



CAUSALITY BETWEEN FINANCIAL INCLUSION AND AGRICULTURAL SECTOR OUTPUT IN NIGERIA



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ABSTRACT

Article History

Received: 3 December 2018

Revised: 17 January 2019

Accepted: 22 February 2019

Published: 10 April 2019

Keywords

Financial inclusion

Prime lending rate

Deposit rate

Agricultural credit guarantee

Scheme fund

Demand deposit from rural areas

and deposit money bank loan to

small scale enterprises as a

percentage of total loan.

This study examines the causality between financial inclusion and Nigeria's agricultural sector output (AOG). Ex-post facto research design was used and the annual time series data for various years were obtained from the Central Bank of Nigeria's (CBN) Statistical Bulletin. The Unit Root Test, Engle –Granger Co- integration Test, Error correction Model (ECM) Test and Granger Causality Tests were used to analyse the data. Financial inclusion was proxied by the prime lending rate, the deposit rate, the agricultural credit guarantee scheme fund, the demand for deposits from rural areas and the deposits of bank loans to small scale enterprises as a percentage of total loan. The results revealed that financial inclusion explains 41% of the changes in the Nigerian agricultural sector output. Prob. (F-statistics) co-efficient of 0.070531 proved that the explanatory variables have an insignificant effect on the dependent variable and Granger Causality Test showed more support for the non-existence of a causal relationship between the variables of explanatory variables and the dependent variables. Hence, the study recommends that the agricultural and financial sectors operators be sensitized on the benefits of their services to each other through symposiums, lectures, seminars and workshops. The two sectors should be encouraged to depend on each other with the agricultural sector relying more on the services of conventional financial institutions than on unorganized or traditional financial bodies. Financial institutions should also concentrate more on rendering services to the agricultural sector.

Contribution/ Originality: This study examines the causality between financial inclusion and the agricultural sector output in Nigeria (AOG).

1. INTRODUCTION

1.1. Background to the Study

Financial inclusion is a process that ensures the ease of access, availability and usage of a formal financial system by all members of the economy (Onaolapo, 2015). It is seen and defined as a state in which all the people of a particular nation have complete access to the appropriate desired financial products and services in order to manage their money effectively (Nwanne, 2015). Kama and Adigun (2013) stated in their research study that financial

inclusion is a state where financial services are delivered by a range of providers, mostly the private sector, to reach everyone who could use them, while according to Nwanne (2015) the World Bank sees and defines financial inclusion as the range, quality and availability of financial services to the underserved and financially excluded.

Okafor (2012) observed that financial investment accelerates the flow of credit to small-scale enterprise, which serves as a new engine of sustaining small enterprises' growth and balance development, because credit provides a significant source of employment and income to rural dwellers. In this regard, one can also consider the other side of it, which is financial exclusion, which is in traditional context, the inability of individual, household or group, especially low income earners and cottage entrepreneurs to access particularly the formal financial products and services of accepting deposits and provision of credits.

According to Hanning and Jansen (2010) and Convoy (2005) financial exclusion is the process that prevents the poor and disadvantaged social groups from gaining access to a formal financial system of their countries. From these definitions of financial inclusion and financial exclusion, it is obvious that their major impacts are felt most by the poor, rural dwellers, low income earners, cottage and micro industries owners in the developing nations and this can determine the economic growth of such nation (Shabna, 2014).

This process of linking up the activities and parties involved in a financial system is known as the financial intermediation process and bringing the services down to the poor/low income earners, cottage entrepreneurs and unbanked is known as financial inclusion.

The government in recognizing the crucial role of agriculture in driving Nigerian economic growth and development, recently embarked on some policies that will increase the provision of financial services by financial intermediaries with a wider choice of services and products geared to all levels of society especially the poor, cottage entrepreneurs and the agricultural sector. With the introduction of the Structural Adjustment Programme (SAP) and the Financial Liberalization Policy, the mandatory agricultural lending limits by the banks were abandoned. The Central Bank of Nigeria (CBN), knowing the role of agriculture in the country, continued with the intervention programmes to ensure an adequate allocation of funds from the banking sector to the agricultural sector. Some of these intervention programmes are the direct agricultural financial programme through the Deposit Money Banks, the now defunct Rural Banking Programme formerly introduced in 1977, the establishment of Microfinance Banks in 2005, the Agricultural Credit Guarantee Scheme Fund (ACGSF) established by Decree 20 of 1977 (as amended), the Commercial Agricultural Credit Scheme (CACCS) and Nigeria Incentive-based Risk Sharing System for Agricultural Lending (NIRSAL), and the introduction of the Peoples' Bank in 1989 which later merged with the Family Economic Advancement Programme (FEAP) and Nigerian Agricultural and Corporate Bank to form the Nigeria Agricultural Cooperative and Rural Development Bank (NACRDB) in 2000.

