that, the residuals are normally distributed.

4.4.4. Impulse Response Function

Any dynamic system's response to external changes is called an impulse Response function. In Figure 2, the blue line represents the impulse response function, which must fall inside the 95% confidence interval, and the red line represents the 95% confidence interval. The response of LACGSF to a shock of one standard deviation in LACGDP is seen in the first graph. Due to the fact that LACGSF is positive and has been above the zero line throughout the entire period, there hasn't been much reaction, as can be seen in the graph. The reaction of LCBLA to a shock of one standard deviation to LACGDP indicates that at period 1, LCBLA is zero and subsequently increases across the board. M3 GDP and CPS GDP both moved in the same way in response to a one standard deviation shock to LACGDP. Both M3 GDP and CPS GDP showed positive growth in the early phases, progressing on an increasing scale from the negative zone in periods 1 and 2 towards the positive region.

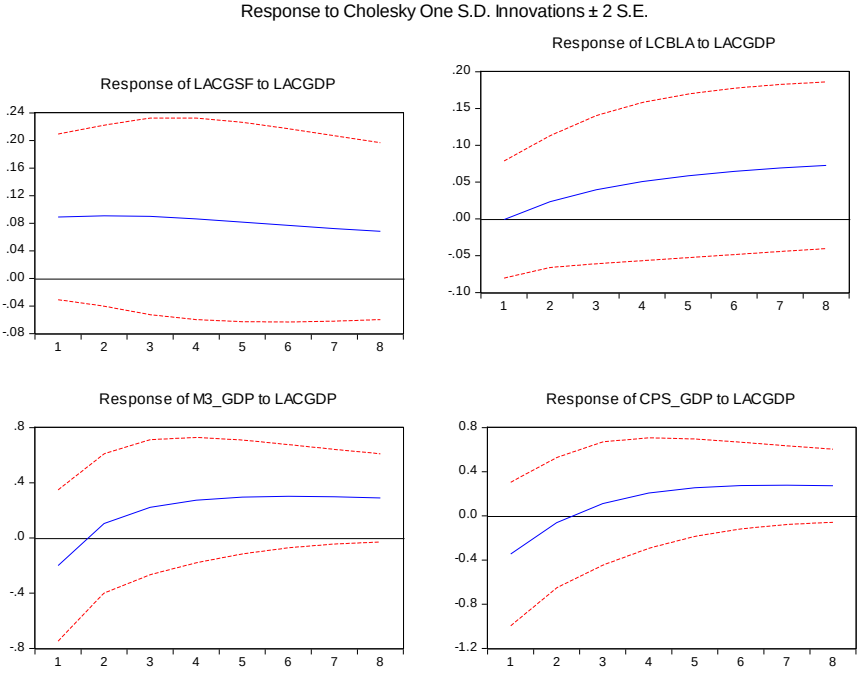

Figure 2: Impulse Response Function

Source: Researcher's compilation, 2022 from Eviews 10

4.4.5. Variance Decomposition

Five-year projections were produced throughout the study. Periods 1 and 2 are regarded as the short-run period and Periods 3 to 5 as the long-run period. As a result, the variable itself accounts for 100% of the predicted error variance in LACGDP during the short term, looking at period 1. Influences from M3 GDP, CPS GDP, LACGSF, and LCBLA increased somewhat between 3% and 7% in period 2. Thus, LACGSF, LCBLA, M3 GDP, and CPS GDP have large exogenous effects on the LACGDP model but minimal endogenous effects on LACGDP prediction. At period 5, the variable alone accounts for 57.9% of the variance in forecast error. Therefore, LACGDP exhibits a significant exogenous influence from the short term into the future. The influence of other variables on LACGDP is generally weak as shown in table 5

