Financial Inclusion and Agricultural Productivity in Nigeria

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Abstract

There has been a constant debate about the efficacy of financial inclusion of the rural dwellers, especially farmers, as a tool for promoting agricultural productivity of the country at this period when the country strives toward improves food production to stem the menace of the rising cost of feeding. However, these debates have been indecisive, given the conflicting results that arises from several studies. This study was thus embarked upon to take a stand and shed more light on the efficacy of financial inclusion as a potent tool for improving agricultural output in Nigeria. The study used secondary data which spanned 1980 to 2023 sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, 2023 edition. The data collected were analyzed using Autoregressive Distributed Lag after confirming the stationarity property of the variables involved and discovered that all were combinations of I(0) and I(1). Heteroscedasticity and Cointegration tests which equally confirmed existence of cointegration among the independent variables were carried out to standardize the result of the findings. From the findings it was revealed that loans and advances of commercial banks bring to bear a positive and significant effect on agricultural outputs in Nigeria. It was therefore recommended, among others, that commercial banks in rural areas should continue to make loans and advances available to agricultural sector with non-strict conditionality and ensure that they are used for the purpose for which they are meant for and not diverted to other purposes; also the establishment of more rural bank branches should be enhanced to give farmers more easy access to it and be encouraged to save thus improving their financial inclusion and hence agricultural productivity.

Key Words: Agricultural Productivity, Farmers, Financial Inclusion, Loans and Advances.

JEL Classification: E_5, G_{21}, O_{13}, Q_{10}, Q_{14}.

Introduction

Before the discovery of crude oil in commercial quantity, Nigeria economy depends largely on agriculture. The inhabitants of the country engage in it for commercial as well as subsistence purposes. It thus serves as sources of food for man, providing job opportunities for practitioners and also sources of raw materials for agro-allied industries. Agriculture also contributes largely to the country's Gross Domestic Products forming an essential part of the growth process of the nation (Rahji & Fakayode, 2009; National Bureau of Statistics, 2022; Statista, 2023) thus serving as an important sector for both the household and the nation at large (Ayeomoni & Aladejana, 2016; Ojo, Mustapha & Ismaila, 2022).

Despite the focus on oil, at the expense of agricultural sector since its discovery in commercial quantity, the pivotal role of agriculture in the pursuit of development in Nigeria cannot be neglected; as a source of raw materials for industry, source of revenue for government and household, source of food production for the citizenry, just to mention but a few. Hence a boost in agricultural output is still a necessity in every developing country, Nigeria in particular, as food insecurity, high level of food importations and rising food prices are issues bordering the economy (Ukeje, 2007; Umaru & Inusa, 2022) and needed to be addressed, this thus calls for the need to increase productivity in agricultural sector.

Although several theories have been brought to fore on the determinants of productivity (agricultural sector inclusive) among which are labour, capital, environment, trade openness, terms of trade, availability of credit institutions, etc. As far as agricultural sector is concerned, it was believed by some scholars that an innegligible factor among them is the availability of financial institution. Scholars in this category have confirmed that a well-developed financial system remains a fundamental factor to economic development, as it provides mechanisms for efficient allocation of investible funds and will enable the farmers to increase its investment and adopt new inventions in their farming operation which will in turn boost the productivity level (King & Levine, 1993; Rajan & Zingales, 1998; Udoh & Ogbuagu, 2012). Other researchers came out with contradicting findings that financial inclusion has no significant effect on farmers' productivity (Festus & Sebastine, 2019; Okuma, 2019).

Findings by some even revealed that to increase agricultural productivity, some input are needed to be purchased but the sector is affected by a lot of challenges in this regards especially in terms of limited accessibility of financial services coupled with lack of inclusion in the financial system and thus limiting the yield and performances in the sector (Ashoro, Gbigbi, & Ovharhe, 2024; Odoemenem & Boinne, 2010), these submissions thus posed a contradictory view that calls for clarity.

It should be noted that financial inclusion is a way of involving the unbanked populace in the formal financial activities. It is a process of making financial services accessible and available to all individuals and businesses at an affordable cost (World Bank, 2018; Oladimeji & Adegbite, 2019). El-Said et al. (2020) also defined financial inclusion as access to and use of financial products and services by member of an economy. Rural Dwellers, a high proportion of who are farmers have been seen as mostly excluded from financial services they thus form majority of the unbanked population. Consequently the provision of financial services to rural dwellers will enable them to get finances to fund their various needs both agricultural and material needs. This provision of access to financial services will therefore boost agricultural sector of the country.

