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Credit Supply and Agricultural Production in Nigeria: A Vector Autoregressive (VAR) Approach

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Abstract

Agriculture used to be the mainstay of the Nigerian economy contributing over 70 percent to the country's total output and accounts for over 90 percent of total food consumption. However, the performance of the sector has drastically deteriorated since the discovery of crude oil in 1956. The strategic roles of the agricultural sector in national development led the Federal Government to establish agricultural sector credit schemes and various other institutions to boost the level of productivity in the sector. Notwithstanding, the intensification of government and private sector support to the sector, the contribution of agricultural to GDP has fallen significantly creating a fundamental gap in resource allocation to the agricultural sector. The basic question raised in this research, is, does increased credit supply through the Agricultural Credit Guarantee Scheme Fund (ACGSF) and commercial loans to the sector boost agricultural sector productivity? This study examines the impact of the credit supply, and various commercial bank loan schemes on agricultural sector production using vector autoregressive (VAR) approach. Using time series data sourced from Central Bank of Nigeria Statistical Bulletin over the sample period of 1981-2013, the study found ACGSF to have performed poorly in explaining agricultural sector performance while commercial loans to agricultural sector had a significant impact on agricultural production. The policy implication of this study is that government should encourage the commercial bank to finance investment in the agricultural sector by granting credit facilities at below market interest rates.

Keywords: ACGSF; Agricultural Production; Credit Supply; Nigeria; Vector Autoregressive Model

1. Introduction

In the 1960s, Nigerian economy was majorly driven by the agricultural sector accounting for about 70 percent of the country's Gross Domestic Products (GDP) and 65-70 percent of the nation's exports (Olajide, Akinlabi, & Tijani, 2012). The sector has also contributed about 65 percent of employment to the teeming population and accounted for over 90 percent of the total food consumption requirement, thus, contributing significantly to the nation's food security (Emeka, 2007; Izuchukwu, 2011). Consequently, the agricultural sector was estimated to be the largest contributor to Nigeria's non-oil foreign earnings (Iganiga & Unemhilin, 2011). The sector was also seen as the key to the development of the economy through product contribution, market contribution, factor contribution, and foreign exchange contribution (Abayomi, 1997).

In recent time, the performance of the agricultural sector and its share of contributions to the nation's GDP have drastically reduced following the oil booms of the late 1970s that led to the neglect of agriculture (Olajide et al., 2012). In addition, factors such as education (Pudasaini, 1983), infrastructure (Queiroz & Gautam, 1992; Gopinath & Roe, 1997; Yee et al., 2002), and inflation (Bullard & Keating, 1995; Andrés & Hernando, 1997; Gokal & Hanif, 2004) have also led to the poor performance of the sector. Other factors include lack of modern inputs and credit facilities (Iganiga & Unemhilin, 2011; Awe, 2013; Zakaree, 2014), land and environmental degradation, inadequate research and extension services (Olajide et al., 2012). Among these factors, the lack of insufficient fund and credit facilities seems to be the core issue facing agriculture as other matters are directly and indirectly linked to it. For instance, most farmers in the rural areas are faced with the challenges of accessing formal credit that has resulted in the dominance of informal credit associations such as credit and drift cooperatives, and money lenders. Farmers in the rural areas find it difficult in accessing formal credit because the financial institutions, which suppose to provide formal financial credits, are controlled from headquarters located in the cities, hence, cannot adequately cater for the need of subsistence farmers (Obeta, 1992). Furthermore, the complicated procedures involved in securing loans coupled with the high-interest rates charges, have restricted the access of farmers to fund in the sector. Consequence upon these, it has become pertinent to evolve means of stimulating the availability of credit in the sector.

In an attempt to ensure the availability of agricultural credit as a mean of providing the needed capital in the sector, the Federal government introduced agricultural credit institutions as well as policies and programmes. Some of these agricultural credit schemes include Nigerian Agricultural and Cooperative Bank (NACB), Agricultural Credit Guarantee Scheme Fund (ACGSF), Commercial Agricultural Credit Scheme (CACS), and Nigerian Incentive-based Risk Sharing for Agricultural Lending (NIRSAL).

