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RESEARCH ARTICLE

Relationship between Agricultural Financing and Agricultural Output in Nigeria

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ABSTRACT

This study assessed the relationship between Agricultural Financing and Agricultural Output in Nigeria. The effect was assessed through the relationship between Agricultural Gross Domestic Product (AGDP) and Banks" Credit to Agriculture (BCRA) together with Banks" Lending Rate proxied by Interest Rate (INTR), Foreign Exchange Rate (FREX), and Government Expenditure on Agriculture (GEXA) for the period 2011 – 2021. A very reliable econometric tool (Ordinary Least Square –OLS) regression method and error correction modeling were used to check the impact/level of relationship between the dependent variable and each of the independent variables. That notwithstanding before the model was estimated; the properties of the variables (parameters) were established in terms of stationarity and long-run relationship. The Dickey-Fuller test for stationarity and Johasen co-integration for long-run relationships were conducted and the variables were integrated. The causality among these variables was equally ascertained using the Granger Causality test. Lastly, the Error Correction Mechanism which checks the short-run shock/relationships among variables was also employed. The results of the analysis show that banks' credit to the agricultural sector was rightly signed and significant (0.06167). This simply meant a positive relationship existed between Banks' lending and Agricultural output in Nigeria. High-interest rates lower agricultural credit demand by farmers, reducing agricultural output in Nigeria (-0.00577). The study concluded that agricultural financing contributed to the economic performance of Nigeria within the sampled period because of inadequate funding. It was recommended that agricultural financing programs exert more commitment in implementing the policy of granting loans by purpose so that segments of the nation's agricultural products targeted for improved productivity and output will be achieved.

Keywords: *Agricultural Financing; Agricultural Output: Nigeria; Agricultural Gross Domestic Product*

Introduction

Agriculture has been regarded as the mainstay of the Nigerian economy despite the increased prominence of oil exploration, making the country fundamentally an agrarian economy (Zuberu *et al.,* 2019). Agriculture significantly affects the Nigerian economy in a number of ways, and the most significant way in which it supports the country's growth is as a provider of food for the rising population, as a source of raw materials, and as a market for industrial products (Obioma, 2021). Additionally, agriculture provides a major source of employment and foreign exchange earnings (Okumadewa, 2007). In addition, agriculture interlinks the subsistent sector with the modern sector to enhance economic growth. These benefits demonstrate that agricultural development is fundamental for industrialization (Ozurumba and Uzomaka, 2011). Okoh (2015) noted that almost 70% of the entire working population in Nigeria is employed in the agricultural sector. Agriculture used to be the cornerstone of the Nigerian economy in the 1950s, 60s and early 70s, whose contribution to the gross domestic product (GDP) was above 50% in these periods. Furthermore, during this era, agriculture generated huge foreign exchange earnings for the economy from exportation of primary products such as rubber, cotton, cocoa, palm oil and groundnut amongst others. The economic fortune of agriculture was shattered as a result of the emergence of crude oil as the country's major export products (Kelani, Olunlade & Olubanwo, 2020).

Available statistics from the Central Bank of Nigeria indicated that the contributions of agriculture to GDP fell from 57% in the 1960s to 30% in the 1970s. Agricultural financing has the capacity to eliminate the financial challenges facing farmers, paving way for adoption of new technologies to spur productivity, promoting economic development through increased income and improved living standards, and helping to unveil talents, capacities, prospects, and opportunities, which are catalytic elements of sustainable development (Kelani *et al.,* 2020). The funding challenges faced by the agriculture sector do not only emanate from a paucity of finance but rather stem from the unwillingness of financial institutions to grant loans and credit facilities to Small and Medium enterprise farmers without necessary collateral requirements. Often, peasant farmers are incapable to provide the collateral requirements needed to access credit facilities and are eventually left with the option of internal sourcing funds (Agbada, 2015).

Farm households in developing countries are heavily constrained in accessing credit from financial markets (Kelani *et al.,* 2020). Available statistics from the Central Bank of Nigeria revealed that commercial bank credit equaled $18, 065.57 was allotted to the agricultural sector in 1970, rose to $96, 522.984 in 1974, $1,192,884.52 million in 1980, and $3,381,576.384 million in 1985. Aggregate credit to the agricultural sector rose to $10,895,134.14 million, depicting 16% of the total credit in the economy, and $65,242,532.663 million in 1995, which was 17% of the overall credit available in the economy. Starting from the year 2000, the proportion of credit to the agriculture sector increased in absolute terms but decreased on relative grounds. For example, total credit to agriculture rose from $106,865,182.34 million, representing 2.46% of total credit in 2005, to $331,404,400.427 million in 2010, representing 1.67% of total commercial bank credit to the economy. As of 2013 and 2014, the share of agriculture credit in total commercial bank credit fell were 3.9% and 3.7% respectively (CBN, 2017).

