Would Agricultural Credit Sustain Agricultural Output in Nigeria? An Empirical Perspective

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Abstract: This study examines the sustainability of agricultural output through agricultural credit in Nigeria. Secondary data from the Central Bank of Nigeria Statistical Bulletin was utilized from 1981-2019. Cointegration, DOLS and Granger Causality were employed in analyzing the objective of the study. Moreover, the study results found that credit disbursed to the agricultural sector has a significant positive impact on agricultural output in Nigeria. However, agricultural expenditure has an insignificant direct linkage with output from agriculture in Nigeria. Also, there exists a unidirectional causality which runs from agricultural credit to agricultural expenditure. Likewise, a one-way feedback effect runs from agricultural output to agricultural expenditure in Nigeria. This research is the first empirical study that tests the sustainability of agricultural output through agricultural credit in Nigeria. Therefore, the policymakers in the country are advised to be committed to financing of the agricultural sector because it has the capacity to sustain agricultural output and as such food security and zero hunger would be guaranteed in the country. Also, there should be an increase in the allocation of the national budget to the agricultural sector in Nigeria.

Keywords: Agricultural Credit; Output; Expenditure; ACGSF; and Nigeria.

JEL Classification: C13; C22

I. Introduction

In times past, agriculture used to be the pillar of the Nigeria economy and the sustainability of the Nigeria's economy then largely depends on the agricultural sector. But, the emergency of oil drifted away the attention of the Nigerians from the industry that accounted for about 71% of Nigeria's GDP and 90% foreign earnings in 1970 respectively CBN (1971). In the 70s, available evidence indicates that Nigeria was the second-largest cocoa producer in Africa. In the same vein, Nigeria occupied the top position among the countries that exported palm products to the global market in those years (FAO, 1980).

As a matter of fact, a substantial part of the fund that was utilized to sponsor developmental projects in Nigeria before the oil boom was generated from the agricultural products. For instance, the history documented that most of the earlier developmental projects in South Western Nigeria were facilitated

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by the earnings from agriculture, especially cocoa exports. However, the quick money from oil and gas has contributed more of a setback than progress to the Nigerian economy. Because since the time of the oil boom emergency, the agricultural sector has been abandoned by the Nigerian policymakers and serious effort is yet to be made to revamp the sector to meet up with the global standard. Consequently, the key role played by credit cannot be overemphasized in the expansion of agricultural sector in ensuring economic growth on a sustainable basis. This paramount role orchestrated the action of the Nigeria apex bank (Central Bank of Nigeria) in initiating the disbursement of the Two Hundred Billion (N200 billion) Commercial Agriculture Credit Scheme (CACS) in 2009. This scheme is mandated to finance the value chain in agricultural products on a large scale.

In the same vein, in an attempt, to facilitate the lending capacity of the Nigerian commercial banks with a view to developing the agricultural sector, the Central Bank of Nigeria instituted a scheme called Agricultural Credit Guarantee Scheme Fund (ACGSF) and this provides about 75% guarantee of all loans in which the commercial banks disbursed to agricultural sector. ₦48.6 billion was disabused in 2005 by the commercial banks, the figure rose astronomically to ₦1.88 trillion in 2015. This amounts to a 3000% rise. (CBN 2016).

Meanwhile, in spite of the several efforts of the Nigerian policymakers to address the inadequate credit problem confronting the agricultural sector in the country, there has been a divided opinion regarding the aftermath effects of these schemes on the agricultural production in Nigeria. See Udoka and Duke (2016), Olomola and Yaro (2015), Obasi (2015), Imoisi *et al.* (2012). Due to the inconclusiveness of the empirical studies regarding this subject matter, there is a need for further empirical investigation in recent times.

Also, it is imperative to state that this study is unique because it adopts the latest methodology, which most previous studies have not fully explored. The scope of this study ranges from 1981 to 2019.

2. Review of Empirical Literature

This study attempts to present past empirical studies about the relationship between agricultural credit and agricultural output in Nigeria.