Table 5: Variance Decomposition of LACGDP

Period	S.E.	LACGDP	LACGSF	LCBLA	M3_GDP	CPS_GDP
1	0.066730	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.091152	82.44970	4.098254	2.257753	3.353156	7.841139
3	0.110292	70.79763	7.921489	4.898402	4.760901	11.62158
4	0.126135	63.25588	10.74670	7.621816	5.064629	13.31098
5	0.139860	57.89089	12.63666	10.38951	4.925866	14.15708

Source: Researcher's compilation, 2022 from Eviews 10

As shown in table 6 below, 94.6% forecast error variance in LACGSF is explained by the variable itself in the short-run of period 1. Meanwhile, 83.6% of forecast error variance of LACGSF in the long-run of period 5 is explained by LACGSF itself. Thus, other variables in the model have weak influence in predicting LACGSF.

Table6: Variance Decomposition of LACGSF

Period	S.E.	LACGDP	LACGSF	LCBLA	M3_GDP	CPS_GDP
1		5.350300				0.000000
	0.385288		94.64970	0.000000	0.000000	
2		5.959256				0.833915
	0.521283		92.54456	0.431830	0.230436	
3		6.483713				1.794462
	0.611898		89.74518	1.290496	0.686145	
4		6.902419				2.682708
	0.678129		86.71033	2.494761	1.209783	
5		7.236589				3.465012
	0.728611		83.63072	3.971831	1.695852	

Source: Researcher's compilation, 2022 from Eviews 10

Table 7 below shows that in both the short-run and long-run, LCBLA is explained by itself to the tune of 99% and 84.6% respectively. With this, it can be seen that other variables in the model have strong exogenous impact on LCBLA as they can scarcely predict the dependent variable (LCBLA) both in the short-run and long-run.

Table 7: Variance Decomposition of LCBLA

Period	S.E.	LACGDP	LACGSF	LCBLA	M3_GDP	CPS_GDP
1	0.251667	0.000993	0.840039	99.15897	0.000000	0.000000
2	0.348139	0.450128	2.880675	95.86809	0.102589	0.698520
3	0.419335	1.198652	5.007960	91.89834	0.370550	1.524500
4	0.477091	2.050978	6.830600	88.05561	0.807431	2.255384
5	0.525815	2.927502	8.225391	84.59988	1.383411	2.863814

Source: Researcher's compilation, 2022 from Eviews 10

The interaction in table 8 below for both the short-run and long-run reveals that M3 GDP can account for 96.7% and 90.2% of its variance on its own, respectively. This demonstrates that other model variables have a significant exogenous influence on M3 GDP because they have limited ability to forecast the dependent variable (M3 GDP) in both the short- and long-term.

Table 8: Variance Decomposition of M3_GDP

Period	S.E.	LACGDP	LACGSF	LCBLA	M3_GDP	CPS_GDP
1	1.737349	1.323069	1.214696	0.693161	96.76907	0.000000
2	2.120680	1.133013	1.573521	1.825367	94.48275	0.985348
3	2.322526	1.859860	1.395345	2.558842	93.03513	1.150826
4	2.446328	2.933515	1.305513	2.943320	91.75071	1.066941
5	2.531295	4.109789	1.587664	3.071167	90.22384	1.007535

Source: Researcher's compilation, 2022 from Eviews 10

It was shown that CPS GDP does not strongly predict itself from the short-run period into the future, as shown in table 9 below. M3 GDP, which accounts for 55.32% of the short-term forecast error variance, is a significant predictor of CPS GDP. Over the long term, M3 GDP was responsible for 63.32% of the variance in CPS GDP's forecast error. Additionally, CPS GDP's forecast error variance on itself decreased, going from 38.9% in the short run to 26.6% in the long run. M3 GDP has a significant impact on predicting changes in CPS GDP.