It seems that the financial reformation policies, the Structural Adjustment Programme (liberalization policy) and the various CBN agricultural finance programmes and initiatives are not having a positive impact on the growth of the agricultural sector (Osa-Afina and Kelikume, 2015). For instance, the CBN and World Bank official statistics indicate that the annual growth rate of Nigeria's agricultural output fell from 55.2 percent in 2002 to 7.4 percent at the end of 2006. It further dropped to 5.9 percent in 2009 and 2.9 percent in 2013. The persistent decline in the growth rate of agricultural sector in Nigeria may be related to the nation's lack of interest on agricultural sector due to the dependence on oil as the major source of government revenue. All other sectors were abandoned. Unfortunately when the price of oil fell in the international oil market, it threw Nigeria into deep financial crises with deep social repercussions.

This created an urgent need for accelerated investment in the agricultural sector. This study was undertaken to examine the causality between financial development and the agricultural sector output.

1.2. Objectives of the Study

The main objective of the study is to examine the causal relationship between financial inclusion and the agricultural sector's output in Nigeria. The specific objectives are to:

- i. Examine the causal relationship between the prime lending rate and agricultural sector output in Nigeria.
- ii. Determine the causal relationship between the deposit rate and agricultural sector output in Nigeria.
- iii. Investigate the causal relationship between the Agricultural Credit Guarantee Scheme Fund and agricultural sector output in Nigeria.
- iv. Ascertain the causal relationship between the demand deposit from rural areas and agricultural sector output in Nigeria.
- v. Examine the causal relationship between the deposit of money bank loan to small scale enterprises as a percentage of total loans and the agricultural sector's output in Nigeria

2. REVIEW OF RELATED LITERATURE

2.1. Conceptual Framework

2.1.1. Financial Inclusion

Extending the same quality of bank products and services in the cities and urban to the rural areas where more of these low-income earners, the poor household firm and micro businesses reside will go a very long way to enhance our economy. Financial inclusion is a state in which all people who use financial services have access to a complement of quality financial services provided at affordable prices in a convenient manner and with dignity for the clients (Financial Inclusion Center, 2013). Economic growth is the result of effective and efficient financial systems that includes all the classes and has mostly both the Economic Deficit Unit (EDU) and Economy Supplies Unit (ESU). When all the sectors of the economy are involved in the banking and financial system, they will obviously contribute positively to the economy.

According to Nwanne (2015), the World Bank defined financial inclusion as the range, quality and availability of financial services to the underserved and financially excluded. Okafor (2012) posits that financial investment accelerates the flows of credit to small-scale enterprise, which helps sustain small enterprises' growth and balance development because credit provides a significant source of employment and income to rural dwellers. About 90% of farmers in rural areas in developing nations engage in subsistence agriculture and have inadequate funds to facilitate the expansion of their business, or even practice mechanized farming, with modern equipment like ploughs, tractors, and other labour saving devices.

According to Saheed (2014), in the bid to address the credit needs of rural farmers, and improve domestic food supply, the Nigerian government took financial inclusion measures by introducing the Agricultural Credit Guarantee Scheme Fund (ACGF) and the rural banking programme in 1977, establishing the Community Bank in 1990/91 that was later reformed to Micro Finance Bank in 2005, and introducing the Nigeria People's Bank which was later changed to the Nigeria Agricultural Corporative and Rural development Bank (NACRDB) in 2000. Some other recent financial inclusion innovations in Nigeria are the non-interest banking policy, the financial literacy campaign, electronic banking and the cashless policy.