NACB was established in 1973 to provide medium and long-term credit to expand agricultural production. The bank was set up to tackle the challenges of low savings, inadequate investment, and lack of entrepreneurial skills in the sector. However, the inability of the NACB in actualizing the purpose of its establishment led to the creation of the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) in 2000 following the merger of NACB, the People Bank of Nigeria (PBN), and the Family Economic Advancement Programme (FEAP).

The Agricultural Credit Guarantee Scheme Fund (ACGSF) was set up by the Federal Military Government in 1977 with the initial fund of ₦100 million to provide guarantee in respect of loans granted by banks for agricultural purposes that are connected with the establishment or management of plantation for the production of producing rubber, cocoa, oil palm tea, coffee and similar crops. The scheme, which is managed by the Central Bank of Nigeria (CBN) and a constituted Board, aims at increasing the volume of bank credit to the agricultural sector.

The CACS was established in 2009 by the CBN in collaboration with the Federal Ministry of Agriculture and Water Resources to contribute to the development of agricultural sector via the expansion of lending by commercial banks to the sector. The purpose of the scheme is to induce the commercial banks to increase their lending for the development of commercial agriculture. In a bid to achieve this, the Federal Government raised a seven-year bond of ₦200 billion as intervention fund through the Debt Management Office and made the fund available to the sector through some approved commercial banks (Olomola & Yaro, 2015). The aim of the fund was to make credit facilities available for commercial agricultural enterprises at the single-interest rate.

The government also introduced NIRSAL in 2011 to address the challenge of poor agricultural financing. The scheme focused on the development of value chain on six commodities namely cotton, tomato, maize, rice, cassava, and soybean. NIRSAL, unlike another scheme, encourages lending to all value chain actors and all categories of producers such as small, medium and large scale. NIRSAL is wholly financed by the CBN, which is also charged with the responsibility of enabling banks to lend with confidence. CBN also offers technical support and incentive to banks to reduce risk in lending.

Despite the enormous resources committed to the agricultural sector by the Federal Government through the various formal credit institutions, schemes, policies, and programmes, the performance of the sector is still below average as the sector cannot supply domestic food requirement, raw materials for agro-allied industries, and generate enough foreign exchange via exports (Izuchukwu, 2011; Awe, 2013; Olomola & Yaro, 2015). The sector remains undercapitalized; most farmers are unable to secure the equity capital required for expansion of operations and modernization of their enterprises, while the phobia among banks in lending to the sector is still in existence, despite the policy initiatives to address the situation (Olomola & Yaro, 2015).

The objective of the study is to explore the impact of the agricultural credit supply on the agricultural production in Nigeria using vector autoregressive model (VAR) approach. The paper is structured into five sections. The first section is the introduction; the second part is the review of related literature. The third part features the methodology used for the study while the fourth section is the presentation and discussion of results. The fifth section is the conclusion.

2. Review of Literature

Studies abound on the relationship between credit supply and agricultural production, but there is no consensus as regards the existence and direction of the relationship between these variables. Ammani (2012) investigated the relationship between agricultural production and formal credit supply in Nigeria using simple regression model and found that formal credit had a positive and significant impact on agricultural productivity. The study is important as it revealed the impact of formal credit to each of the agricultural sub-sectors (i.e. crops, livestock, and fishing). However, the major weakness of the study was the assumption that the source of the loan to the agricultural sector was mainly through agricultural credit guarantee scheme fund (ACGSF). The assumption is quite weak as there are specialized institutions, including commercial banks and other schemes, through which credit could be sourced by farmers.

Awe (2013) examined the mobilization of domestic financial resources for agricultural productivity in Nigeria. Some of the financial resources the study identified include credit facilities from Nigerian Bank for Commerce and Industries (NBCI) and credit provided by commercial and merchant banks. The results revealed that these resources have a positive relationship with agricultural productivity in Nigeria. However, Ayegba & Ikani (2013) assessment of agricultural credit on rural farmers in Nigeria through the administration of questionnaires found that credits to agriculture have not sufficiently boost productivity in the sector.

