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Commercial Bank Credit and Agricultural Growth Outcomes in Nigeria: An Empirical Analysis

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Abstract

This study investigates the impact of commercial bank loans on agricultural growth outcomes in Nigeria. It uses Augmented Dickey Fuller unit root test in order to examine stationarity of model input variables, documenting that all variables were stationary either at levels $I(0)$ or at first difference $I(1)$. The study then employed the ARDL model and Error Correction Model to estimate the long-run and short-run effects of the variables. The long-run model results showed that commercial bank credit and government expenditure had a positive relationship with agricultural output, while exchange rate had a negative effect. The error correction model results revealed that government expenditure had a positive relationship with agricultural growth outcomes, while exchange rate and interest rates had a negative effect.

In conclusion, the research found that commercial bank credit had a significant positive effect on agricultural growth outcomes in Nigeria, and recommended that commercial banks' lending policies and procedures should be flexible to accommodate more farmers. The results also imply that the government should provide adequate funds for the agricultural sector, specifically increasing its financial grants to small-scale farmers, to promote agricultural output and economic growth in the country.

Keywords: Commercial Bank; Agricultural Credit; Growth Outcomes; Nigeria.

JEL Classification: O11, O13.

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1. Introduction

Agriculture remains one of the most impactful sectors in the Nigerian economy. It plays crucial roles in the provision of food for human consumption and sustenance, raw materials for manufacturing industries, occupation for individuals in agrarian communities, provision of foreign exchange incomes and the overall human development of the economy. Agriculture makes important contribution to poverty reduction, expansion of employment opportunities, enhancing effective income distribution while contributing immensely to speed up industrialization with favourable balance of payments (Ogbonna & Osondu, 2015; Ugochukwu, 1999).

Nigeria was originally an agriculturally dependent country in the 1960s and up to the time of the oil boom of the 1970s. Agriculture was solely the mainstay of the Nigerian economy. It occupied a coveted position among other sectors of the economy and allies in the global world by taking a lead in the exportation of cocoa, palm oil, cotton and groundnuts ahead of major competing economies. During the 1960s, Nigeria held the position of being the biggest global exporter of groundnut, the second biggest exporter of cocoa and palm produce, and was also a major exporter of rubber and cotton (Aluko, 2004; Otaha, 2012; Sekunmade, 2009; Sulaimon, 2021).

The sector is fraught with so many challenges limiting its growth and development despite availability of prospects to attain better results. Among its many challenges are lack of adequate funds to finance agricultural investments, lack of adequate infrastructural facilities to expand its base and underutilization of available resources. These factors continually limit the capacity of the sector (Tolulope & Chinonso, 2013).

Agricultural finance is one very key aspect to increased food production and commercial banks play an important role in funding agriculture. Ayodele et al. (2013) acknowledged the fact that increased funding and favorable agricultural policies is sure to boost food production in Nigeria. Many policies have been enacted by the government to solve the problem of agricultural finance in Nigeria and banks have been specifically burdened with the role of providing adequate funding through agricultural credits. However, the facts remain that farmers often lack access to credit facilities for agricultural production. Often times, commercial banks prefer granting credit to investors from the industrial sector rather than those from the agricultural sector and where the credit was provided, the interest payable on loans and need for collateral security are outrageous. These conditions place restrictions on access to capital and scare many farmers away. Majority of farmers lack adequate funds for food production and this has continued to be a

constraint hindering farmers from adopting new agricultural innovations and technologies needed to increase food productivity (Sunny, 2013; Aduralere, 2019).

After abandoning the agricultural sector, Nigeria shifted focus to oil exportation in the 1970s and has continued to witness decades of low agricultural productivity and slow economic growth as a result (CIA, 2013). Today, Nigeria is an import dependent economy, importing major staple food such as rice, maize and wheat among other food products to feed its rapidly increasing population. The country imported wheat valued at 6 billion USD between 2016 and 2022 and the value of imported rice was ₦467.96 billion between 2019 and 2020 (Nzeka, 2013; CBN, 2020; Olowa, 2021; Punch Business News, 2022). This clearly reveals that the food insecurity situation in Nigeria is disturbing and requires urgent attention.

Nigeria, though an abundantly blessed nation is also plagued with problems of resource curse syndrome. Despite having plentiful natural and human resources that could support increased food production and rapid economic growth, a significant portion of the population in this country suffers from hunger, starvation, and poverty. This is because the agricultural sector has been neglected. Recent records also reveal that the performance of the economy has been far below expectation (World Bank, 2020). Agriculture in Nigeria is still in a poor and underdeveloped state. The sector relies heavily on outdated methods used by small-scale farmers to provide for a rapidly expanding population. As a result, this has had significant adverse effects on the sector's traditional role in food production and its contributions to economic growth (Falola & Haton, 2008).