2.1.2. Agricultural Output Growth

The agricultural sector of Nigeria's economy has the critical role of broadening the productive and export base of the economy by creating employment, ensuring industrial input, full security and economic growth and, in fact, it is the major sector used to predict the Nigerian economy. However, recent studies on financial development in Nigeria especially on recent deepening efforts have shown more interest in its effects on economic growth. Adalokun (2010), Sanni (2012), Calderon and Liu (2003), Sunde (2012) and a host of other researchers imply that once there is improvement in economic growth, it means that all other various individual and specific sectors are

efficiently functioning and improving, and therefore disregard the study of growth in some sensitive individual sectors of the economy like the agricultural sector. Some other activities equally indicate a lack of interest on issues relating to agriculture in Nigeria.

Agricultural output is supposed to be the major driver of Nigerian economic growth considering factors like natural resources, human resources, historical evidence and past records. According to Usman (2006) agriculture is the largest employer of labor as it serves as a source of livelihood to two-thirds of the Nigerian population. Apart from these factors, the contribution of the agricultural sector output to the entire Nigerian economic growth rate has been declining continuously since the oil boom of 1970. The agricultural share of the gross domestic product (GDP) has progressively declined from 70% in the early 1960s to 48.8% in the 1970s to 22.2% in the 1980s, in 2006 it dropped to 7.4% and further dropped to 5.9% at the end of 2009, and further declined to 2.9% in 2013.

2.2. Theoretical Framework

This study is anchored on the economic growth theory. This theory explains the factors responsible for the growth rate of the various sectors of an economy and the economic growth rate generally.

2.2.1. Solow Growth Model or Neo-Classical Growth Theory

This model asserted that an economy's growth rate is dependent on two factors. The main work on neo-classical growth theory model was done by Robert S. and Trevor S. in 1956 and was extended in 1946 by the Harrod-Domar model. The work of Harrod-Domar was extended and expanded by Solow who adds labour as a factor of production and makes capital labour ratios flexible unlike in the Harrod-Dommer model where they are fixed. The Solow growth model shows how an increase in capital and labour force and advancement in technology can influence an entire nation's economic growth and development. The model specification is that output is a function of capital and labour that is $V=f(K,L)$.

Where V= output, K=capital and L=Labour.

Some of the assumptions of the models are that:

- All savings in the economy are channeled to investment opportunities and the augmentation of physical capital stock (Kularatne, 2001),
- The depreciation of capital rate is assumed to be zero,
- No technical progress, and
- The population growth rate is assumed to be fixed.

The summary of the Solow growth model shows that an increase in output is dependent on a higher rate of savings via higher stock of capital (Mankiw, 2007). The model indicates that a long term increase in labour will reduce the level of output if there is no improvement in technological progress that will enhance the efficiency of labour. The theory therefore concludes that the long term equilibrium growth rate depends on two exogenous variables: the rate of population growth and rate of technological change (Froyen, 2007). Froyen (2007) further posits that the theory provides little reference to the importance of finance in economic growth other than making reference to savings which do not affect the growth in the long term. This theory is relevant to the study because financial development comes in form of technical innovations into the financial system that spurs growth of the system and enhances services to the economy and the agricultural sector in particular. Thus the theory posits that financial development leads to agricultural output growth.

2.3. Theoretical Exposition

2.3.1. Financial Inclusion and Agricultural Sector Output

Financial inclusion is relevant to the agricultural sector and the Nigerians' economic growth in general, as it reduces inequality and poverty in the country through enhancing the financial capacity of the low-class entrepreneurs mostly the farmers. The transformative power of financial inclusion should not be underestimated since the improved access to finance by low income earners, poor household, and cottage and micro enterprises can unlock income earning opportunities and self-reliance for many, hence positively impact on the economic growth. Yunus and Karl (2007) posit that micro loans, savings accounts and assurance policy makes a very great difference to the poor, low income earners, farmers and micro entrepreneurs. They further explained that these financial services enable the poor to have better nutrition, housing, education for children and better health-care and improve their standard of living.

Financial inclusion is almost new to this part of the world but is mostly needed in developing nations for enhancement of the poor income earners, rural dwellers, household businesses, and cottage entrepreneur, as we have more of these classes of people and businesses in developing nations like Nigeria. Onaolapo (2015) opined that financial inclusion is a process that ensures the ease of access, availability and usage of a formal financial system by all members of the economy. Financial inclusion is seen and defined as a state in which all the people of a particular nation have complete access to appropriate desired financial products and services in order to manage their money effectively (Kama and Adigun, 2013).