In a study, Ammani (2012) examined the effects of agricultural production on formal credit supply in Nigeria. The study discovered that formal credit had a significant impact on crop productivity, livestock and fish farming. Okojie *et al*. (2010), argued that one of the major problems associated with informal credit is that higher interest rates is usually imposed on borrowers relative to those credit obtained from the formal sector. Moreover, Imoisi *et al*. (2012) used secondary data sources between 1970 and 2010 to investigate the linkages between how agricultural credit facilities contributed to the output and productivity of the agricultural sector in Nigeria. The authors posited that there exists a significant relationship between deposit money banks loans and advances, and agricultural outputs in Nigeria. Aderemi *et al*. (2020) examined how agriculture generated employment in Nigeria during the post Structural Adjustment Programme era. The author explored Cointegration, Dynamic Ordinary Least Squares and Granger Causality techniques to estimate the objective of the study. The finding form the study argued that agricultural sector did not contribute a significant impact to employment generation in Nigeria during post SAP periods. The study also affirmed that agricultural expenditure led to an inverse with employment generation in the country.

Consequently, Okafor *et a*l. (2016) utilized both Granger causality test and Vector Autoregressive (VAR) in estimating the existence of causal relationship between deposit money banks' credit and economic growth in Nigeria from 1981 to 2014. It was concluded from the study that there is a unidirectional causal effect that runs from the private sector credit to enhance economic growth in Nigeria. Udoka and Duke (2016) carried out a study to assess the link between that exists between the disbursements of loans by commercial banks to the output generated by the agricultural sector in Nigeria. It could be inferred from the work that credit scheme contributed significantly to the output of agriculture in Nigeria in one hand, but the contribution of interest rate to agricultural output was adverse to the Nigerian economy. In another study, Marshal *et al.* (2015) employed a quantitative technique to investigate how domestic credit advanced by the Nigerian commercial banks affected how the economy of the Nigeria has grown between 1980 and 2013. The result from the paper showed that CPS and CGS had a positive significant correlation with GDP in the short run, whereas in the long run there is the existence of a negative relationship between banks domestic credit indicators and the expansion of the Nigerian economy.

In another perspective, Nnamocha and Eke (2015) applied Error Correction Model (ECM) to estimate the linkage among Bank Credit and Agricultural Output between 1970 and 2013 in Nigeria. It was reported from the analysis that the contributions of both the bank credit and the output from industry has led to a noticeable effect, in the long-run on the agricultural output in but the impact of industrial output was felt only in the short-run on the agricultural output in Nigeria. However, Onoja (2012) examined the trends, patterns and determinants of institutional credit supply to the agricultural sector during pre- and post-financial reforms in Nigeria. (1978 to 1985; and 1986 to 2009). The author argued that an exponential rise in the trends of agricultural credit supply in the economy after the advent of the reform was observed. Similarly, the stock market capitalization, interest rate and immediate past volume of credit guaranteed by ACGSF had an impact which is significant on the quantity of institutional credit allotted to the agricultural sector during the period. Meanwhile, during the period of analysis, there was a noticeable knowledge gap between credit supply function.

In summary, the above reviewed studies show the perception of different scholars regarding the subject matter of this study which attest that there is yet to be a consensus regarding the subject matter, hence the importance of this study.

3. Methodology

This paper utilized data from secondary source. Data on agricultural credit, agricultural expenditure and agricultural output between 1981 and 2019 were extracted from the Central Bank of Nigeria Statistical Bulletin.

3.1. Specification of Model

In order to estimate the data for this study, it is imperative to specify the general model as adapted from Olayemi *et al*. (2019) and Aderemi *et al.* (2020).

$$AOP = F(ACR, AEXP) \quad (I)$$

As model (I) is linearized to form model two as follows.

$$AOPt = \beta_1 + \beta_2 ACRt + \beta_3 AEXPt + \varepsilon_t \quad (II)$$

3.2. The Direction of Causality among Agricultural Credit, Agricultural Output and Agricultural Expenditure in Nigeria.

In addressing the feedback effect between agricultural credit, agricultural output and agricultural expenditure, it is instructive to employ the technique of pairwise Granger causality. Therefore, the model is specified as follows:

$$AOP_t = \partial_0 + \sum_{i=0}^{p} \partial_1 AOP_{t-1} + \sum_{i=0}^{p} \partial_2 ACR_{t-1} + \sum_{i=0}^{p} \partial_3 AEXP_{t-1} + u \quad \text{(III)}$$

$$ACR_t = + \partial_{20} + \sum_{i=0}^{p} \partial_{21} ACR_{t-1} + \sum_{i=0}^{p} \partial_{22} AOP_{t-1} + \sum_{i=0}^{p} \partial_{23} CoAEXP_{t-1} + u_{2t} \quad \text{(IV)}$$

$$AEXP_t = \partial_{30} + \sum_{i=0}^{p} \partial_{31} AEXP_{t-1} + \sum_{i=0}^{p} \partial_{32} AOP_{t-1} + \sum_{i=0}^{p} \partial_{33} ACR_{t-1} + u_{3t} \quad \text{(V)}$$