Zakaree (2014) study on the impact of agricultural credit guarantee scheme fund (ACGSF) on domestic food supply in Nigeria using the ordinarily least square approach revealed that the credit scheme had a positive and significant impact on domestic food supply. On the contrary, Akinleye, Akanni, & Oladoja (2005) appraisal of the agricultural credit guarantee scheme in Nigeria found that the scheme has failed in bringing about the desired productivity of the agricultural sector.

Tasie & Offor (2013) explored the effects of international fund for agricultural development (IFAD) credit supply on rural farmers in River state, Nigeria through the administration of questionnaires. The result showed that the IFAD credit programme has contributed significantly to farm output and income. In the same vein, Chisasa & Makina (2015) recent study on bank credit and agricultural output in South Africa using cointegration and error correction model (ECM) showed that credit supply has a positive and significant impact on agricultural output in the long run. However, the ECM revealed that bank credit has a negative impact on agricultural out in the short run.

Olagunju & Babatunde (2011) examined the impact of credit on poultry productivity in South-Western Nigeria through the administration of questionnaires. The outcome of the study showed that credit acquisition by farmers had led to increased productivity of poultry. In the same vein, Adetiloye (2012) study on agricultural financing in Nigeria found that credit to the agricultural sector is significant but noted that credit supply has not been growing in relation to the economy.

Khan et al. (2011) carried out a review of past literature on agriculture credit in the rural area of Pakistan. Their research findings clearly indicated that the importance of agriculture credit as not only developing the farming but also furnished every sector of the economy positively. Hussain & Taqi (2014) investigated the impact of agricultural credit on agricultural productivity in Pakistan using logit regression analysis. The results showed that there was a direct and significant relationship between credit and agricultural productivity. In the same vein, ur Rahman et al. (2014) investigated the impact of agricultural credit on agricultural productivity in Pakistan: an empirical analysis by using logit regression analysis. The outcome of their research findings shows that there exist a direct relationship between agricultural credit and agricultural productivity.

Ahmad (2007) noted in his study that boosting agricultural productivity depends on the availability and accessibility of credit facility by farmers in respective of their areas. de Castro et al. (2012) study examine the rural credit and agricultural supply in Brazil within the period 1976-2005. The result of their research findings revealed that farmers normally have a budget constraint to purchase agricultural inputs (fertilizers, labour, pesticides, etc.), and government credit program might increase agricultural supply.

Anthony (2010) investigated agricultural credit and economic growth in Nigeria: an empirical analysis. The outcome of the research shows that agricultural variables have an impact on economic growth and their role in the growth of export has been encouraging.

Feder et al. (1990) in their study examined the relationship between credit and productivity in Chinese agriculture: a microeconomic model of disequilibrium. The outcome of their result indicates that a major part of the short-term credit provided by the rural credit cooperatives known as “production credit” might be used for consumption and investment. Also, the medium and long term formal credit is nil among the agricultural households covered in the study.

Foltz (2004) investigated credit market access and profitability in Tunisian agriculture using data gathered from rural Tunisia. The outcome of the result reveals that the existence of credit market constraints does significantly affect farm profitability but does not affect investment. Also, Petrick (2004) study on farm investment, credit rationing, and governmentally promoted credit access in Poland: a cross-sectional analysis noted that the character of the borrower not the availability of land as collateral had an impact on credit rationing. The outcome of the research also revealed that access to subsidized credit plays a major role in determining farmer’s investment behaviour and that investment size is negatively related to farm size.

Zeller et al. (2002) in their research investigated group-based financial institutions for the rural poor in Bangladesh: An institutional- and household-level analysis. The result of the research shows that in Bangladesh access to credit has a significant effect on income and consumption.

Reyes et al. (2012) examined the impact of access to credit on farm productivity of fruit and vegetable growers in Chile between the period 2006 and 2008 with 177 farmers. The outcome of the research indicates that short-term credit does not affect farm productivity while other factors such as education and the type of activity do.

The foregoing literature suggests that the relationship between credit supply and agricultural production in Nigeria is inconclusive. This, therefore, has induced this study to examine the impact of credit supply, through ACGSF and commercial loans, on agricultural production.