Based on this milieu, this study seeks to investigate the effects of commercial bank loans on the agricultural growth outcomes in Nigeria. It also seeks to ascertain the effects of government expenditure, exchange rate and commercial bank lending rates on agricultural output in Nigeria.

The rest of this paper is structured as following. Section 2 reviews theoretical and empirical literature. Section 3 shows data, model specification and methodology. Section 4 discusses about results of analyses and Section 5 concludes.

2. Literature Review

2.1. Theoretical Review

A number of theories have explained the importance of loans in investment. Some of the theories are namely loanable funds theory, loan pricing theory, financial liberalization theory and pro-concentration theory. However, the most appropriate of these theories to this study is the loanable funds theory.

Loanable Funds Theory

The loanable fund theory of interest rate also known as the neo-classical theory of interest rate is founded based on the neo-classical approach which states that interest rate is the price paid for loanable funds. The loanable fund is demanded by the three economic agents namely; government, firms and households whose roles are very important in an economy (Wicksell, 1951).

The supply of loanable funds comes from the savings of these economic agents. The supply of funds available for credit is determined by the money supply of loanable funds from commercial banks and new money supply obtained through credit creation by commercial banks. On the other hand, demand for loanable funds is determined by investment expenditure. At the particular point where the supply of loanable funds equals the demand for loanable funds, the equilibrium interest rate is determined. The demand for loanable funds is negatively related to the interest rate while the supply of loanable funds is directly related to the interest rate since more loanable funds are sufficiently accessible at higher interest rates, and vice versa (Hansen, 1951). This theory explains the reason why investors go for more credit at lower interest rates and shy away from obtaining loans when the lending rates are high.

2.2. Empirical Review

Recent studies have thoroughly explored the significance of the agricultural sector in promoting sustainable development and economic growth. According to Ahungwa et al. (2014), agricultural productivity is the most crucial factor in facilitating successful industrialization. Thus, it is imperative for Nigeria to prioritize the development of a robust agricultural sector that can meet the increasing demand for food and raw materials required by the expanding industrial sector, and also create employment opportunities for its growing

population. Therefore, there is a need to redirect focus towards agriculture as a crucial element for ensuring sustainable economic growth and development.

Okuneye and Ajayi (2020) conduct a study to investigate the influence of commercial banks' credit for agriculture and government agricultural expenditure on agricultural production in Nigeria from 1980 to 2018. The study uses the ARDL co-integration mechanism to analyze the data and finds that there is a long-term correlation between interest rates, government spending on agriculture, and agricultural production in Nigeria.

In a similar study, Nakazi and Nathan (2020) examine the effects of commercial banks' credit on the growth of Uganda's agricultural sector using quarterly time series data from 2008 to 2018 sourced from the Uganda Bureau of Statistics (UBS) and the Bank of Uganda. The study uses the Autoregressive Distributed Lag (ARDL) approach to evaluate the short and long-term relationship between commercial banks' credit and agricultural performance. The results show that agricultural credit has a significant positive impact on agricultural output. Loans and advances for production purposes are found to have a significantly greater impact on agricultural output than credit for agricultural marketing and processing. Furthermore, the research findings suggest that although the provision of bank loans to the agricultural industry did not result in an immediate boost in agricultural productivity in the short term, it did have a noteworthy effect on Uganda's agricultural gross domestic product (GDP) over a longer time period.

Adeshina, Tomiwa, and Eniola (2020) investigate the impact of agricultural credit on economic growth in Nigeria. The study utilizes data from the Central Bank of Nigeria statistical bulletin and analyzes it using the Unit root stationarity test, Autoregressive distributed lag model (ARDL), and error correction modeling to estimate the specified variables. The analysis shows that the Agricultural Credit Guarantee Scheme Fund has a more substantial positive effect on economic growth than government expenditure on the agricultural sector in the long run.

Medugu, Musa, and Abalis (2019) study the impact of commercial banks' credit on agricultural performance in Nigeria. They use time series data from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria's statistical bulletin covering the period from 1980 to 2018. The analysis utilizes the autoregressive distributed lag model (ARDL) and error correction mechanism, and the results indicate a positive and significant relationship between commercial banks' credit, government expenditure, and agricultural output in Nigeria. However, the interest rate is found to have a negative correlation with agricultural output.

Emenuga (2019) examines the relationship between commercial bank and the agricultural sector in Nigeria between 1981 and 2017. Using Johansen co-integration test, he documents existence of long-run relationship between agricultural bank loans and agricultural performance in Nigeria. He also sets up Error Correction Model where he finds negative and statistically significant error correction coefficient.