2.4. Empirical Review

2.4.1. Financial Inclusion and Agricultural Sector Output

Saheed (2014) in India, studied financial inclusion concepts in an Indian context using empirical literature review design and in his findings he stated that people investing and saving more would break a vicious circle of poverty and unemployment and also lead to empowerment. "Cooperative banks as an effective financial inclusion strategy in Nigeria" was a study by Olufemi and Bello (2015). They reviewed the related existing literature to find out that financial inclusion is a good means of reducing poverty, ensuring food security and creating jobs.

Anthony and Harry (2015) researched government policy and the performance of small and medium business management. The survey shows that the performance of SMEs varies with the choice of the government for the individual sector.

Yoko (2010) did a research work on financial inclusion, poverty reduction and economic growth using surveys as the research method. He found out that the People Credit Bank (BDRS) have an important role to play financially and that they can positively change the lives of poorer households.

According to Onaolapo (2015) in his research: "Effects of Financial Inclusion on the Economic Growth of Nigeria (1982-2012)", inclusive bank financial activities greatly influenced poverty reduction but only marginally determined national economic growth and affected financial intermediation through enhanced banks branch networks, loan to rural areas, loan to small enterprises. In arriving at the conclusion, the researcher used secondary data which was analyzed using the ordinary least square method.

Osiken and Deniz (2016) studied the role of financial inclusion in driving employment led growth. They empirically reviewed existing literature and were able to found out that the availability, cost and design of financial services and products help to improve competitiveness and integrate economic sectors will drive employment growth.

Anigbogu *et al.* (2015) studied the financial intermediation process and small and medium enterprises performance in Nigeria in an aggregated analysis from 1980 to 2013. They used secondary data and the econometric model of the OLS method in their analysis and their result indicates that with the exception of bank interest rates to SMEs all other variables: financial intermediation, commercial bank loans and advances to SMEs,

the bank lending rate to SMEs, the exchange rate and monetary policy, have a positive and significant influence on small and medium enterprises performance in Nigeria.

Robert *et al.* (2014) researched financial inclusion and development. Previous works related to the topic were empirically reviewed. The literature review indicated that empirically a market that reaches all the citizens allows for more effective and efficient execution of other social policies and also that financial inclusion is positively correlated with growth and employment.

Okaro (2016) researched financial inclusion and the Nigerian economy (1990-2015) and defined financial inclusion as the provision of a broad range of high-quality financial products such as savings, credit, insurance, payments and pension, which are affordable for all within the society. In his study, he used the Ordinary Least Squares (OLS) regression technique and the result shows that the DMBIS, financial intermediation activities, financial deepening, financial accessibility, and institutional infrastructures all have positive significant effect on economic growth (Real GDP), while there was no relationship between financial inclusion and poverty eradication in Nigeria.

“Financial Inclusion in Nigeria: issues and challenges” was a study by Kama and Adigun, in 2013. The study was carried out empirically and the empirical result shows that greater financial inclusion is achieved when every demographic segment of the society has access to financial information, and financing with ease at less cost.

3. METHODOLOGY

3.1. Research Design

The study employs ex-post facto research design.

3.2. Nature, Sources and Scope of Data

The annual time series secondary data collected from the CBN Statistical Bulletin was used for the analysis. The data used in the analysis covered the period from 1986 to 2017.

3.3. Description of Variables

The variables specified in the sources of data above are defined below and their models and a priori relationship are also highlighted.

3.3.1. Financial Inclusion

A financial system is developed when all the sectors and classes or levels of members of the society and economy have access to financial services. It is the process that ensures the ease of access, availability and usage of formal financial system by all members of the economy (Onaolapo, 2015). The variables of financial inclusion are as follows:

3.3.2. Agricultural Credit Guarantee Scheme Fund (ACGSF)

The ACGSF was established by the federal military government of Nigeria under the ACGSF degree 1977 (degree No 20) and was amended on 13th, June 1988, for the purpose of providing guarantees in respect of loans granted by any bank for agricultural purposes.

3.3.3. Demand Deposit from Rural Areas (DDR)

The demand deposit from rural areas comprises of all the deposits of the deposit money bank located in the rural areas. This includes the deposits of mostly the farmers, low income earners, cottage enterprise and micro enterprise owners.

3.3.4. Deposit Money Bank Loan to Small Enterprises (% of GDP)

This is the percentage of the deposit money bank credit that is allocated to the small and medium enterprises in Nigeria.