3. Methodology

3.1 Sources of Data

The study employed the use of secondary data that were mainly sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin of 2014. The scope of the study covers the period between 1981-2013 while the variables are Agricultural Production (AGP), Agricultural Credit Guarantee Scheme Fund (ACGSF), and Commercial Loan and Advances to the Agricultural Sector (CLA). It is importance to mention that the analytical framework of this study is based on the assumptions that: (i) credit is the main variable form of capital for agricultural production while other factors of production are assumed to be constant; (ii) CLA and ACGSF are the only sources of agricultural credit available to farmers; (iii) credit acquisition and utilization relate to the agricultural production of the same year; and (iv) linear relationship exist between credit and agricultural production (Ammani, 2012). Table 1 gives a brief descriptions and sources of the variables.

Table 1: Data Description and Sources

Variables	Abbreviation	Description and Sources
Agricultural Production	AGP	Agricultural production refers to the gross outputs of agricultural sub-sectors, which include livestock, fishing, and crop production.
Commercial Loans to Agriculture	CLA	This refers to the loans and advances granted to the agricultural sector by commercial banks.
Agricultural Credit Guarantee Scheme Fund	ACGSF	It is a scheme established by the Federal Government of Nigeria and managed by its Central Bank to guarantee and increase the volume of bank credit to the agricultural sector.

Source: Authors', 2015

3.2 Analytical Techniques

The study employed the vector autoregressive (VAR) model to understand the interaction among the three variables. However, the properties of these variables such as stationarity and long term relationship were verified before estimating the model with VAR. The study employed the Augmented Dickey-Fuller to test for stationarity while the Johansen co-integrated was used to test for the presence of a long-term relationship. Also, the study adopted the Granger Causality to test for the existence causality among the variables. Finally, impulse response function and variance decomposition were employed to examine the effects of shocks and variations caused by variable itself and other variables respectively.

3.2.1 Unit root test

The study used Augmented Dickey Fuller (ADF) test to determine the presence of unit root, that is, to ascertain if the variables are stationary. ADF was preferred to test for unit root because it is the simplest approach in testing for unit root and it is very suitable when dealing with a large and complex set of time series data with unknown orders.

3.2.2 Cointegration Test

This test was conducted to determine the presence of a long-run relationship. In achieving this, the Trace and Maximum Eigenvalue statistics of the Maximum Likelihood method (ML) developed by Johansen (1988; 1991) were employed.

3.2.3 Impulse Response

The impulse response function explains the reaction of an endogenous variable to one of the innovations. It traces the effects on present and future values of the endogenous variable of one standard deviation shock to one of the innovations.

3.2.4 Variance Decomposition

The variance decomposition, on the other hand, separates the variation in an endogenous variable into component shocks to the VAR. Hence, variance decomposition gives information on the relative importance of each random innovation in affecting the variables in the VAR. It is important to mention that if cointegration is detected between series, there exists a long-term equilibrium relationship hence; it becomes appropriate to use vector error correction model (VECM) in place of VAR. In the absence of cointegration, VAR becomes more relevant.

3.2.5 Model Specification

The VAR models that establish the interaction of the variables of this study are expressed as follows:

$$\log AGP_t = \alpha_1 + \sum_{j=1}^{n} \beta_j \log AGP_{t-j} + \sum_{j=1}^{n} \theta_j \log ACGSF_{t-j} + \sum_{j=1}^{n} \gamma_j \log CLA_{t-j} + \mu_{1t} \quad (1)$$

$$\log ACGSF_t = \alpha_2 + \sum_{j=1}^{n} \theta_j \log ACGSF_{t-j} + \sum_{j=1}^{n} \beta_j \log AGP_{t-j} + \sum_{j=1}^{n} \gamma_j \log CLA_{t-j} + \mu_{2t} \quad (2)$$

$$\log CLA_t = \alpha_3 + \sum_{j=1}^{n} \gamma_j \log CLA_{t-j} + \sum_{j=1}^{n} \beta_j \log ACGSF_{t-j} + \sum_{j=1}^{n} \theta_j \log AGP_{t-j} + \mu_{3t} \quad (3)$$

Where:

Log (AGP) = Logarithm of Agricultural Production
Log (ACGSF) = Logarithm of Agricultural Credit Guarantee Fund
Log (CLA) = Logarithm of Commercial Loans and Advances to the Agricultural Sector
μ_s are the stochastic error term called impulses or innovations or shocks in VAR
t = Current time

4. Results and Discussion

4.1 Unit Root

Table 2 shows the outcome of the unit root test. The results revealed that the variables became stationary at first differences. Since all the variables became stationary after first differences, it is important to test if the non-stationary variables were co-integrated, that is whether a long run relationship exists between the variables. However, it is crucial to determine the optimum lag length to estimate the cointegration test.