Agenson and Eyo (2019) investigate the effect of financial sector reforms on agricultural output in Nigeria. They aim to compare the output of different agricultural sub-sectors under different reform periods, compare the impact of loans on agricultural output for each agricultural sub-sector, and analyze the effect of reforms on farmer's output. As a result, they observe that commercial bank loans to farmers have significant impact on agricultural sector output. Furthermore, the agricultural output from the crop sector consistently exceeds that of other agricultural sub-sectors in all the reform periods.

Ekine and Onukwuru (2018) examine the impact of credit from commercial banks on the performance of the agricultural sector in Nigeria, using time series data from 1986 to 2016. Using co-integration technique, they fail to find existence of long-run relationship between credit from commercial banks and agricultural sector performance. However, they observe that government expenditure has a significant positive impact on agricultural sector performance, while interest rates has a significant negative impact.

Uremadu et al. (2018) analyze the impact of agricultural credit, actual exchange rates, average annual rainfall, and population growth rates on agricultural production in Nigeria using time series data from 1981 to 2014. The study finds a strong positive association between agricultural production and agricultural credit from the banking system and government agricultural spending. In contrast, actual exchange rates, average annual rainfall, and population growth rates have negative relationship with agricultural production.

Jonathan and Cynthia (2017) study the impact of commercial bank credit on agricultural productivity in Nigeria using an annual time series data for the period 1981-2014. As a result, they document existence of long-run cointegration between input variables. Thus, they conclude that the effect of commercial banks' agricultural credit on agricultural productivity is significant and positive in the long run. However, in the short term, the impact is relatively insignificant.

Adewole et al. (2015) investigate the effects of commercial banks contribution in agricultural financing in Nigeria during period of 2002-2014. Utilizing Ordinary Least Squares (OLS) technique, they find that cash reserve

ratios, minimum money market rediscount rate and the liquidity ratio of commercial banks are not statistically significant in relation to agricultural gross domestic product.

Similarly, Athanasius (2017) investigates the correlation between bank credit and agricultural sector performance in Nigeria using time series data from 1980 to 2014. He employs Ordinary Least Square (OLS) technique and Error Correction Model (ECM) to analyze the data. As a result, he finds that agricultural gross domestic product (AGDP) has a positive and significant relationship with bank credit to agriculture, foreign exchange rate, government expenditure on agriculture, and money supply. However, interest rate has a significant negative influence on agricultural performance.

Chris et al (2016) conduct a study to examine the impact of commercial banks' credit on agricultural output in Nigeria. Using Ordinary Least Square (OLS) technique, the study utilizes specified variables including gross domestic product (GDP) to the agricultural sector, commercial banks' credit to agriculture, government spending, and lending rate on agricultural loans. As a result, it documents a significant positive relationship between Agricultural Credit Guarantee Scheme Fund (ACGSF) and agricultural production in Nigeria.

Anthony et al. (2015) investigate the impact of commercial bank credit on the performance of the agricultural sector in Nigeria using annual time series data from 1988 to 2011. By employing Ordinary Least Squares regression technique, they find a positive and significant relationship between commercial bank loans and agricultural sector output, while Agricultural Credit Guarantee Scheme Funds fail to have a significant relationship with agricultural output. Based on the results, they recommend increasing loans for the agricultural sector to enhance productivity.

Nnamocha and Charles (2015) use the error correction model to examine the effect of commercial bank loans have on agricultural output in Nigeria between 1970 and 2013. As a result, they document existence of a long run relationship among input variables. They also find that commercial bank loans has positive connection to agricultural output in Nigeria on the long run while industrial output affects agricultural production only in the short-run.

Agunuwa et al (2014) examine the impact of commercial banks' credit on agricultural productivity in Nigeria using time series data during the periods between 1980 and 2013. Using Ordinary Least Squares technique, they reveal a positive relationship between commercial banks' credit and agricultural productivity. Moreover, they observe a positive relationship between government

expenditure and agricultural productivity, while they find a negative association between interest rate on bank loans and agricultural productivity.

Mamman and Hashim (2014) conduct a study on the influence of bank lending on economic growth in Nigeria from 1987 to 2012 using a multiple regression model. They find that bank lending significantly affects economic growth. In addition, Yakubu and Affoi (2014) document significant positive impact running from commercial bank credit onto Nigeria's economic growth during the period 1992-2012.

Udih (2014) suggests that bank credit can have a positive effect on the productive sectors of the economy, particularly in terms of enhancing agricultural output of goods and services in Ghana. Using Johansen Cointegration approach coupled with Fully Modified Ordinary Least Square method (FMOLS), he finds that money deposit bank credits to agricultural entrepreneurs promote agricultural productivity and development. Furthermore, regulated banks' credits to the agricultural entrepreneurs had no impact on their production performance. It is argued that if bank credit is well-matched with agricultural entrepreneurship, it could lead to a significant increase in agricultural productivity.