The contribution of agricultural sector to the country's Gross Domestic Product (GDP) has been reported to be dwindling of recent (Fowowe, 2020; CBN Bulletin, 2020, 2021, 2022, 2023). It has been observed that proceeds from agricultural sector which formed 63.8% of the country's GDP as at independence has dropped drastically to 23.8%, 21.4%, 26.09%, 26.95%, 26.14%, and 21% in 2010, 2018, 2019, 2020, 2021 and 2023 respectively (CBN Statistical Bulletin, Adeagbo, 2018, 2024). This has been attributed to the country's overdependence on oil since its discovery in large quantity and as well as financial exclusion of most of the rural farmers. It is appalling to note that commercial bank loans and advances are negatively skewed against the agricultural sector as agriculture got 8%, 1.96%, 1.67%, 3.26%, 5.15%, 5.98%, and 6.16% in years 2000, 2006, 2016, 2020, 2021, 2022, and 2023 respectively (CBN bulletin, 2023).

Research has also shown that in spite of the country's abundant arable land, the growth of agricultural sector is very low hence its low contribution to GDP (Ekine & Onu, 2018). One of the major reasons adduced to the foregoing is lack of access of farmer to credit facility which hinders farmers from taking available economic opportunities around them. This also hinders them from increasing output and escaping the poverty trap. The few ones among them who even try to access the opportunity cannot do so because they are either unbanked or have little savings thus hindering the growth of agricultural sector and hence result to adverse effect on farmers productivity (Ekine & Onu, 2018; Ashoro, et.al., 2024). Do we now advocate for financial inclusion of farmers or not considering these raging and inconclusive opinions?

To answer the above question, this research work beams its searchlight on the effect of financial inclusion on the output of agricultural sector in Nigeria with the aim to examine the effect of commercial bank loans and advances to agricultural sector on farmers output in Nigeria; examine the effect of deposits of rural branches of commercial banks on agricultural output in Nigeria, and as well investigate the effect of available branches of rural commercial banks on agricultural output in Nigeria.

Empirical Review of Related Literature

There are numerous studies on the impact of financial inclusion on output of agricultural sector nationwide using various methods as well as various data (cross sectional, time series and panel data). Some of the studies are country specific while others are cross country in nature. However,

these studies have been inconclusive; while some reported positive relationships, some affirmed an inverse relationship and others reported mixed findings which thus calls for further studies to shed more light on the real effect and take a stand. Some of the previous empirical studies are selected for review below.

Udoka, Mbat and Duke (2016) examined the effect of commercial banks credit on Nigerian agricultural productivity between 1985 and 2014 using an ex-post facto research design. Data for the study were collected from printed manuscripts and the statistical bulletin of the Central Bank of Nigeria. From their findings, it was revealed that a positive and statistically significant relationship exists between commercial bank credits and agricultural output in Nigeria during the period investigated.

In another study on Nigeria, Olaniyi (2017) examined the effect of financial inclusion on agricultural productivity using data that spanned 1981 to 2014 which were sourced from the Central Bank of Nigeria Statistical bulletin. The study analyzed the short and long run effects of the explanatory variables on the explained using Auto-Regressive Distributed Lag bound testing approach. From the analysis, it was revealed that usage of financial services produce a significant positive effect on agricultural output both in the short-run and long-run.

Okuma (2019) in a related study investigated the impact of financial deepening on agricultural output in Nigeria using the ex-post facto research design while annual time series data obtained from the Central Bank of Nigeria Statistical bulletin were used. Various robustness checks, which includes the unit root test, Engle-Granger co-integration test, the error correction model test and Granger Causality test; were carried out to standardize the result of the study. From the findings, it was revealed that financial inclusion does not have a significant effect on agricultural output in Nigeria.

In another study, Oyelade (2019) examined the impact of financial inclusion through commercial bank credit on agricultural output in Nigeria using data collected from the central bank of Nigeria statistical bulletin. The data were analyzed using Ordinary Least Square statistical technique. From the findings, it was revealed that adequate provisions of credits to farmers is capable of improving their productivity and enhance the nation's economic growth.