3.4. Model Specification

A model of financial inclusion and agricultural sector output was used to address objective two of the study. The model for financial inclusion in this study depends on the work of Onaolapo (2015) in his study of the “effects of financial inclusion on the economic growth”, and the per capita income, the number of commercial banks branches, the bank loans to rural areas, the demand deposit from rural areas and the agricultural guarantee scheme fund were used as explanatory variables in examining financial inclusions and were represented in the econometric model as

$GDP = \alpha + \beta_1 \text{Branch} + \beta_2 \text{LR} + \beta_3 \text{DRA} + \beta_4 \text{ACGSF} + \mu$. This study therefore sought to examine the relationship between financial inclusion and growth using the financial inclusion index: the prime lending rate, the deposit rate, the agricultural credit guarantee scheme fund, the demand deposit from rural areas, and the deposit money bank loan to small scale enterprises as a percentage of total loans. Thus this study used the functional model for objective two indicated below:

$$AOG = F(\text{PLR}, \text{DR}, \text{ACGSF}, \text{DDR}, \text{PLSE}) \quad (1)$$

The above functional model can be presented in equation form as:

$$AOG = \beta_0 + \beta_1 \text{PLR} + \beta_2 \text{DR} + \beta_3 \text{ACGSF} + \beta_4 \text{DDR} + \beta_5 \text{PLSE} + \mu \quad (2)$$

Where β_0 = constant, β_{1-6} = coefficient of the regression, μ = error term, PLR = Prime Lending Rate, DR = Deposit Rate, ACGSF = Agricultural Credit Guarantee Scheme Fund, DDR = Demand Deposit from Rural Areas, PLSE = Deposit Money Bank Loan to Small Scale Enterprises as a Percentage of Total Loan.

3.5. Estimation Techniques

3.5.1. Testing for Stationery/Unit Root

Prior to identifying any possible long term relationship, it will be important to test the time series data for stationerity as the key concept underlying time series processes. The Stationerity Test can also be useful in determining if trending data should be first differenced or regressed on deterministic functions of time to render the data stationery. This implies that non stationery time series data might need to be differenced more than once before it becomes stationery. If the time series are stationery in their levels, they are said to be integrated of order zero Equation 1 (0), If the time series are stationery in their first difference, then they are said to be integrated of order one, Equation 1; and lastly, if they are stationery in their second differences, they are said to be integrated of order two Equation 2. The order of integration of the variables was tested using the Argument Dickey – Fuller (ADF) (Dickey and Fuller, 1981) Unit Root Test for the presence of unit roots.

3.5.2. Co – Integration Test

The Co – integration Test is a follows up to the Unit Root Test in order to establish whether there exists any long – term relationship between the variables.

3.5.3. Engle – Granger Co-integration Approach

The sequence of this approach starts by conducting a test between two non – stationery time series to determine if they are co – integrated of the order I (1). The test requires conducting Ordinary Least Squire (OLS) Regression, saving the residuals and then running the ADF tests on those residuals in order to determine whether

or not it is stationery. If it is stationary at level, it indicates that the long term relationship exists and a follow up test will be conducted.

3.5.4. Error Correction Model (ECM)

The existence of the long term co-integration equilibrium provides for short term fluctuation and in order to straighten out or absolve these fluctuations it was necessary to apply the Error Correction Model (ECM) (Ibenta, 2008).

Granger (1981) showed that if variables X and Y are Co-integrated, that, the two variables have an error correction representation. The Error Correction Model (ECM) provides information on the long term relationship and short term relationship as well as the speed of adjustment between the two variables in incorporating to the equations and the Error Correction Term (ECT).

3.5.5. Granger Causality

Testing causality in the granger sense involves using f-tests to test whether lagged information on a variable y provides any statistically significant information about a variable X in the presence of lagged X, if not, then y does not granger cause x (Granger, 1981). The Granger Causality Test will be used to estimate the following hypotheses:

4. ANALYSES OF THE RESULTS

Table-1. Unit Root Test.