However, agricultural financing is pivotal to agricultural development and economic growth and has been among the policy thrusts of successive governments. The Federal Government of Nigeria has instructed financial institutions to make loans and credits available for the sector. Against this background, this study was carried out to analyze the relationship between agricultural financing and agricultural output in Nigeria.

Statement of the Problem

The unmet financial need of small and medium-scale farmers has restricted them to a peasant farming system that resulted in low levels of output. Despite the rich natural resources Nigeria has to offer, the agricultural business has had difficulty in the last several years, according to the information. Even though the country has limited access to credit facilities, this hasn't stopped the agricultural sector from playing a major role in helping the country's economy grow and develop. The lack of access to credit, coupled with inefficient allocation of financial resources and its non-exercise by the agricultural sector, has prompted perceptions that agricultural development in Nigeria has been constrained by a host of social-economic and structural problems, such as financial shortfalls; ineffective and misdirected allocation of funds; lack of access to adequate information Interest rates on loan facilities are problematic for farmers in Nigeria, and in certain cases inhibit their ability to get money.

Thus, inadequate capital in financing agricultural projects over the years has subsequently led to a significant decline in the performance of the sector, evidenced by the increasing importation of food commodities, acute food shortage, the high price of food, importation of factor inputs and low share of agriculture in national output.

Objectives of the Study

The broad objective of the study was to analyze the relationship between agricultural financing on agricultural output in Nigeria. The specific objectives included to:

i. Determine the relationship between access to banks' credit and agricultural output in Nigeria.
ii. Analyze the relationship between high-interest rates and agricultural output in Nigeria.
iii. Find out the relationship between exchange rate variations and agricultural output in Nigeria.

Statement of Hypotheses

The under-listed hypotheses stated in the null form were designed to further guide the study:

i. There is no relationship between access to banks' credit and agricultural output in Nigeria.
ii. There is no relationship between high-interest rates and agricultural output in Nigeria.
iii. There is no relationship between exchange rate variations and agricultural output in Nigeria.

Conceptual Review

Agricultural Financing in Nigeria

In order to solve the problem of agricultural financing and poor agricultural output, the Nigerian government established various schemes, institutions, and programs to support the agricultural sector's production capacity (Nwakwo, 2013). Agricultural finance involves the study, examination, and analysis of financial aspects of the farm business. The financial aspect involves money associated with agricultural production and sales. Hopkins (2005) cited in Kelani *et al*. (2020) viewed agricultural finance as the acquisition and control of assets, borrowing, leasing, or custom-hiring. Lee (2008) cited in Kelani *et al*. (2020) defined agricultural finance as the acquisition and usage of capital in agriculture. Agricultural finance is basically about supplying and demanding funds for agriculture. Murray (2007) cited in Kelani *et al*. (2020) pictured agricultural finance as the economic study of funds borrowed by farmers and organizations. Tandan (2012) submitted that agricultural finance is a field of agriculture that focuses on the acquisition and utilization of financial resources by individual farm units.

Agricultural financing is as important as other factor inputs like labour and land, for without adequate credit to finance agriculture, agricultural activities would be redundant. The agricultural lending market is constituted by financial institutions that would make funds available for agricultural activities. The agricultural lending market contains commercial banks, non-financial institutions, and other specialized institutions like the Nigerian Agricultural Cooperative and Rural Development Bank (NARCDB) and Nigerian Agricultural and Co-operative Bank (NACB). Adetiloye (2012) observed that farmers who have sufficient land for cultivation find it easier to obtain credit compared to smallholder farmers who lack sufficient land to optimize credit peradventure it was made available. In addition, lenders failed to assist smallholder farmers owing to credit appraisal costs.