Similarly, Obilor (2013) assesses the effect of commercial banks' credit to agricultural sector and agricultural output under the Agricultural Credit Guarantee Scheme Fund (ACGSF) in Nigeria using the Ordinary Least Square (OLS) method. As a result, he finds that the combined action of commercial banks credit to the agricultural sector, agricultural credit guarantee loan and government expenditure to the agricultural sector are significant factors that has effect on agricultural output in Nigeria.

Ogbanje, Yahaya, and Kolawole (2012) conduct a study to examine the correlation between commercial bank credit and the growth of agricultural output in Nigeria from 1981 to 2007, using descriptive and inferential statistics. The findings indicate that there is a substantial rise in commercial banks' loans to the agricultural sector between 1981 and 1991. However, at some points during this period, interest rates on loans increased, making them unaffordable to many farmers. The study concludes that commercial banks' loan to the agricultural sector has considerable effect on the contribution of the agricultural sector contribution to economic growth in Nigeria.

In turn, in this study we investigate overall effects of commercial bank loans, lending rate, exchange rate and government expenditure on the agricultural sector output in Nigeria through the use of an up-to-date data.

3. Data, Model Specification and Methodology

3.1. Data

We use annual data for the period 1981-2021 for the empirical analysis. The data are obtained from Central Bank of Nigeria (CBN) statistical bulletin and the 2019 World Development Indicators Data. To ensure the stability of the data, we use the logarithmic form for the analysis.

3.2. Model Specification

The research utilized the ARDL model and Error Correction model (ECM) as the statistical techniques for data analysis. These methods involved testing the hypotheses formulated using the Augmented Dickey Fuller Test (Unit Root) and Co-integration test. Additionally, other preliminary econometric tests were employed to examine the impact of commercial bank loans on the growth of the agricultural sector in Nigeria.

$$AGOUT = f(CBCA, INT, GEA, EXR) \quad (1)$$

$$\begin{aligned} \ln(AGOUT) = \alpha_0 + \alpha_1 \ln(CBCA_t) + \alpha_2 \ln(INT_t) \\ + \alpha_3 \ln(GEA_t) + \alpha_4 \ln(EXR_t) + U_t \end{aligned} \quad (2)$$

Where,

AGOUT: Agricultural Output measured as the share of agricultural sector to GDP;

CBCA: Commercial banks' credit to the agricultural sector;

INT: Interest rate on Commercial banks' credit to agricultural sector

GEA: Government expenditure on the agriculture;

EXR: Exchange Rate;

U: Error Term.

4. Results and Discussion

4.1. Descriptive Analysis

Table 1 presents the results of the descriptive statistics for the variables. The mean of the specified variables, namely agricultural sector GDP, exchange rate,

commercial banks' credit to the agricultural sector, government expenditure on the agricultural sector, average interest rate on commercial banks' credit to agricultural sector are ₦8,511.762 billion, ₦115.214 to one USD, ₦192.614 billion, ₦20.694 billion and 16.75% respectively.

Table 1. Result of Descriptive Statistics

	AGOUT	EXCR	CBCA	GEA	INT
Mean	8511.762	115.214	192.614	20.694	16.754
Median	2015.422	113.450	48.562	7.5400	16.893
Maximum	41126.06	550.000	1457.822	76.600	31.650
Minimum	17.052	6.000	0.600	0.010	8.917
Std. Dev.	11183.50	123.358	317.807	24.380	5.215
Skewness	1.3780	1.4590	2.2931	0.9164	0.3507
Kurtosis	4.007	5.249	8.305	2.523	3.198
Jarque-Bera	14.718	23.194	84.006	6.127	0.908

The maximum and minimum values are 41126.06 and 17.05 for AGOUT, 550 and 6.0 for EXCR, 1457.82 and 0.60 for CBCA, 76.60 and 0.010 for GEA and 31.65 and 8.92 for INT respectively. All variables are positively skewed and this implies that they have long right tail distribution. All variables are also leptokurtic with Kurtosis value of > 3 except GEA which is platykurtic with Kurtosis values of < 3 . The p value of Jarque Bera statistics show that all the variables are normally distributed devoid of outliers except INT values. The lending rate values have been changing spontaneously over the time period under study.

4.2. Stationarity Test

The pre-estimation result is presented in this section with the test for stationarity. Augmented Dickey-Fuller unit root tests showed that the specified variables are stationary at level $I(0)$ and first difference $I(1)$. The summary of the result is on table 2 below.