S/N	Variables	At level	At 1 st difference	At 2 nd difference	Order of ()	Results		
						At level	At 1 st different	At 2 nd difference
1	DR	-	-6.549942	-	1(1)	Not significant	Significant	Significant
2	LnACGSF	-	-5.332284	-	1(1)	Not significant	Significant	Significant
3	LnAOG	-	-5.21722	-	1(1)	Not significant	Significant	Significant
4	LnDDR	-	-4.021716	-	1(1)	Not significant	Significant	Significant
5	PLR	-	-5.785241	-	1(1)	Not significant	Significant	Significant
6	PLSE	-	-5.735013	-	1(1)	Not significant	Significant	Significant
	At 0.05 c.v	-	-3.574244	-				

Source: Authors computation using E-view 10 computer package.

The results of Table 1(unit root test) shows that all the financial inclusion variables and independent variable are stationary at their first differences. It is then necessary to test and establish the existence of the long term relationship of the variables using the Co-integration Tool.

Table-2. Co- integration test of Financial Inclusion Variable and Agricultural Sector Output in Nigeria.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.755525	0.0337
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Source: Authors computation using E-view 10 computer package

Using the Engle and Granger (1987) method of testing Co- integration, the P-value of ADF Test in Table 2 is 0.0337, since the p-value is less than the 5% critical value and the Augmented Dickey- Fuller (ADF) value -3.755525>-3.568379 (at the 0.05 level of significance) at absolute terms. We reject the null hypothesis which states that there is no convergence of the variables in the long term. The result therefore reveals that the six (6) financial

inclusion variables have a long term equilibrium relationship at the 5% significance level. The error correction model of the Least Square adopted from Table 3 is represented in the equation below:

$\text{LnAOG} = -0.046201 + 0.024765\text{ACGSF} - 0.007373\text{DR} + 0.005364\text{DDR} + 0.005829\text{PLR} + 0.014332\text{PLSE}$. The equation shows the DR has an adverse contribution to agricultural output growth while ACGSF, DDR, PLR and PLSE have positive contribution to the dependent variable (AOG). The P-value (0.0029) of ECM indicates that short-term relationship exists between the variables.

Table-3. Error Correction Model of Financial Inclusion Variable and Agricultural Sector Output in Nigeria.

Dependent Variable: D(LNAOG)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.046201	0.065175	-0.708876	0.4858
D(D(LNACGSF))	0.024765	0.047585	0.520435	0.6080
D(DR)	-0.007373	0.006542	-1.127032	0.2719
D(LNDDR)	0.005364	0.006762	0.793281	0.4361
PLR	0.005829	0.003316	1.757917	0.0927
D(PLSE)	0.014332	0.007120	2.012986	0.0565
ECM(-1)	-0.544719	0.162815	-3.345638	0.0029
R-squared	0.538112	Mean dependent var		0.060276
Adjusted R-squared	0.412142	S.D. dependent var		0.075484
S.E. of regression	0.057875	Akaike info criterion		-2.654560
Sum squared resid	0.073689	Schwarz criterion		-2.324523
Log likelihood	45.49111	Hannan-Quinn criter.		-2.551196
F-statistic	4.271762	Durbin-Watson stat		2.325154
Prob(F-statistic)	0.070531			

Source: Authors computation using E-view 10 computer package.

The negative sign of the ECM is a necessary condition for the variables to be co-integrated and the co-efficient value of ECM at -0.544719 implies that the speed at which the variable will converge or adjust at long-term or the speed in which they will attempt a long-term relationship is 54%. The probability values of the independent variables ACGSF, DR, DDR, PLR, PLSE indicates that they have no statistical significant relationship with the dependent variables (AOG). The value of the adjusted R-squared (0.412142) shows that 41% of the changes in the dependent variables are influenced by the changes of the independent variables. The value of Prob. (F-statistic) of 0.070531 is implies that all the independent variables put together have no statistical significant relationship with the agricultural sector output in Nigeria. Durbin-Watson's value of 2.3251154 proves the absence of auto correlation in the model.

Model Estimation

The result of the Causality Test was used to address the objectives of the study. The model results were used to answer the research questions and hypotheses.

Table-4. Pairwise Granger Causality Test for hypotheses: There is no relationship between the Financial Inclusion variables and Agricultural Sector Output in Nigeria.