The majority of the credit to the farmer could be for a period of less than one year for arable crops which fits well into the Nigerian bank's desired portfolio. Between 1978 and 1989 with the sectoral allocation of credit to agriculture, the lending portfolios of banks to agriculture rose remarkably. The whole lending process has been shattered as a result of the introduction of financial sector deregulation which made agricultural lending risky, un-lucrative, and uncertain in relation to other sectors (Nwokoro, 2017). The nominal value of bank credit rose from N230 million in 1978 to about N262 billion in 2005; similarly, food imports continue to increase steadily. The effectiveness of agriculture credit lies in soft landing for credit providers and farmers with respect to cost and duration. Various policies and programs have been designed to encourage agricultural financing in Nigeria, the commonest among them are:

1. **Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB):** This is the earliest institution established to encourage financing in agriculture and rural development in Nigeria. The bank is a limited liability company owned by the Federal Government. 60% of the shares are owned by the Federal Ministry of Finance and the remaining 40% by the Central Bank of Nigeria. The basic responsibility of NARCDB was to provide funds for agriculture, especially for small and medium-scale farmers. The NARCDB accepts deposits from customers, provides loans and advances to customers, provides advisory serves and acts as a major partner for investors in the agricultural sector.
2. **National Agriculture and Cooperative Bank (NACB):** This scheme was established in 1973 with the overall objective of developing the economy through the provision of support for agriculture and providing funds for farmers and cooperative societies. The need to finance agricultural projects resulted in the establishment of NACB. After its emergence, there was a remarkable change in the process of credit provision for farmers. NACB provides farmers loans to enable them to procure surplus crops during harvesting seasons. This method has reduced wastage and acts as a catalyst for farmers to produce more. The duration of the loans ranged from one month to 21 months. Unfortunately, the NACB failed to achieve its objectives (Kelani *et al*., 2020).
3. **Nigerian Agricultural Insurance Corporation (NAIC):** This scheme was established in 1977 at the period agricultural financing needed a specialized agricultural insurance firm to provide insurance cover for farmers. The scheme was birthed as a result of the unwillingness of conventional insurance firms to provide cover for agricultural activities, which they tagged as risky. The NAIC was basically established to provide insurance cover for farmers against havoc, natural disasters, unforeseen contingencies, and other risks inherent in agriculture production (Kelani *et al*., 2020).
4. **Refinancing and Rediscounting Facility:** This scheme was instituted by the Central Bank of Nigeria to provide support for agricultural exports. This scheme helps commercial banks to provide short-term finance in domestic currency at favorable interest rates to support export commodities. The objectives of the facility are to foster medium and long-term bank lending to critical sectors of the economy in order to expand the production base of the country and also to ensure that a significant fraction of total credits is channeled to the real sector for economic growth and development (Kelani *et al*., 2020).
5. **Agricultural Credit Guarantee Scheme Fund (ACGSF):** The scheme was established in 1977 to provide assurance to banks that provide credits to farmers. The scheme was established to stimulate credit flows to the agricultural sector by making guarantees available to commercial banks. The scheme has a capital base of about N3 billion and provides credit facilities to farmers to a maximum limit of 75% of the amount of security accrued. Several measures have sprung up in ACGSF such as Self-Help Group Linkage Banking, the Trust Fund Model, and the Interest Drawback [21]. The interest drawback scheme was instituted to encourage easy access to credit facilities at a cheap interest of 8%. ACGSF rose from N0.04 billion in 1981 to N0.16 billion in 1995, N3.31 billion in 2004, N7.74 billion in 2010, and N11.44 billion and N8.10 billion in 2015 and 2016 respectively.

Agricultural Output

Agricultural output relates to the value of production or yield of a specific farming enterprise used or sold on the farm. It is simply the sum of the yield of crop production, livestock, fishing forestry, and other agricultural products (Muftaudeen & Abdullahi, 2014). Francis (2013) cited in Ibitomi & Ijaiya (2020) averred that cash crops are crops that are grown for sale at a profit. It includes cotton, oil palm, fruit trees, rubber, sugarcane, cocoa, coffee, etc. They are majorly produced in the southern and western parts of Nigeria. Food crops are agricultural products produced for use as food either for sale commercially or for use by the grower. It includes cereals, legumes, vegetables, tubers, fruits, etc. They are majorly produced in every region of the country. Livestock is domesticated animals raised in agricultural settings to produce labour and commodities. It includes cattle, horses, sheep, goats, camels, poultry, and others; they are used in the production of meat, eggs, milk, fur, leather, jewelry, and wool (Obasi, 2015). Fisheries are the science of producing fish and other aquatic resources for the purpose of producing food for man. Examples are marine fish, moonfish, catfish, white sharks, mormyridae, Atlantic cod, pupfish, and lots more. Forestry is the science, art, and practice of understanding, managing, and using wisely the natural resources associated with and derived from forest lands (Obilor, 2013). These resources include timber, water, fish, wildlife, soil, plants, and recreation.