Table 2. Result of Unit Root Test for Stationarity

Variable	ADF	1% CV	5% CV	10% CV	Order	p-Value
<i>Ln(AGOUT)</i>	-4.4111	-4.2119	-3.5298	-3.1964	I(1)	0.0060
<i>Ln(CBCA)</i>	-7.0872	-4.2119	-3.5298	-3.1964	I(1)	0.0000
<i>Ln(GEA)</i>	-7.3199	-4.2191	-3.5331	-3.1983	I(1)	0.0000
<i>Ln(EXR)</i>	-5.6807	-4.2119	-3.5298	-3.1964	I(1)	0.0002
<i>INT</i>	-4.1227	-3.6701	-2.9639	-2.6210	I(0)	0.0033

Note: ADF is ADF statistics, CV is Critical Value, Order is Order of Integration.

4.3. Cointegration Analysis

From the unit root test results on table 2, the variables in the model are stationary at levels I(0) and first difference I(1). Therefore, it is still important to test for the presence of long-run relations among the variables so as to affirm the result of the unit root test i.e., co-integrating relationship. Co-integration test was carried out to establish the existence of a long-run association between the variables. The Autoregressive distributed lag model (ARDL) model was used for the analysis because the variables came out stationary at level and first difference. However, before the co-integration test was carried out, the lag order selection criteria was determined and the result is presented in table 3 while the test result for the ARDL model is presented in table 4 below.

Table 3 presents the lag order selection criteria and lag order 3 was picked for the co-integration test because majority of the test results indicated a lag order of 3.

Table 3. Result of Unit

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-135.442	NA	0.00112	7.39171	7.60718	7.46837
1	43.3297	301.090	3.46e-07	-0.70156	0.59127*	0.24168*
2	67.6675	34.5853	3.85e-07	-0.66671	1.703480	0.17659
3	104.350	42.474*	2.53e07*	1.2816*	2.165973	-0.05497

Note: Endogenous variables are Ln(GDP), Ln(CBCA), Ln(EXR), LN(GEA), INT. Exogenous variable is intercept. LR is sequential modified LR test statistic (each test at 5% level). FPE is Final prediction error. AIC is Akaike information criterion. SC is Schwarz information criterion. HQ is Hannan-Quinn information criterion.

4.4. Result of Autoregressive Distributed Lag (ARDL) Bounds Test

The result on table 4 confirms that there is an exceptional and established long run relationship between the variables specified in the model within the period of 1990-2021. This is because the F-statistics at 19.98 exceeds the upper bound test results at 1%, 2.5% and 5% and 10% levels of significance. After the confirmation of the existence of a stable long run relationship among the estimated variables we go further to estimate the long run and short run parameters of the variables and the result is presented on Table 5 and 6.

Table 4. Results of ARDL Bound Test

Test statistic	Value	K	
F Statistics	19.9819	4	

Critical value bond			
Significance	I(0)	I(1)	Decision
10%	2.20	3.09	Long run relationship
5%	2.56	3.49	Long run relationship
2.5%	2.88	3.87	Long run relationship
1%	3.29	4.37	Long run relationship

4.5. Results of Short-Run Estimates

Table 5 presents the error correction regression with their standard errors and t-values extracted from the estimated ECM technique. In this view, an error correction model estimates the speed of adjustment to equilibrium in a co-integrating relationship between commercial bank loans and agricultural growth outcomes.

The speed of adjustment does conform to the a-priori expectation of the error correction term which is negative and statistically significant at 1%. The coefficient of the lagged error term or equilibrium error correction model (-0.7331), is negative and significant, confirming that a long-run (co-integrating) relationship exists between the agricultural growth rate outcomes and the set of explanatory variables. The size of this coefficient implies that adjustment to disequilibria towards long-run equilibrium via the correction term is relatively strong, as 73.32% of disequilibrium in a given year is corrected in the following year. The implication of this is that it takes about a year to eliminate 73.31% of deviation between the actual and equilibrium agricultural growth rate outcomes as determined by the basics. It is also shown that agricultural growth rate

outcome is moderate to adjust back to equilibrium, implying policy effectiveness or flexibility.

Table 5. Short-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D[Ln(CBCA _{t-1})]	0.1202**	0.0561	2.1433	0.0434
D[Ln(EXR _t)]	-0.1916***	0.0592	-3.2341	0.0038
D[Ln(EXR _{t-1})]	-0.3481***	0.0734	-4.7401	0.0001
D[Ln(EXR _{t-2})]	-0.3287***	0.0810	-4.0553	0.0005
D[Ln(GEA)]	0.1093***	0.0240	4.5549	0.0002
D[Ln(GEA _{t-1})]	-0.1565***	0.0310	-5.0451	0.0000
D[Ln(GEA _{t-2})]	-0.0728***	0.0208	-3.5015	0.0020
D[INT]	-0.0027	0.0016	-1.6724	0.1086
D[INT _{t-1}]	-0.0048***	0.0016	-2.8749	0.0088
ECT _{t-1}	-0.7331***	0.0604	-12.1301	0.0000
R-squared	0.8583	Akaike info criterion	-3.9246	
Adj.R-squared	0.8058	Schwarz criterion	-3.4506	
Durbin-Watson	1.6542	Hannan-Quinn criter.	-3.7559	

Note: Dependent variable is D[Ln(AGOUT)]. The *, **, and *** denotes statistically significance levels of 10%, 5%, and 1% respectively.