Null Hypothesis:	Obs	F-Statistic	Prob.
PLR does not Granger Cause LNAOG	29	0.54377	0.5875
LNAOG does not Granger Cause PLR		4.03194	0.0309
DR does not Granger Cause LNAOG	29	2.30036	0.1219
LNAOG does not Granger Cause DR		0.03128	0.9692
LNACGSF does not Granger Cause LNAOG	29	7.36046	0.0032
LNAOG does not Granger Cause LNACGSF		2.42729	0.1096
LNDDR does not Granger Cause LNAOG	29	0.37767	0.6895
LNAOG does not Granger Cause LNDDR		1.01040	0.3790
PLSE does not Granger Cause LNAOG	29	2.31327	0.1206
LNAOG does not Granger Cause PLSE		1.82861	0.1823

Source: Authors computation using E-view 10 computer package.

The Pairwise Granger Causality Test on Table 4 is used to address objective of the study. The aim is to determine the causal relationship between the financial inclusion variables and agricultural sector output in Nigeria. The proxies for financial inclusion are: the Agricultural Credit Guarantee Scheme Fund (ACGSF), the demand deposit from rural areas (ddr), the deposit money bank loan to small scale enterprises as a percentage of total loans (plse), the prime lending rate (plr) and the deposit rate (dr). Hence, the objective is presented in Table 4 based on this following hypothesis

Demand-Following Hypothesis

H0: $P = 0$, i.e. AOG does not granger cause PLR, DR, ACGSF, DDR, PLSE.

H1: $P = 1$, i.e. AOG granger causes PLR, DR, ACGSF, DDR, PLSE.

Supply-Leading Hypothesis

H0: $P = 0$, i.e. PLR, DR, ACGSF, DDR, PLSE, do not granger cause AOG.

H1: $P = 1$, i.e. PLR, DR, ACGSF, DDR, PLSE, granger causes AOG.

To accept the alternative hypothesis, the P-value needed to be within the critical value of 0.05 significant level. The results of the above analysis imply that F-statistics and the probability value of the first equation proved the existence of unidirectional causality from AOG to PLR. Therefore, there is existence of demand following hypothesis. Thus, Agricultural Sector Output (AOG) in Nigeria Granger Causes Prime Lending Rate (PIR)

The second equation implies that the F-statistics and P-value of the second equation indicate independence causality (i.e no causality). Therefore there is no existence of relationship between deposit rate (DR) and agricultural sector output (AOG) in Nigeria during the period of 1986 to 2017.

The results of the Pairwise Granger Causality test in equation three show that at the 0.05 levels of significance, ACGSF granger causes AOG. This indicates unidirectional causality running from ACGSF to AOG. Thus, there is evidence existence of supply leading hypothesis in Nigeria.

There is no evidence of any casual relationship existing between the financial inclusion variables in equation four and five respectively. In equation four, the result of the analysis proved that the demand deposit from rural area (DDR) the agricultural sector output (AOG) are independent of each other. In the equation five, P-value at 0.05 critical values also indicates that deposit money bank loan to small scale enterprises as percentage of total loan (PLSE) and agricultural sector output (AOG) are not dependent of each other.

The results of the Pairwise Granger Causality test are in agreement with the results of ECM of the ordinary least square which revealed that DR, PLR, ACGSF, DDR and PLSE with P-values of 0.2717, 0.0927, 0.6080, 0.4361 and 0.0565 respectively do not have any significant effect on agricultural output in Nigeria. Thus, the Prob (F-statistic) value of 0.070531 shows that all the variables of financial inclusion put together have no significant relationship with the dependent variable.

4.1. Discussion of Results

The results of this study were discussed in line with the results of the ECM and Pairwise Granger Causality Analysis for each of the financial development indicators. This discussion was done to establish the nature of relationship existing between financial inclusion and agricultural sector output in Nigeria based on the stated objectives of the study.

The results of the ADF showed that all the independent variables and agricultural sector output variable are stationary at their first differencing. The result of the Co-integration test also revealed that the six (6) financial inclusion variables have long run equilibrium relationship at 5% significance level.

The Error Correction Model result indicated that the DR has adverse contribution to agricultural output while ACGSF, DDR, PLR and PLSE have positive contributions to the dependent variable (AGO). The P-values of the

explanatory variables ACGSF, DR, DDR, PLR, PLSE indicated that they have no statistical significant effect on the AOG. The value of adjusted R-Squared 0.412142 shows that 41% of the changes of the dependent variables are caused by the changes of the explanatory variables. The values of Prob.(F-statistic) of 0.070531 implies that all the independent variables put together have no statistical significant effect on agricultural sector output in Nigeria.