Table 9: Variance Decomposition of CPS_GDP

Period	S.E.	LACGDP	LACGSF	LCBLA	M3_GDP	CPS_GDP
1	2.070813	2.780545	0.339323	2.668942	55.31948	38.89171
2	2.498101	1.971675	0.620290	3.282522	60.55503	33.57048
3	2.696040	1.863624	1.125781	3.749143	62.97865	30.28281
4	2.809628	2.258469	1.938580	4.002539	63.68209	28.11833
5	2.886789	2.918137	3.060586	4.061746	63.31942	26.64011

Source: Researcher's compilation, 2022 from Eviews 10

5. Conclusions and Recommendations

The Nigerian government has increased budgetary allocations, targeted agricultural financing programs, and commercial bank lending to agriculture over the past ten years. The performance of Nigeria's agricultural output between 1981 and 2021 was examined in this study together with the influence of agricultural loan finance. It was discovered from the coefficients of the variables used in the model that the Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, and Money Supply have a positive impact on agricultural output productivity as a result of the model's application of the Vector Auto-Regression (VAR) estimation technique. However, data estimation indicates that domestic lending to the private sector has a detrimental impact on agricultural output productivity.

The main finding of the study was that financing for agricultural credit enhances Nigerian agricultural output performance. Therefore, the policy conclusion is that in order to reduce (if not totally eradicate) the occurrence of money diversion and to build and enforce strict adherence to the policy on agricultural credit utilization guidance, the government should create a useful and reliable database for farmers. The results of the study also demonstrate that domestic lending to the private sector degrades agricultural output performance, which ought to have a positive effect. In order to ensure that domestic credit to the private sector is used for the intended purpose and is strictly adhered to for that purpose, the Nigerian government should establish a policy. The study recommended that regulations for agricultural loan financing be implemented in order to increase the stability and quantity of finances that Nigerian farmers can assess.

References

Adamgbe, E. T., Belonwu, M. C., Ochu, E. R., & Okafor, I. I. (2020). Analysis of the impact of Central Bank of Nigeria's agricultural intervention funds on the economy. *Economic and Financial Review*, *58*(1), 57 – 80.

Agbenyo, W., Jiang, Y., & Antony, S. (2019). Cointegration analysis of agricultural growth and financial inclusion in Ghana. *Theoretical Economics Letters*, *9*(4), 895-911.

Aniekan, J. A., Anthony, N. R., Daniele, D. W., Ionel-Mugurel, J., & Alex, A. A. (2015). Impact of financial sector reforms on agricultural growth in Nigeria: A Vector Autoregressive (VAR) approach. *American Journal of Experimental Agriculture*, *7*(1), 17-35.

Anyanwu, J. C., & Oaikhenan, H.E. (1995).*Modern macroeconomics: Theory and application in Nigeria*. Onitsha, Nigeria: Joanee Educational Publishers LTD.

Cass, D. (1965). Optimum growth in an aggregative model of capital accumulation. *Review of Economic Studies*, *3*(2), 233-240.

Central Bank of Nigeria (2005).Annual Statistical Bulletin. Abuja.

Central Bank of Nigeria (2021).Annual Report for The Year Ended 31st December 2021. Retrieved from: http://www.cbn.org.ng

Central Bank of Nigeria (2021).The Nigerian incentive-based risk sharing system for agricultural lending. Retrieved from http://www.cbn.gov.ng/OUT/2011/PUBLICATIONS/REPORTS/DFD/BRIEF%200N%20NIRSAL.

Central Bank of Nigeria (2022).Statistical Bulletin. Retrieved from:http://www.cbn.org.ng

Egwu, P. N. (2016). Impact of agricultural financing on agricultural output, economic growth and poverty alleviation in Nigeria. *Journal of Biology, Agriculture and Healthcare*, *6*(2), 36-42.

Emenuga, P. E. (2019). Effect of commercial banks credits on agricultural productivity in Nigeria. *ACTA Universitatis Danubus*, *15*(3), 417-428.

Food and Agricultural Organization (2020).The state of food security and nutrition in the world. Retrieved from http://www.fao.org/publications/sofi/2020/en/

Food and Agricultural Organization (2021). Nigeria at glance. Retrieved from http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/.