Where AOP denotes agricultural output, proxies by contribution of agriculture to GDP. ACR stands for the credit disbursed to agriculture. AEXP is both capital and recurrent expenditure on agriculture. u_t is error term; t =1981-2019. Where the a priori expectations follow this pattern β2 and β3> 0.

4. Result of Findings and Discussion

Table 1. The Descriptive Statistics of Annual Data Series (1981 - 2019)

Descriptive Results	AOP	ACR	AEXP
Mean	5.17E+12	2967237	1.50E+10
Median	1.43E+12	246082.5	6.34E+09
Maximum	2.15E+13	12997004	6.54E+10
Minimum	1.71E+10	24654.90	10000000
Std. Deviation	6.63E+12	4050023	1.86E+10
Skewness	0.135126	0.088078	0.078575
Kurtosis	2.921667	2.705103	3.101562
Jargue-Bera	7.955277	7.434866	7.189732
Probability	0.018730	0.024296	0.027464
Sum	1.91E+14	1.10E+08	5.57E+11
Sum. Sq. Deviation	1.58E+27	5.90E+14	1.25E+22
Observation	39	39	39

Source: Authors' Work (2021).

The Table above displays the descriptive results and this output indicates that the data are largely dispersed from their mean because the values of the standard deviation of the variables are bigger than those of their mean values. However, all the variables possess a positive skewness with kurtosis value close to 3. This provides a necessary condition to justify the existence of a normal distribution of the data employed for this empirical analysis.

Table 2. Unit Root Test

Variables	ADF Test			PP Test		
	Level	First Difference	Remarks	Level	First Difference	Remarks
ACR	-3.167767**		I (0)	-3.925142**	-3.418304**	I (1)
AOP	-3.045312**	-3.928610**	I (1)	-3.644812**	-3.532404**	I (1)
AEXP	-3.142441**	-3.753195**	I (1)	-3.745842**	-3.618304**	I (1)

*Source: The Authors' (2021) ** %5 level*

The important role in which the test of stationarity plays in empirical analysis motivated us to adopt the technique of Augmented Dickey-Fuller (ADF) test alongside Phillips-Perron (PP) test in

estimating unit root in this study. Moreover, the findings in the above table imply that data on agricultural output, agricultural credit and expenditure on agriculture were not stationary in their original form, apart from the result of ADF test on agricultural credit. This implies that the data are characterized with problem of a unit root.

Table 3. Trace Statistics (Johansen Cointegration Test) and Maximum Eigenvalue

H_0	Eigenvalue	Trace Statistics	P. Value	Maximum Eigenvalue	P. Value
r=0	0.493891	39.73215	0.0026	23.83514	0.0203
r≤1	0.345041	15.89701	0.0435	14.81140	0.0409
r≤2	0.030541	1.085613	0.2974	1.085613	0.2974

Source: Authors' Work (2021).

Considering the above results, agricultural output, agricultural credit and expenditure on agricultural possess a unit root, as such it is possible these variables possessed an equilibrium linkage in the long run despite the temporary deviation orchestrated by the unit root problem. In this study, we made use of Johansen and Juselius work in an attempt to investigate the possibility of the linkage in the long run among agricultural output, agricultural credit and agricultural expenditure. Johansen and Juselius (1990). Our estimation results established the presence of at most two vectors that are cointegrated in the systems, inferring from trace statistics and maximal eigenvalue statistics. Thus, existence of long run convergence is proven from the study.