Theoretical Framework

Quite a number of theories on financing and agricultural development have been postulated in literature. However, the study reviewed two theories that are highly relevant to the subject matter. The theories are

i. Loan pricing theory,
ii. Structural change theory,
iii. Theory of multiple lending and
iv. Boserupian theory of agricultural development.

Loan Pricing Theory

This theory is of the view that banks are always tempted to set high-interest rates in order to earn higher income or maximize profit. Banks should always take cognizance of the problems of adverse selection and moral hazard in trying to earn maximum interest income because it is very difficult to forecast the borrower type at the start of any banking relationship. Setting interest rates too high may induce adverse selection problems because high-risk borrowers may develop moral hazard behaviour since they are likely to take on highly risky projects or investments (Olokoyo, 2011). From the reasoning of Stiglitz and Weis, it is usual that in some cases we may not find that the interest rate set by banks is commensurate with the risk of the borrowers.

Theory of Multiple Lending

This theory is of the view that banks should be more concerned with equity, mergers, and acquisitions which increase their lending capacities and they should be less inclined to share lending. This will reduce the need for greater diversification and monitoring. This, however, is obtainable in the presence of a well-developed equity market. Banks should be less inclined to share lending (loan syndication) in the presence of well-developed equity markets and after a process of consolidation. Both outside equity, mergers, and acquisitions increase banks' multi-lending capacities, thus reducing their need for greater diversification and monitoring through share lending (Carletti *et al.,* 2009 cited in Nwokoro, 2017). This theory has a greater implication for banks in Nigeria in light of the recent 2005 consolidation and recapitalization exercise in the banking industry.

Structural Changes Models

The structural-change theory according to Ernest (2014) focuses on the mechanism by which underdeveloped economies transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern, more urbanized, and more industrially diverse manufacturing and service economy. It employs the tools of neoclassical price and resource allocation theory and modern econometrics to describe how this transformation process takes place (Todaro and Smith, 2011). The two well-known types of the structural-change model are the "two-sector surplus labour" theoretical model of W. Arthur Lewis and the "patterns of development" empirical analysis of Hollis B. Chenery.

Boserupian Theory of Agricultural Development

As mentioned by Ekeh (2014) cited in Nwokoro (2017), this theory was established by Ester Boserup, a Danish Economist. The Boserupian theory states that the increase in the growth and development of Agriculture is determined by the size of the population (labour Force) involved in agricultural practice. This opposes Malthusian theory which stipulates that the size and growth of the population depend on the food supply and agricultural methods; in times when food is not sufficient for everyone, the excess population will die. Boserup argued that in those times of pressure, people will find ways to increase the production of food by increasing the workforce, machinery, and fertilizers.

Empirical Review

Ewubare and Eyitope (2015) evaluated the effects of government expenditure on the agricultural sector output in Nigeria. The study made use of time series data to ascertain the effects of government expenditure (GEA), deposit money banks loan (DBA), and gross capital formation (GCF) on agricultural production output in Nigeria using data generated from the statistical bulletin of Central Bank of Nigeria and National Bureau of Statistics database, various issues. Ordinary least squares multiple regression model was adopted in analyzing the data. The study found that GEA was positive and statistically significant in influencing agricultural output in Nigeria.

Mathew and Mordecai (2016) examined the impact of public expenditure in the agricultural sector on agricultural output in Nigeria from 1981 to 2014 using time series data sourced from the CBN Statistical Bulletin and Annual Reports, on various issues. The results of the multiple regression analysis carried out revealed that government expenditure on agriculture has a significant but negative impact on agricultural output. In contrast, commercial banks' credit to the agricultural sector and the interest rate have an insignificant positive impact on agricultural output in Nigeria.

Ajayi, Nageri, and Akolo (2017) evaluated the impact of agricultural financing policy and deposit money bank loans to the agricultural sector on agricultural productivity. The study used a time series linear regression model employing data sets from 1981 and 2015. The research results recorded that deposit money bank loans and policy on agricultural financing have significant and positive effects on agricultural sector productivity, while lending rate (LR) had a significant but inverse effect on agricultural output in Nigeria.