Agbenyo, Jiang and Anthony (2019) also investigated the impact of financial inclusion on the growth of agricultural sector in Ghana from 1980-2014 using Johansen cointegration and Fully Modified Ordinary Least Square method of analysis. Findings from their study revealed that financial inclusion positively influenced the growth of agricultural sector, with increased productivity observed, in the country.

Festus and Sebastine (2019) in their study examined the effect of financial inclusion of rural farmers in Nigeria on agricultural productivity between 1986 and 2017. Various robustness tests were carried out on the data collected among which were unit root test, cointegration test of Engle-Granger, Error Correction Method and Test of Granger Causality. From their study, it was reported

that financial inclusion presents a non-significance influence on agricultural sector output in Nigeria.

Also, Fowowe (2020) has carried out a similar study on Nigeria to find out the impacts of financial inclusion on agricultural productivity in Nigeria using the Living Standards Measurement Study-Integrated Survey on Agriculture methodology. The study revealed that financial inclusion exerted a positive and statistically significant effect on agricultural productivity in Nigeria. This is in contrast to the findings of Okuma (2019) and that of Festus and Sebastine (2019).

In another study Umaru and Inusa (2022) investigated the asymmetric effect of financial inclusion on agricultural output in Nigeria using data sourced from CBN statistical bulletin (2021) and the Nigeria inter-bank settlement system PLC. The data collected were analyzed the non-linear autoregressive distributed lag and stepwise least squares. From the study, it was revealed that there exist a positive and significant correlation between financial inclusion and agricultural output in Nigeria. However the study only examined the short run effect it does not show whether a long run effect occur over time.

Sethy and Goyari (2023) examined the effect of financial inclusion on agricultural output in South Asian countries between 2004 and 2018. The data collected were analyzed using fully modified ordinary least square and dynamic ordinary least square estimation techniques. From their analysis, it was revealed that financial inclusion presents a positive impact on agricultural output in South Asian countries during the period of study. However, it should be noted that the study was not carried out on Nigeria.

An examination of above review revealed no consensus in the outcomes of the previous researchers' findings hence the need for further study.

Research Methodology
The data for the variables used for this study are secondary in nature; it was sourced from CBN Statistical bulletin, 2023 edition. A period of forty-four years (1980-2023) which is the period before financial inclusion gained prominence and the post-introduction of National Financial Inclusion Strategy (NFIS) period was covered. Annual data on commercial bank loan to agricultural sector, deposit of rural branches of commercial banks, loans of rural branches of commercial banks and number of commercial bank branches in rural areas were employed as the explanatory variables while agricultural productivity is used as the explained variable.

Following from the above, an econometric model is specified in other to analyze the data collected.

APD = f(CBLA, CBRD, RCBL, NCBBr) ………………… (i)
where
APD = Agricultural Productivity
CBLA = Commercial Bank's Loan to Agricultural Sector
CBRD = Commercial Bank's Branches Rural Deposits
RCBL = Rural Commercial Bank's Loan

NCBBr = Number of commercial Bank's Branches

Putting equation (ii) above in econometric and logarithm form it gives

$$\ln APD_t = \beta_0 + \beta_1 \ln CBLA_t + \beta_2 \ln CBRD_t + \beta_3 \ln RCBL_t + \beta_4 NCBr_t + \mu \quad \ldots\ldots\ldots\ldots\text{(ii)}$$

β_0 to β_4 are vectors of the variables, μ = error term, t = time trend. On the *a priori,* β_0 to $\beta_{4,} > 0$. To determine the stationarity of the included variables, Augmented Dickey Fuller (ADF) test and Phillip-Perron statistics were carried out. Also the study examined the cointegration level of the variables, i.e. whether long-run relationship exist between dependent and independent variables or not; this is done with the use of Autoregressive Distributed Lags (ARDL) bound test while Ordinary Least Square (OLS) techniques was used to determine the effect of each independent variables included in the model on the dependent variable.