The value of the coefficient of determination (R^2) of 0.8583 implies that about 86% of the total variation in agricultural growth outcomes is explained by changes in the exogenous variables while 14% is explained due to error term. The result of the Durbin-Watson statistic is 1.6542. This value is around 2 and reveals that there is no first order autocorrelation among the variables.

The summary of the regression result in the table 5 reveals that the coefficient of the one year lagged value of commercial bank credit to the agricultural sector is positively signed. This shows that the variable has a direct relationship with agricultural output. The variable is also statistically significant at 5% with a probability value of 0.0434. This implies that 1 unit increase in the value of commercial bank credit will lead to 0.1202 increase in agricultural output. The coefficient of current values and one year and two years lagged values of exchange rate has significant negative relationship with agricultural output being significant at 1%. This implies that higher values of exchange rate will debar farmers from having access to imported mechanized equipment and machines which can boost agricultural output because they will be expensive.

The coefficient of current values of government expenditure to the agricultural sector also has significant positive relationship with agricultural output with a probability value of 1%. This implies that a 1 unit increase in government expenditure to the agricultural sector will lead to an 11% increase in agricultural output. The coefficient of the one year lagged value of interest rate is negatively signed. The implication is that decreased interest rates on bank loans to farmers will positively increase agricultural growth outcomes in Nigeria in the short run.

4.6. Results of Long-Run Estimates

The result of the long-run parameters is specifically presented on table 6 below. The long run result documents that commercial bank credit is positive and significantly affect agricultural output in Nigeria. This result confirms the fact that commercial bank credit to the agricultural sector in Nigeria has a significant effect on agricultural growth outcomes during the period under study. This result is also in support of findings from recent studies which also confirm a positive and significant relationship of commercial bank credit to agricultural outputs in Nigeria (Okuneye and Ajayi 2020; Adeshina, Tomiwa and Eniola 2020; Yakubu & Affoi 2014; Uzomba et al., 2014). The long run results also imply that higher interest rate will lead to a reduction in agricultural output due to the negative relationship between the variables.

Table 6. Long-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\text{Ln}(\text{AGOUT}_{t-1})$	-0.7331***	0.1085	-6.7522	0.0000
$\text{Ln}(\text{CBCA}_{t-1})$	0.2545***	0.0507	5.01134	0.0001
$\text{Ln}(\text{EXR}_{t-1})$	-0.2227***	0.0601	-3.7054	0.0012
$\text{Ln}(\text{GEA}_{t-1})$	0.3084***	0.0582	5.2921	0.0000
INT_{t-1}	0.0011	0.0022	0.5173	0.6101
intercept	1.5250	0.2563	5.9500	0.0000

Note: Dependent variable is $D[\text{Ln}(\text{AGOUT})]$. The *, **, and *** denotes statistically significance levels of 10%, 5%, and 1% respectively.

The result on table 6 implies that commercial bank credit to the agricultural sector has significant positive long run relationship with agricultural output. Government expenditure also has significant positive long run relationship with

agricultural output while exchange rate has long run relationship but the direction of the relationship is negative.

4.7. Diagnostic Tests

This section helps to validate the ECM results in order to ascertain the usefulness of the estimated model for policymaking. The Durbin Watson statistics is 1.654264. This shows that there is no first order serial autocorrelation in the error term of the variables. The Breusch-Godfrey second order serial correlation test also shows no autocorrelation (test statistics is not significant at 5%). The stability of the parameters is tested through the CUSUMSQ (cumulative sum of recursive residuals of square) and the Jaque Bera statistics. These tests are suggested by Pesaran and Pesaran (1997) for measuring the parameter stability.

Table 7. Serial Autocorrelation, Heteroskedasticity and Normality Tests

	χ^2	Probability
Breusch-Godfrey Serial Correlation test	0.9785	0.9888
Heteroskedasticity test	0.4426	0.9772
*Jarque-Bera test	0.0966	0.9528

The normality test result reveals that the sample variance is normally distributed since Jaque-Bera probability is not significant.