Enilolobo and Ode-Omenka (2018) investigated the impact of deposit money banks' credit on agricultural output in Nigeria from 1978 to 2016. Time series data were sourced from the statistical bulletin of the Central Bank of Nigeria. Ordinary least squares regression models were used in analyzing data. The findings of the study indicated that there was no long-run relationship between deposit money banks' credit to the agricultural sector and agriculture sector output in Nigeria.

Ikpesu and Okpe (2019) employed the ARDL model in examining the effect of capital inflows and exchange rates on agricultural productivity in Nigeria from 1981 to 2016. The study used agricultural output as a proxy for agricultural productivity, private capital inflow, public capital inflow, investment, labor, and real effective exchange rate as explanatory variables. The study found that the variables were co-integrated. It further indicates that in the short run and long run, private capital inflow and public capital inflow positively influenced Nigeria's agricultural performance. In addition, it was discovered that exchange rate depreciation caused a reduction in the yield of agricultural produce in the short and long run.

Methodology

The choice of research design employed in this study is the archival and documentary research strategy, associated with the deductive approach, used for descriptive research purposes (Saunders *et al*., 2009); the rationale is to allow the collection of quantitative data. Furthermore, the research choice employed is the quantitative method, which involves a secondary data collection technique. It is also designed to be inductive in nature since the researcher will be drawing conclusions based on the analysis of the data collected. This study was conducted in Nigeria. The population of this study comprises 10 years of data on total annual financial expenditure on agricultural productivity output and export earnings from 2011 to 2021 (10 years) forms the population of the study. A very reliable econometric tool (Ordinary Least Square –OLS) regression method and error correction modeling were used to check the impact/level of relationship between the dependent variable and each of the independent variables. That notwithstanding before the model was estimated; the properties of the variables (parameters) were established in terms of stationarity and long-run relationship. The Dickey-Fuller test for stationarity and Johasen co-integration for long-run relationships were conducted and the variables were integrated of the same order, especially order one (1). The causality among these variables was equally ascertained using the Granger Causality test. Lastly, the Error Correction Mechanism which checks the short-run shock/relationships among variables was also employed.

Model Specification

The model of this research work is built or structured to establish the functional relationship between Banks' credits and Agricultural Sector performance in Nigeria, 2011 - 2021. The model we tested in this study is a multiple regression stated below:

AGDP = F(INTR, FREX, INVA, GEXA, AGCR)

Where;
AGDP = Agricultural Gross Domestic Product
INTR = Banks' Lending Rate (proxied by interest rate)

FREX = Foreign Exchange Rate
MSPL = Investment in Agriculture
GEXA = Government Expenditure on Agriculture
AGRC = Banks' Credits to Agriculture
Determining the Mathematical form of the model, we, therefore, state that;
$Y = F(X_1\ X_2\ X_3\ X_4\ X_5)$…… (1)

Where;
F = Functional relationship
Y = Dependent Variable (AGDP)
X_1 = Interest Rate
X_2 = Foreign Exchange Rate
X_3 = Investment in Agriculture
X_4 = Government Expenditure on Agriculture
X_5 = Banks Credit to Agriculture

Interest Rate, Foreign Exchange Rate, Investment in Agriculture, Government Expenditure on Agriculture, and Banks" Credits to agriculture are the regressors or Independent variables. Because money growths are non-linear, the equation is put in a log-linear form. Re-writing the above equation in its mathematical form as a Log-linear model in other to rescale the value including the unknown estimation parameters below;

$LnY = b_0 + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 X_4 + b_5 X_5$…… (2)

Where;
Ln = Logarithm
Y = Dependent Variable
b_0 = Functional Intercept
b_1, b_2, and b_3 = Weight of a unit change in the explanatory variables, that is parameters or co-efficient of X_1, X_2, X_3, X_4, and X_5 respectively. We further re-write the above equation (2) in the standard form (Econometric form) by introducing the Error term below.
$LnY = b_0 + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + U$…… (3)
This can also be written as,
$AGDP = a_0 + a_1 INTR + a_2 FREX + a_3 INVA + a_4 GEXA + a_5 AGCR + \mu$… (4)

Where, b_1, b_2, b_3, b_4 and b_5 = Estimation parameters
U = Error term or Random term.
$H0: b_1 = b_2 = b_3 = \ldots\ldots b_n = 0$
Against the alternative hypothesis;
H_1: not all b's are zero. If the null hypothesis is true, there is a significant relationship between Y (the Regressand) and the Regressors.
The hypotheses are stated as follows:
H_0: $b_1 = b_2 = b_3 = b_4 = b_5 = 0$ (that the b's are not statistically different from zero).