Table 2: Augmented Dicker-Fuller Unit Root Test Result

Variable	T-Statistics	Critical Values			Order of Integration
		1%	5%	10%	
LOG(AGP)	-3.2184*	-4.2845	-3.5628	-3.2152	I(1)
LOG(ACGSF)	-5.5094***	-4.2845	-3.5628	-3.2152	I(1)
LOG(CLA)	-6.4525***	-4.2845	-3.5628	-3.2152	I(1)

Source: Authors' Computation and EViews 7 Output.

*Note: *** (*) denotes 1% (10%) significance level*

4.2 VAR Lag Order Selection Criteria

Table 3 depicts the optimum lag structure for the VAR. The outcomes suggest that most of the selection criteria, such as sequential modified LR test statistic (LR), Schwarz Information Criteria (SC) and the Hannan-Quinn Information Criteria (HQ), selected the optimum lag length of 1 at 5 percent level of significance. Hence, the lag length of 1 will be used in estimating VAR and more also Johansen cointegration test.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-101.9793	NA	0.175397	6.772861	6.911634	6.818097
1	10.69193	196.2661*	0.000219	0.084392	0.639484*	0.265338*
2	20.79212	15.63901	0.000208*	0.013411*	0.984822	0.330067

Source: Authors' Computation and EViews 7 Output.

4.3 Cointegration Test

Tables 4 and 5 depict the results of the cointegrating test employing both the Trace and the Maximum Eigenvalue tests. The outcomes show that there is an absence of long-run relationship among the three variables; hence, the use of VAR model is appropriate.

Table 4. Johansen Cointegration Trace Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.235764	12.74802	29.79707	0.9027
At most 1	0.119262	4.412768	15.49471	0.8675
At most 2	0.015236	0.475936	3.841466	0.4903

Source: Authors' Computation and EViews 7 Output.

Table 5. Johansen Cointegration Maximum Eigenvalue Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.235764	8.335251	21.13162	0.8821
At most 1	0.119262	3.936831	14.26460	0.8659
At most 2	0.015236	0.475936	3.841466	0.4903

Source: Authors' Computation and EViews 7 Output.

4.4 Model Estimation Results

Table 6 depicts the VAR estimate result. The result showed that the coefficient of determination, R^2 of 0.9968 (99%). It implies that 99% of the total variation in agricultural production is explained by the explanatory variables. The adjusted R^2 of 0.996487 or 99% suggested that the explanatory variable were robust in explaining the variation in agricultural production and was a good fit. The R^2 of agricultural credit guarantee scheme fund and commercial credit to agriculture are 0.966971 and 0.981385 respectively while there adjusted R^2 are 96% and 97% respectively. This implies that the models were a good fit. However, the significance of the individual variables cannot be explained as a result of the absence of the probability values in the estimate. Therefore, it has become pertinent to estimate the system equation to know the probability values of the variables with much emphasis on the first equation.

Table 6: Vector Autoregression Estimates
Standard errors in ( ) & t-statistics in [ ]

	LOG(AGP)	LOG(ACGSF)	LOG(CLA)
LOG(AGP(-1))	0.810403	-0.117570	0.379596
	(0.09161)	(0.28186)	(0.18974)
	[8.84586]	[-0.41712]	[2.00058]
LOG(ACGSF(-1))	-0.009991	0.862669	-0.034826
	(0.03025)	(0.09305)	(0.06264)
	[-0.33034]	[9.27081]	[-0.55596]
LOG(CLA(-1))	0.213477	0.299800	0.568938
	(0.09552)	(0.29387)	(0.19783)
	[2.23491]	[1.02016]	[2.87588]
C	0.744131	-0.334417	-0.514085
	(0.29517)	(0.90811)	(0.61132)
	[2.52105]	[-0.36826]	[-0.84094]
R-squared	0.996827	0.966971	0.981385
Adj. R-squared	0.996487	0.963433	0.979391
Sum sq. resids	0.443295	4.196000	1.901518
S.E. equation	0.125825	0.387114	0.260598
F-statistic	2932.381	273.2499	492.0566
Log likelihood	23.06205	-12.90037	-0.236700
Akaike AIC	-1.191378	1.056273	0.264794
Schwarz SC	-1.008161	1.239490	0.448011
Mean dependent	13.63590	6.129290	9.888700
S.D. dependent	2.122988	2.024378	1.815260
Determinant resid covariance (dof adj.)		0.000138	
Determinant resid covariance		9.24E-05	
Log likelihood		12.41151	
Akaike information criterion		-0.025720	
Schwarz criterion		0.523931	