Cumulative Sum of Recursive Residuals of Square (CUSUMSQ)

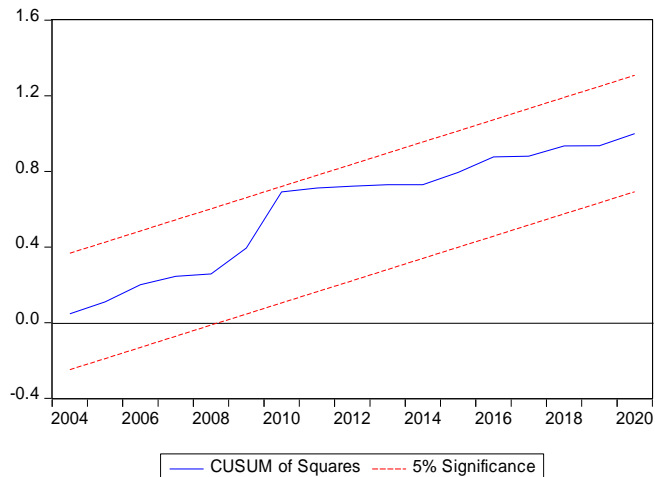


Figure 1. CUSUM Square Tests for ARDL Model

Figures above are the graphical plots of the CUSUM of squares points. The CUSUM of squares plots also lay within the critical lines. These suggest that the estimated model is relatively stable, and that valid inferences can be drawn from its estimated coefficients.

5. Conclusion

The findings of this study demonstrate that there is a co-integration relationship between the agricultural growth and the independent variables used in the model. The speed of adjustment adheres to the anticipated negative direction of the error correction term, which is statistically significant at the 1% level. The research findings indicate that agricultural bank credit and government expenditure have a positive and significant impact on agricultural growth in Nigeria, both in the short and long run. However, the exchange rate has a negative and significant relationship with agricultural output, while the interest rate has a significant but short-term negative impact on agricultural output. This is due to farmers' reluctance to borrow money at high-interest rates. The exchange rate also has a negative and significant effect on agricultural output in the short and long run.

The analysis results can be used for policy recommendations. It implies that the Nigerian government should give more attention to the agricultural sector as it holds the key to economic stability in the future. Moreover, the government should shift away its focus from proceeds of crude oil. Plus, the commercial banks should be encouraged to give better loans to farmers at affordable interest rates. Lastly, the government should increase its financial allocation to the agricultural sector and also provide grants to small and medium scale farmers in the country.

References

- Adeshina, K.F., Tomiwa, O.Y. & Eniola, O.M. (2020). Agricultural financing and economic performance in Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*, 38(7), pp. 61-74.
- Adewole, J.A., Adekanmi, A.D., & Gabriel, A.O. (2015). An assessment of the contributions of commercial banks to agricultural financing in the Nigerian economy. *International Journal of Advanced Academic Research*, 1(2), 1-16.

- Aduralere, O. (2019). Impact of commercial bank credit on agricultural output in Nigeria. *Review of Innovation and Competitiveness: A Journal of Economic and Social Research*, 5(1), pp.5-20. <https://doi.org/10.32728/ric.2019.51/1>
- Agunuwa, E.T., Inaya, L. & Proso, T. (2015). Impact of Commercial Banks' Credit on Agricultural Productivity in Nigeria: Time Series Analysis 1980-2013. *International Journal of Academic Research in Business and Social Sciences*, 5(11), pp. 337-350.
- Aluko, S. (2004). Making Natural Resources into a blessing rather than a curse: in covering oil. A Reporter's Guide to Energy and Development. *Open Society Institute*.
- Athanasius, N.N. (2017). An analysis of banks' credit and agricultural output in Nigeria: 1980-2014. *International Journal of Innovative Finance and Economics Research*, 5(1), pp. 54-66.
- Anthony, O., Gabriel, E.E. & Arikpo, O.F. (2015). The contribution of deposit money banks on the growth of the agricultural sector in Nigeria. *Advances in Social Sciences Research Journal*, 3(2), 33-42.
- Ayodele D., Adeleke, S. & Damilola, F.A. (2013). Empirical analysis of agricultural credit in Africa: Any role for institutional factors? *African Development Bank Group*, 1(192), pp. 1-27.
- Ayoola, G.B. & Oboh, V.U. (2006). A model of public expenditure to reveal the preference for agriculture in the budget. *Journal of Rural Economic Development*, 14(1), pp. 56-73
- Bassey, N.E. & Ibok, O.W. & Amba, E.A. (2014). The effect of selected financial indicators on formal agricultural credit supply in Nigeria. *International Journal of Management Sciences and Business Research*, 3(9), pp. 1-8.
- Chris, O.U, Mbat, D.O. & Stephen, B.D. (2016). The Effect of Commercial Banks' Credit on Agricultural Production in Nigeria. *Journal of Finance and Accounting*, 1(4), pp. 1-10.
- Ekine, D.I. & Onukwuru, F.M. (2018). Deposit Money Banks' Credit and Agricultural Sector Performance in Nigeria. *Global Journals*, 8(3), pp. 65-73.
- Emenuga, P.E. (2019). Effect of commercial banks' credit on agricultural productivity in Nigeria. *ACTA Universitatis Danubius AUDCE*, 15(3), pp. 417-428.
- Falola, T. & Heaton, M. (2008). *A History of Nigeria*. New York: Cambridge University Press.