H_1: $b_1 \neq b_2 \neq b_3 \neq b_4 \neq b_5 \neq 0$ (that the b's are statistically different from zero).

Results

Unit Root Test

Table 1: Stationarity Test

	T Statistic.	Critical values 1%	Critical values 5%	Critical values10%	Prob.	Order of integration
AGDP	-4.882548	-3.6661	-2.9627	-2.6200	0.000012	I(1)
INT	-5.511028	-3.6661	-2.9627	-2.6200	0.000000	I(1)
FOREX	-3.583208	-3.6661	-2.9627	-2.6200	0.000096	I(1)
INVA	-4.342788	-3.6661	-2.9627	-2.6200	0.000002	I(1)
GEXA	7.764452	-3.6661	-2.9627	-2.6200	0.000000	I(1)
BCRA	-6.590445	-3.6661	-2.9627	-2.6200	0.000000	I(1)

Author's Computation Eviews 3.1 Output

The table above presents the summary of unit root test results gotten at levels, of first difference and second difference. The Augmented Dickey-Fuller test was conducted on all the variables and the result gotten, showed that agric GDP, interest rate, foreign exchange rate, investment in agriculture, government expenditure on agriculture, and banks" credit to agriculture were stationary at first difference as their T Statistic values at first differencing is greater than the critical value at 5%.

Co-integration Test

Table 2: Co-integration Test

Sample: 2011 2021
Included observations: 10
Test assumption: Linear deterministic trend in the data
Series: AGDP INT FOREX MSPL GEXA BCRA
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.796032	147.0414	114.90	124.75	None **
0.688857	97.75778	87.31	96.58	At most 1 **
0.654501	61.56517	62.99	70.05	At most 2
0.371643	28.61942	42.44	48.45	At most 3
0.257777	14.21536	25.32	30.45	At most 4
0.148244	4.974109	12.25	16.26	At most 5

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

The result above showed two cointegrating variables at 5% critical value as the likelihood ratio value of these variables (147.0414) and (97.75778) in the table was greater than their 5 percent critical value (114.90) and (87.31). We, therefore, reject the null hypothesis and conclude that there exists a long-run equilibrium relationship between the dependent and independent variables.

Causality Test

Table 3: Causality Test

Null Hypothesis:	Obs	F-Statistic	Probability
INT does not Granger Cause AGDPAGDP does not Granger Cause INT	31	0.62858 0.09002	**0.54126** **0.91419**
FOREX does not Granger Cause AGDPAGDP does not Granger Cause FOREX	31	0.61053 1.49479	**0.55067** **0.24294**
MSPL does not Granger Cause AGDPAGDP does not Granger Cause MSPL	31	0.46359 1.45640	**0.63412** **0.25147**
GEXA does not Granger Cause AGDPAGDP does not Granger Cause GEXA	31	0.68075 2.61797	**0.51503** **0.09208**
BCRA does not Granger Cause AGDPAGDP does not Granger Cause BCRA	**31**	**0.26128** **0.76399**	**0.77207** **0.47598**

There was no bidirectional causality. However, there was unidirectional causality at 5% and 10% significant levels moving from AGDP to GEXA

Table 4: Estimation of Result Long run Estimate

Dependent Variable: AGDP
Method: Least Squares
Date: 06/2/22 Time: 06:06
Sample: 2011 2021
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.497151	0.185242	51.26889	0.0000
INT	-0.005743	0.003338	-2.920615	0.0498
FOREX	0.000306	0.000691	0.442854	0.0614
INVA	0.228021	0.026984	8.450236	0.0000
GEXA	0.007218	0.027113	0.266228	0.7921
BCRA	0.061667	0.022166	-2.782007	0.0397
R-squared	0.976998	Mean dependent var		12.01335
Adjusted R-squared	0.972738	S.D. dependent var		0.454403
S.E. of regression	0.075027	Akaike info criterion		-2.178967
Sum squared resid	0.151985	Schwarz criterion		-1.906875
Log-likelihood	41.95296	F-statistic		229.3603
Durbin-Watson stat	0.910433	Prob(F-statistic)		0.000000

AGDP = 9.497 - 0.0057INT + 0.0003FOREX + 0.228INVA + 0.0072GEXA + 0.06167BCRA

Model I

Constant

a_0 =9.497, this reveals the constant factors that affect AGDP in addition to interest rate, Foreign exchange rate, money supply, Government Expenditure, and bank credit to agriculture. Therefore, if the above-listed variables are zero, the GDP will be 9.497.