Analysis and Interpretation of Results

In other to avoid having an erroneous regression result which can arise by conducting regression analysis on non-stationary variable, a unit root test was carried out to determine the state of stationarity of the variable based on the null hypothesis which states that there is no unit root. This was done using Augmented Dickey Fuller unit root test procedure (with constant and trend) as well as Phillip-Perron statistic. Below is the table of the result:

Table 1: Unit Root Test Results

Variable		ADF 5% t-Statistics value	P-value	PP 5% t-Statistics value	P-value	Order of integration	Conclusion
Log APD$_t$	Levels	-3.260	0.511	-5.486	0.529	I(1)	Stationary at 1st diff
	1st diff	-4.366	0.021**	-4.512	0.037**		
Log CBLA$_t$	Levels	-3.745	0.563	-3.417	0.463	I(1)	Stationary at 1st diff
	1st diff	-4.679	0.000***	-4.491	0.000***		
Log CBRD$_t$	Levels	-3.421	0.176	-3.018	0.125	I(1)	Stationary at 1st diff
	1st diff	-4.731	0.026**	-4.806	0.038**		
Log RCBL$_t$	Levels	-5.463	0.032**	-3.752	0.040**	I(0)	Stationary at levels
NCBr$_t$	Levels	-4.056	0.662	-5.014	0.582	I(1)	Stationary at 1st diff
	1st diff	-7.074	0.000***	-6.058	0.000***		

* Denotes significant at 10%, **denotes significant at 5%, *** denotes 1%.

The unit root results based on 1%, 5% and 10% significant level from ADF and PP method shows the order of integration of variables being stationary at levels and at first difference (levels and intercept). The result reported that the test statistics in respect of $RCBL_t$ is significant at levels while APD_t, $CBLA_t$, $CBRD_t$, and $NCBr_t$ are significant at first difference. Thus we conclude that the former did not have a unit root while the later have unit roots and this calls for ARDL bound testing cointegration relationship process due to the mixed series nature. The result of the ARDL bound test is thus presented below:

Table 2	ARDL Bounds Test	
Test Statistic	Value	K
F-statistic	5.14	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.26	3.06
5%	2.61	3.39
2.5%	2.07	3.07
1%	3.28	4.26

Explanatory Note: K stands for number of parameters.
Source: Author's computation (2024) using E-view 9

The decision rule is to reject the null hypothesis if F-statistics produced from the result is greater than the upper critical value bound, I(1), and conclude that there is co-integration which shows the presence of a long-run relationship between the explained variable in question and its explanatory ones. On the other hand, if F-statistics produced from the result falls below the lower critical value bound, I(0), the null hypothesis is to be accepted but if it is in-between the lower and upper critical value bound, the test is pronounced inconclusive. For the analysis of the model of this study the result signifies the existence of cointegration among the variables hence the need to estimate the long run relationship between agricultural output and the explanatory variables. This was done using the ARDL method as it is an apt analytical method which takes care of models with lesser sample size as well as variables that are stationary at different levels.

Robustness and diagnostic test results

This study carried out a test of heteroscedasticity using Breusch-Pagan-Godfrey approach judging with the decision rule to accept the null hypothesis if the value of the probability produced is less than 5% and we reject it, with the conclusion that there is no heteroscedasticity, if otherwise. The result is presented below:

Table 3: Heteroskedasticity Test: White

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.530	Prob. F(7,29)	0.454
Obs*R-squared	4.816	Prob. Chi-Square(7)	0.722
Scaled explained SS	11.022	Prob. Chi-Square(7)	0.162

The estimate of heteroscedasticity test statistic, using Breusch-Pagan-Godfrey technique, revealed that the observed R^2 value is 4.816 with the resulting Chi-square of 0.722 which implied that the probability value is greater than 5% significant level. Hence, we reject the null hypothesis and conclude that there is no heteroscedasticity in the model. The assumption of constant variance (Homoskedasticity) existing in the model is therefore upheld.

Table 4 Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.149	Prob. F(2,28)	0.06
Obs*R-squared	4.762	Prob. Chi-Square(2)	0.05

The study used Breusch Godfrey method to carry out the serial Correlation Langranger Multiplier test, from the result it was confirmed that there is no serial correlation in the model this thus established that the model is free from the problem of autocorrelation.