The result of Causality Test revealed unidirectional causality from AOG to PLR, thus indicated the existence of demand following hypothesis. While there is also evidence of unidirectional causality running from ACGSF to AOG, hence, the existence of supplying a leading hypothesis.

There is no evidence of a causal relationship existing between the deposit rate (dr), the demand deposit from rural area (ddr) and the deposit money bank loan for small scale enterprises as a percentage of total loan (PLSE) and the dependent variable (AOG). The causal relationship between the financial inclusion and agricultural sector output in Nigeria has more indication for independent causality hypothesis. This is in conformity with the conclusion of Demetriades and Hussein (1996), Obafemi *et al.* (2016) and Aye (2015). Though it does not agree with the a priori expectation but it does solidify the result of Error Correction Model (ECM) which revealed that DR, PLR, ACGSF, DDR and PLSE with P-value of 0.2717, 0.0927, 0.6080, 0.4361 and 0.0565 respectively do not have any significant effect on agricultural sector output in Nigeria within the period of study.

Nigeria as a nation has more of its population in the rural part of the country and most of its businesses are in cottage and micro forms that are not being accommodated or involved in the banking activities of the nation. Most of the financial policies and schemes favouring the low-income earners and cottage enterprises end up being mischanneled and politicized, and by the end of the exercise, it will not benefit the targeted group. These financial policies, therefore, will not have any significant effect on growth and vice versa. The agricultural sector output has also been on the declining side and this may be attributed to the fact that majority of the Nigerian population lost interest in the sector and the government was not paying adequate concentration to revive the agricultural sector.

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of Findings

The study investigated the causal relationship between financial inclusion and agricultural sector output in Nigeria. The results from the Error Correction Model and Pairwise Granger Causality Test can be summarized according to the objectives of the study as follows:-

- The analysis of co-integration revealed the convergence of financial inclusion and agricultural sector output in the long-term.
- The adjusted R-squared co-efficient showed that financial inclusion explains 41% of the changes in agricultural sector output in Nigeria. Hence, it is a poor tool for boosting AOG.
- The P-value of ECM indicated that DR, PLR, ACGSF, DDR and PLSE are not significant to agricultural sector output changes in Nigeria.
- Prob. (F-statistics) co-efficient of 0.070531 proved that the explanatory variables have an insignificant effect on the dependent variable.
- Pairwise Granger Causality Test indicated that there is unidirectional causality from AOG to PLR, thus, there is existence of a demand following hypothesis. There is also evidence of a unidirectional relationship running from ACGSF to AOG supporting the existence of the supply leading hypothesis.
- Granger Causality Test showed more support for non-existence of a causal relationship between the variables of explanatory variables and the dependent variables. Thus, DR, DDR, PLSE and the independent variable (AOG) are independent of each other.

5.2. Conclusion

Most often, the nexus of causality between finance and growth depends on the nature of proxies used for financial development. Based on the variables used on this study, financial inclusion has not benefited the Nigerian agricultural sector output within the period of the study. Hence, the ECM revealed that financial inclusion does not have significant effect on agricultural sector output in Nigeria. The study through Granger Causality Test indicated more support for the independent causal relationship between financial deepening and agricultural sector output in Nigeria. However, the study shows that financial inclusion has not helped the growth of AOG.

5.3. Recommendations

There is a need for the sensitization of the agricultural and financial sectors operators on the benefits of their services to each other. This can be done through symposiums, lectures, seminars and workshops on the relationship between the agricultural sector and the financial system. The two sectors should be encouraged to depend on each other with the agricultural sector relying more on the services of conventional financial institutions. Financial institutions on their own part should develop more interest in servicing the agricultural sector than other sectors of the economy. The policy makers in Nigeria should ensure the efficient and effectiveness of the financial system in order to eliminate or reduce the financial exclusiveness of the system.

5.4. Contributions to Knowledge

Considering the depth of this study, the extent of the empirical works studied, the methodology and the results of the analysis, this study has some of its contributions to acknowledge as stated below:

- (1) The major gap filled by the study is to confirm that financial inclusion has not been able to influence agricultural sector output in Nigeria.
- (2) This study is one of the very few studies that have researched causality using agricultural sector output as the dependent variable and financial inclusion as the explanatory variable.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: All authors contributed equally to the conception and design of the study.

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