Bank Credit to Agriculture

a_1= The coefficient of bank credit to agriculture (0.06167) appeared with a positive sign and did conform to expectation. The coefficient shows that a 1% increase in bank credit to agriculture will lead to an increase in AGDP by 0.06167%.

Banks' Lending Rate (Interest Rate)

a_2 = -0.00577, the Interest rate appears with a negative sign and conformed to the apriori expectations. This signifies an inverse relationship with AGDP and shows an increase in interest rate by 1% leads to a decrease in AGDP by 0.977%.

Foreign Exchange Rate

a_3= The coefficient of the foreign exchange rate (0.0003) appeared with a positive sign and did conform to expectations. From our analysis, a 1% increase in the foreign exchange rate leads to an increase in AGDP by 0.003%.

Statistical Evaluation

The statistical tools used here are co-efficient of determination and adjusted coefficient of determination for the stated models.

Interpretation of Result Based on Statistical Test of Significance

Test of Goodness of Fit

The coefficient of determination (R^2) is 0.976 i.e. 97.6%. This simply illustrates that 97.6% of thevariation in AGDP is explained by the explanatory variables in the model.

The t-Test

The test of significance from our result showed that two variables (INVA and INT) were statistically significant for the period under review at 5% level of significance while at a 10% level of significance, INF was statistically significant. This is due to the fact that their T probability values of 0.0000, 0.0000, and 0.0226 are all less than 0.05 (5% level of significance), while the T probability value of INT at 0.0580 is less than 0.10 (10% level of significance). We, therefore, reject the null hypothesis and accept the alternative.

The F Test

The F-Stat test, which shows the significance of the entire regression model from our result, was significant as the Prob(F-statistic) value of 0.000 is less than 0.05 (5% level of significance) which further confirms the value of the R^2. Also, F_{cal} which is 229.36 is greater than $F_{tab}(6,33)$. Hence F test issignificant. Since the F stat test is significant, we reject the null hypothesis and accept the alternative that there exists a significant relationship between AGDP and variables tested in the study. The Durbin-Watson value of 0.9104 shows a positive autocorrelation.

Table 5: Error Correction Mechanism

Dependent Variable: D(LNAGDP)
Method: Least Squares
Date: 06/2/22 Time: 10:25
Sample (adjusted): 2011 2021
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.048308	0.026166	1.846191	0.0778
D(LNAGDP(-1))	0.175484	0.290339	0.604411	0.5515
D(LNINT(-1))	-0.039069	0.045684	-3.855206	0.0203
D(LNFOREX(-1))	0.024355	0.034584	-4.704220	0.0084
D(LNINVA(-1))	-0.011015	0.087510	-2.925875	0.0409
D(LNGEXA(-1))	0.014172	0.014016	3.011160	0.0325
D(LNBCRA(-1))	0.003928	0.018390	-0.213609	0.8327
ECM(-1)	-0.144786	0.184883	-4.783123	0.0415

R-squared	0.795767	Mean dependent var	0.049579
Adjusted R-squared	0.727261	S.D. dependent var	0.045862

S.E. of regression	0.048693	Akaike info criterion	-2.988928
Su squared resid	0.054533	Schwarz criterion	-2.618867
Log likelihood	54.32838	Hannan-Quinn criter.	-2.868297
F-statistic	9.516169	Durbin-Watson stat	1.908459
Prob(F-statistic)	0.041296		

Error Correction Mechanism

The result from the parsimonious model showed the expected and right signs for all variables exceptmoney supply. It further revealed that AGDP has a significant relationship with FOREX, INVA, GEXAand BCRA at 5% level of significance. Further, the coefficient of the error correction model bears the correct sign (-0.144786) and is significant. It shows that about 14% recovery rate from the disequilibrium.The R^2 revealed that about 80% variation in agricultural output in Nigeria is explained by the explanatory variables in the model while the F-statistic of 9.516169 also shows that the entire regression model is fit while the Durbin Watson value of 1.908459 tends towards 2 showing no serial autocorrelation.