Food and Agricultural Organization (2022).2022 Global report on food crises. Retrieved from http://www.fao.org/documents/card/en/c/cb9997en/

Gurley, J. & Shaw, E. (1967).Financial structure and economic development. *Journal of Economic Development and Cultural Change, 15*(1), 333–346.

Johnson, H. E. (1962). The neoclassical one-sector model: A geometrical exposition and extension to a monetary economy. *Economics, 1*(2), 11-20.

King, R.G. & Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics, 108*(2), 717–737.

Koopmans, T. C. (1965). On the concept of optimal economic growth. In Fellner *et al., The Econometric Approach to Development Planning (*pp. 225-300). Amsterdam, North Holland Publishers.

Liu, Y., Ji, D., Zhang, L., An, J. & Sun, W. (2021). Rural financial development impacts on agricultural technology innovation: Evidence from China. *International Journal of Environmental Research and Public Health, 18*(1110), 1-17

Marshall, A. (1898). *Principles of Economics*. London, Macmillan.

McKinnon, R. I., (1973). *Money and capital in economic development*. Washington, D. C.: Brookings Institution. Merlinda.

Meade, J. E. (1961). *A neoclassical theory of economic growth*. Oxford University Press.

National Bureau of Statistics (NBS) (2021).*Annual abstract statistics*. http://www.nbs-annualstatistics.gov.ng

Ndebbio, J.E. (2004). Financial deepening, economic growth and development: Evidence from selected Sub-Saharan African countries. *African Economic Research Consortium, 1*(1), 1-10.

Odetola, T., & Etumnu, C. (2013).Contribution of agriculture to economic growth in Nigeria. International Food Policy Research Institute (IFPRI), Abuja, Nigeria. Proceedings of the 18th Annual African Econometric Society (AES), 2013, at the session organized by the Association for the Advancement of African Women Economists (AAAWE), Accra, Ghana.

Ogunlokun, A. D., & Liasu, A. (2021).Effect of bank financial intermediation on agricultural sector performance in Nigeria. *South Asian Research Journal of Business and Management, 3*(1), 1-12.

Ohwofasa, B. O., & Aiyedogbon, J. O. (2013). Financial deepening and economic growth in Nigeria, 1986 – 2011: An empirical investigation. *Journal of Economics and Development Studies, 1*(1), 24-42.

Oyaniran, T. (2020). *State of Agriculture in Nigeria*[AFCFTA workshop]. Federal Ministry of Agriculture and Rural Development, Abuja.

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change*, *14*(1), 174-89

Phelps, E. S. (1962). The new view of investment: A neoclassical analysis. *Quarterly Journal of Economics*, *76*(11), 548-567.

Pilhyun, K. (2006). Three essays on financial development and economic growth. [Doctoral dissertation] Ohio State University.

Ramsey, F. P. (1928). A mathematical theory of savings. *Economic Journal*, *38*(4), 543-559.

Robinson, J. (1952). *The generalization of the general theory in the rate of interest and other essays*. London: Macmillan

Schumpeter, J. A. (1911). *The theory of economic development*. Cambridge: Harvard University Press

Shaw, E. S. (1973). *Financial deepening in economic development.* New York: Oxford University Press

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, *70*(1), 65-94.

Swan, T. (1956). Economic growth and capital accumulation. *Economic Record*, *32*(63), 334-361.

Tekilu, T., Wondaferahu, M., &Jibril, H. (2018). The link between financial development and sectoral output growth in Ethiopia: The case of agriculture, industry and service sectors. *International Journal of Economics and Management Sciences*, *7*(5), 1-12.

Udoka, C. O. (2015). Bank loan and advances: Antidote for restructuring the agricultural sector in Nigeria. *Internal Journal of Business Studies and Management*, *2*(3), 9-15.

Zakaria, M., Jun, W., & Khan, M.F. (2019).Impact of financial development on agricultural productivity in South Asia. *Agricultural Economics – Czech*, *65*(5), 232–239.