Having evaluated the general diagnostic statistics above, the study thus proceed to examine the performance of each explanatory variable from the regression result as shown below

Table 5
Regression analysis

Dependent Variable : APD
Method: ARDL
Date: 12/28/24 Time: 02:19
Sample (adjusted): 1980 2023
Included observations: 44 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LOG(CBLA) LOG(CBRD)
LOG(RCBL)
    NCBr
Fixed regressors: C
Number of models evaluated: 8192
Selected Model: ARDL(2, 3, 0, 3, 1, 0, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(CBLA)	0.611	0.046	3.889	0.001
LOG(CBRD)	0.110	0.015	2.061	0.601
LOG(RCBL)	-0.031	0.131	-2.081	0.630
(NCBr)	2.009	0.781	-2.851	0.013

R-squared	0.901	Mean dependent var	4.010	
Adjusted R-squared	0.870	S.D. dependent var	3.811	
S.E. of regression	2.308	Akaike info criterion	4.022	
Sum squared resid	89.01	Schwarz criterion	5.600	
Log likelihood	-60.13	Hannan-Quinn criter.	5.001	
F-statistic	7.691	Durbin-Watson stat	2.156	
Prob(F-statistic)	0.001			

*Note: p-values and any subsequent tests do not account for model
      selection.

The summary of the regression analysis in table 5 established the importance of the included variables in the determination of economic progress of the country as they accounted for about 90% of the variation in the APD. This was revealed by the R-squared value and it was also confirmed by the adjusted R-squared value of the model which was 87 %. This implied that the other variable outside the model covered about 13% which is taken care of by the stochastic error term.

Generally, the model was confirmed to be significant since the probability of F-statistics which is a measure of the joint effects of the descriptive variable gives a corresponding probability value of 0.001 which is statistically significant at 1%. Based on this value, it is therefore suffice to say that all the explanatory variables in the model are significant determinants of agricultural output in Nigeria. The variables in the model also have positive serial correlation; this was established by the value of Durbin-Waston which is approximately 2.2 which falls within the acceptable range in an econometric analytical rule.

Based on the performance of the individual variables in the model, from the result in table 5, it was reveals that a percentage increase in commercial bank's loan to agricultural sector (CBLA) has a positive and statistically significant effect on agricultural output in Nigeria. From the table it was revealed that a percentage increase in CBLA   leads to 61% increase in agricultural output in Nigeria, this conforms to the *a priori* expectation postulated in this study. Thus we accept the alternate hypothesis that commercial bank loans and advances to agricultural sector will boost agricultural productivity in Nigeria.

Moving to the second explanatory variable, from the result in table 5, it was revealed that deposits of rural branches of commercial banks (CBRD) have positive effects on agricultural output in

Nigeria however the effect is not significant. This is in line with the findings of Okuma (2019). What this implied is that deposits of rural branches of commercial banks boost agricultural output but the effect is not significant enough in Nigeria. This might be due to the fact that majority of the farmers are unbanked; the few financially included have little deposits which makes their contributions insignificant.

As for the loans and advances given out by the rural commercial banks, findings revealed that it does not have a positive effect on agricultural output in Nigeria. This might be traced to the fact that most advances given are not used for the agricultural purpose for which they are meant most divert it to other purpose while other beneficiaries of the agricultural loans are not farmers per se.

With respect to the numbers of commercial bank branches in rural areas, as revealed on table 5 above, there is no positive effect of the available numbers of commercial banks' branches in rural areas on agricultural output in Nigeria. This implied that the available branches in rural areas are not enough to exert a positive effect on agricultural output in Nigeria.

Conclusion and Recommendations

The study examined the effect of financial inclusion on the output of agricultural sector in Nigeria using data from1980-2023. Specific attention was given to loans and advances given to rural farmers, deposits of rural branches of commercial banks as well as availability of the branches of these commercial banks in rural areas. Findings revealed that there exists a positive and significant relationship between loans and advances of commercial banks and agricultural outputs in Nigeria. Also, it was revealed that deposits of rural branches of commercial banks have positive but insignificant effect on agricultural productivity during the period under review while the F-statistic value revealed that the explanatory variables is worthy of been jointly used to explain changes in agricultural output in Nigeria.

Sequel to the above, it was recommended that commercial banks in rural areas should continue and even improve on making loan and advances available to agricultural sector with non-strict conditionality. In addition, close monitoring should be given to loans and advances given to farmers to ensure that it is used for the purpose for which it is meant and not diverted to other purposes.

Since rural bank deposit produce positive effect on agricultural productivity, farmers should be encouraged to increase their deposits to make it a significant force. The unbanked population should be encouraged to open account without stress and cultivate savings culture. Furthermore, the establishment of more rural bank branches should be enhanced; this will give farmers more easy access to it and be encouraged to save as travelling long distance to transact banking activities may discourage them.

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