Discussion of Results

From the properties expatiated and the tests carried out on this research work as aforementioned; the Augumented Dickey Fuller stationarity test showed that all the variables were stationary at first differenceas their T-statistic values at first differencing is greater than their critical value at 5%.

The co-integration test showed two co-integrating variables at 5% critical value as the likelihood ratio value of these variables (147.0414) and (97.75778) in table was greater than their 5 percent critical value (114.90) and (87.31). Decision rule being when there is at least one cointegrating variable; we therefore, conclude that there exists a meaningful long run relationship between Agricultural Gross Domestic Product and the explanatory variables.

The Granger causality test shows a unidirectional causality at 5% significant level from AGDP to GEXA.The coefficient of determination (R^2) values of 97.6% and 80% of OLS and ECM respectively show a strong goodness of fit between the dependent and the independent variables.

The Durbin Waston value of 0.91 was corrected by the error correction mechanism making the value tobe 1.9 which is approximately 2; indicating no serial autocorrelation.

The T-test and the F-test of the two results show that both the individual and general or joint test of the variables in the model are statistically significant.

Summary of Findings

This study assessed the effects of Agricultural financing on Agricultural Output (Sector performance) in Nigeria for the period 2011 – 2021. The effect was assessed through the relationship between Agricultural Gross Domestic Product (AGDP) and Banks‟ Credit to Agriculture (BCRA) together with Banks‟ Lending Rate proxied by Interest Rate (INTR), Foreign Exchange Rate (FREX), Investment in Agriculture (INVA) and Government Expenditure on Agriculture (GEXA). A very reliable econometric tool (Ordinary Least Square –OLS) regression method and error correction modeling were used to check the impact/level of relationship between the dependent variable and each of the independent variables. That notwithstanding before the model was estimated; the properties of the variables (parameters) were established in terms of stationarity and long-run relationship. The Dickey-Fuller test for stationarity and Johasen co-integration for long-run relationships were conducted and the variables were integrated of the same order, especially order one (1). The causality among these variables was equally ascertained using the Granger Causality test. Lastly, the Error Correction Mechanism which checks the short-run shock/relationships among variables was also employed.

Having done the very necessary tests and analyses that are required of this research work; the summary of the major findings in the study is stated thus:

1. Banks' credit to the agricultural sector is rightly signed and significant. This simply means that there exists a positive relationship between Banks‟ lending and Agricultural output in Nigeria. Thus, implying that banks‟ credit to the sector over the years has contributed significantly to the growth of the agricultural sector in Nigeria.

2. High-interest rates lower agricultural credit demand by farmers, reducing agricultural output in Nigeria. In other words, the higher the lending rate, the lower the demand for agricultural loans in Nigeria.
3. Exchange rate variations also influence and affect the Agricultural sector performance in Nigeria. And Government expenditure on agriculture and Investment in Agriculture has a positive and significant effect on the agricultural output in Nigeria. Also from the results of the analyses, there exists a long-run relationship or equilibrium among the variables.

Conclusion

Nigeria's agricultural sector has been poorly financed over the years. Agriculture, which used to be the mainstay of the Nigerian economy in the 1950s, 60s, and early 70s, is now conceived as a risky and unprofitable venture by financial institutions and the government. This conception in collaboration with the financial incapacity of the majority of Nigerian farmers and agro-allied entrepreneurs discouraged financial institutions from granting credit for agricultural purposes. Financial institutions prefer to channel their funds to the industrial and service sector where the payback period is short and the return rate is high. The study maintained that agricultural financing contributed poorly to the economic performance of Nigeria within the sampled period because of inadequate funding.

Recommendations

In line with the findings and the conclusion of the study, the following recommendations were made.

i. Agricultural financing programs should exert more commitment in implementing the policy of granting loans by purpose so that those segments of the nation's agricultural products that are targeted for improved productivity will be achieved.
ii. Government is advised to pay more attention to the agricultural sector by compelling financial institutions to supplement government efforts towards financing agriculture through the disbursement of loans at a low-interest rate at the appropriate time in order to avoid the diversion of such loans.
iii. The government should encourage the export of agricultural produce to the rest of the world by granting excise duty waivers and also encourage the import of modern farm equipment by granting import duty waivers to agricultural machines. This will encourage the mechanization of our agricultural sector currently dominated by the use of crude implements.

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