Table 4. The Relationship between Agricultural Credit, Agricultural Expenditure and Agricultural Output Dependent Variable: AOP

Variables	**Coefficient**	**t.statistics**	**p.value**
ACR	14.67682**	7.473066	0.0000
AEXP	70.01990	1.360727	0.1857
C	4.74E+1	1.100046	0.2818
R-Square	0.981241		
Adjusted R-Square	0.975238		

Source: Authors' Work (2021).

The Table above reveals the results of the dynamic ordinary regression analysis. Dependent variable is the Agricultural output; the explanatory variables have the expected sign. Furthermore, explanatory variables in the adopted model are agricultural output and expenditure on agriculture which jointly accounted for 98% variations in the response variable; agricultural output with about 2% unaccounted for due to chance. Thus, the model employed is good for this empirical paper.

Consequently, agricultural credit has a direct significant relationship with agricultural output, and a unit change in agricultural credit brings about a 14% rise in agricultural output in Nigeria. This implies that credit disbursed to the agricultural sector has a positive significant impact on agricultural output in Nigeria. The result of this paper is in tandem with the previous findings; Udoka and Duke (2016), Imoisi *et al*. (2012), Ammani, (2012), despite the fact that the methodology employed in this paper was not the same with those studies. However, agricultural expenditure has a positive insignificant relationship with agricultural output in Nigeria. Furthermore, low and inconsequential annual budget allocations to the agricultural sector in Nigeria might account for this insignificant relationship between agricultural expenditure and agricultural output in Nigeria.

Table 6. Pairwise Granger Causality Test

Sample: 1981 to 2019
Lags: 2

H0:	Obs	F-Statistic	Prob.
ACR ≈ AEXP	35	3.43674	0.0453
AEXP ≈ ACR		0.96846	0.3912
AOP ≈ AEXP	35	3.98942	0.0291
AEXP ≈ AOP		0.88594	0.4228
AOP ≈ ACR	35	0.37934	0.6875
ACR ≈ AOP		23.6782	7.E-07

Source: Authors' Work (2021).

** ≈ Does not Granger Cause*

In this part of the paper, the feedback effect among agricultural output, agricultural credit and agricultural expenditure was investigated using the pairwise Granger causality test. The deduction from the results is stated as follows; a unidirectional causality which runs from agricultural credit to agricultural expenditure exists. Also, a one-way feedback effect runs from agricultural output to agricultural expenditure; however, agricultural credit does not Granger cause agricultural output in the country. This means there is no feedback association between agricultural credit and agricultural output in Nigeria.

4.1. Summary

The aim of this paper was to examine the linkage between agricultural output and agricultural credit in Nigeria from 1981 to 2019 with a view to establishing how sustainable agricultural output could be in Nigeria. After the analysis of the data, the following conclusions could be drawn from the study; the credit disbursed to agriculture generated a significant contribution to agricultural output in Nigeria. In the same vein, credit disbursed to the agricultural sector in Nigeria has a positive significant impact on agricultural output in the country. However, agricultural expenditure has an insignificant direct linkage with the output of agriculture in the country.

In addition, a unidirectional causality exists, which runs from agricultural credit to agricultural expenditure. Also, one-way feedback effect runs from agricultural output to agricultural expenditure; however, agricultural credit does not Granger cause agricultural output in Nigeria. This indicates that there is no feedback relationship between agricultural credit and agricultural output in Nigeria.

As a result of the principal findings that originated from this paper, it is important to make the following recommendations*;* the policymakers in Nigeria should be committed to the financing of the agricultural sector because it has the capacity to sustain agricultural output, and as such food security and zero hunger would be guaranteed in the country. Also the policy makers in Nigeria should increase the allocation of the national budget to the agricultural sector in Nigeria.

4.2. Implications

The findings of this study support the concept of agricultural financing, which puts emphasis on the mobilizing all resources to ensure sustainable agricultural output. Previous research was mostly conducted with the application of Ordinary Least Squares Udoka and Duke (2016), Olomola and Yaro (2015), Obasi (2015), Imoisi *et al.* (2012). This current study employed Dynamic Ordinary Least Squares and Granger causality technique, which is the uniqueness and novelty of this study because it provides better method of estimation in literature.

4.3. Limitations and Further Research

The scope of this study limits its generalization. The study only focuses on Nigeria, therefore, the next study can conduct impact of agricultural credit on agricultural output in West Africa Sub-Region.

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