Source: Authors' Computation and EViews 7 Output.

Table 7 depicts the outcome of the system equation with respect to the first equation as represented below:

LOG(AGP) = C(1)*LOG(AGP(-1))+C(2)*LOG(ACGSF(-1))+C(3)*LOG(CLA(-1))+C(4) (4)

The result showed that the probability value of ACGSF has depicted by C(2), was above 5% and the coefficient is negative. Hence, it is insignificant. This, therefore, implies that agricultural credit guarantee scheme fund has not significantly resulted in increased agricultural production. This outcome lends credence to the works of Akinleye, Akanni, & Oladoja (2005) and Ayegba & Ikani (2013). The result, however, revealed that commercial loan and advances to agriculture, which is C(3), has a positive coefficient and a probability value of less than 5%. These results suggest that commercial loans to agriculture have significantly increased agricultural production in Nigeria.

Table 7: Estimation Method: Least Squares

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.810403	0.091614	8.845859	0.0000
C(2)	**-0.009991**	**0.030245**	**-0.330340**	**0.7420**
C(3)	**0.213477**	**0.095519**	**2.234912**	**0.0281**
C(4)	0.744131	0.295167	2.521055	0.0136
C(5)	-0.117570	0.281859	-0.417122	0.6777
C(6)	0.862669	0.093052	9.270806	0.0000
C(7)	0.299800	0.293874	1.020164	0.3106
C(8)	-0.334417	0.908110	-0.368256	0.7136
C(9)	0.379596	0.189743	2.000583	0.0487
C(10)	-0.034826	0.062641	-0.555957	0.5797
C(11)	0.568938	0.197831	2.875880	0.0051
C(12)	-0.514085	0.611323	-0.840938	0.4028
Determinant residual covariance		9.24E-05		

Source: Authors' Computation and EViews 7 Output.

4.5 Granger Causality

Table 8 depicts the outcome of the causality relationship between the variables. The result suggests that ACGSF does not cause AGP due to the fact the p-value = 0.7411 exceeded 0.05. Hence, the null hypothesis that ACGSF does not granger cause AGP cannot be rejected. This outcome implies that the agricultural credit guarantee scheme fund established by Federal Government has not influenced agricultural production. The test, however, shows that CLA does cause AGP because of the p-value of 0.0254 which is less than 0.05. Hence, the null hypothesis that CLA does not cause AGP is rejected. The result also signals the fact that there exist bidirectional causalities between CLA and AGP. This result provides the reason to believe that commercial loan to agriculture has an impact on agricultural production.

Table 8: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LOG(AGP)

Excluded	Chi-sq	df	Prob.
LOG(ACGSF)	0.109124	1	0.7411
LOG(CLA)	4.994830	1	0.0254
All	5.902010	2	0.0523

Dependent variable: LOG(ACGSF)

Excluded	Chi-sq	df	Prob.
LOG(AGP)	0.173991	1	0.6766
LOG(CLA)	1.040734	1	0.3077
All	4.619383	2	0.0993

Dependent variable: LOG(CLA)