- Mamman, A. & Hashim, Y.A. (2014). Impact of bank lending on economic growth in Nigeria. *Research Journal of Finance and Accounting*, 5(18), pp. 2222-2847
- Medugu, P.Z., Musa, I. & Abalis, E.P. (2019). Commercial banks' credit and agricultural output in Nigeria: 1980 -2018. *International Journal of Research and Innovation in Social Science*, 3(6), pp. 244-256.
- Nakazi, F. & Nathan, S. (2020). The effect of commercial banks' agricultural credit on agricultural growth in Uganda. *African Journal of Economic Review*, 8(1), pp. 162-175.
- Nnamocha, P.N., & Charles, N.E. (2015). Bank credit and Agricultural output in Nigeria (1970-2013): An Error Correction Model approach. *British journal of Economics, Management and Trade*, 10(2), pp. 1-12.
- Nzeka, U. (2013). Grain and Feed Annual; Annual Report 2013. USDA Foreign Agricultural Service. Available at <http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual>
- Ogbonna, S.I. & Osondu, C.K. (2015). Determinants of Supply of Funds to Agricultural Sector from Formal Sources in Nigeria from 1992 to 2012. *Greener Journal of Agricultural Sciences*, 5(3), pp. 081-092
- Obilor, S.I. (2013). The impact of commercial banks' credit to agriculture on agricultural development in Nigeria: An econometric analysis. *International Journal of Business, Humanities and Technology*, 3(1), pp. 85-95.
- Ogbanje, E.C., Yahaya, M.A., & Kolawole, F. (2012). Effect of commercial banks' loan on agricultural gross domestic product (GDP) in Nigeria from 1981 to 2007. *Production Agriculture and Technology Journal*, 8(2), pp. 88-100.
- Okuneye, B.A. & Ajayi, F.D. (2019). Commercial bank's credit, government expenditure and agricultural output in Nigeria: An error correction model. *Kampala International University*, 7(1), pp. 73-82.
- Otaha, J. (2012). Dutch Disease and Nigeria Oil Economy. *African Research Review*, 6(1), pp. 82-90.
- Sekunmade, A. (2009). The effects of petroleum dependency on agricultural trade in Nigeria: An error correlation modeling (ECM) approach. *Scientific Research and Essay*, 4(11), pp. 1385-1391.
- Sulaimon, M. (2021). Agricultural credit guarantee scheme fund (ACGSF) and agricultural performance in Nigeria: A threshold regression analysis. Online at <https://mpr.ub.uni-muenchen.de/105564/>

- Sunny I.O. (2013). The Impact of Commercial Banks' Credit to Agriculture on Agricultural Development in Nigeria: An Econometric Analysis. *International Journal of Business, Humanities and Technology*. 3(1), pp. 85-94.
- Udih, M. (2014). Bank credits and agricultural development: Does it promote entrepreneurship performance? *International Journal of Business and Social Science*, 5(11), pp. 102–107.
- Ugochukwu, O.C. (1999). *Advanced studies in agricultural science*. Longman Nigeria Plc, Lagos.
- Uremadu, S.O, Ariwa, F.O & Duru Uremadu, C.E. (2018). Impact of Government Agricultural Expenditure on Agricultural Productivity in Nigeria. *Current Investigations in Agriculture and Current Research*. LUPINE Publisher.
- Uzomba, P.C, Chukwu, S.N. & Jumbo, G.A. & Nwankwo, N.U. (2014). An Inquiring into the Impact of Deposit Money Banks' Loans/Advances on Agricultural Sector in Nigeria 1980–2011. *International Review of Social Sciences and Humanities*, 7(2), pp. 130-139.
- Tolulope, O. & Chinonso, E. (2013). Contribution of Agriculture to Economic Growth in Nigeria. *Senior Research Assistants, International Food Policy Research Institute (IFPRI)*, Abuja, Nigeria.
- Yakubu, Y. & Affoi, A.Y. (2014). An Analysis of Commercial Banks' Credit on Economic Growth in Nigeria. *Current Research Journal of Economic Theory*, 6(2), pp. 11-15.