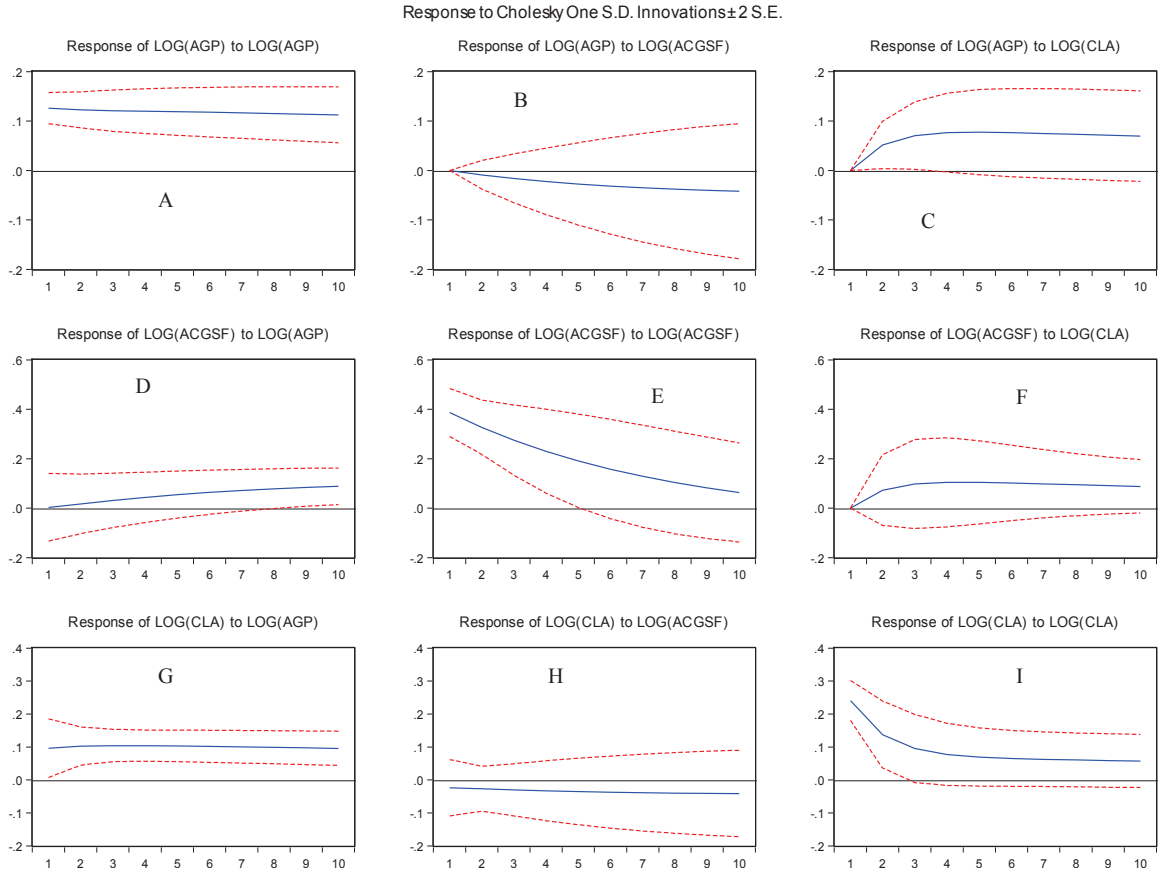
Excluded	Chi-sq	df	Prob.
LOG(AGP)	4.002332	1	0.0454
LOG(ACGSF)	0.309088	1	0.5782
All	4.304819	2	0.1162

Source: Authors' Computation and EViews 7 Output

4.6 Impulse Response

In Figure 4.1, one standard deviation in the model is calculated in percentage. For each of the variables, the horizontal axis of the impulse response function (IRF) shows the number of periods that have passed after the impulse has been given while the vertical axis measures the responses of the variables. It can be observed from panel B that one percent innovation in agricultural credit guarantee scheme fund (ACGSF) produced a negative response by Agricultural production (AGP), i.e. a negative response of 0.01 in the second period, 0.02, 0.03, and 0.04 percent in the third, sixth, and tenth period respectively. This result implies that the agricultural credit guarantee fund scheme has not yielded a positive impact on agricultural productivity. Panel C showed that a shock to commercial loans to agriculture (CLA) produce a positive impact on agricultural production. For instance, the shock in CLA resulted in positive response of 0.05, 0.07, 0.08, and 0.07 percent by ADP in the second, third, fifth and the tenth period respectively.

Figure 4.1: Impulse Response Function Graph

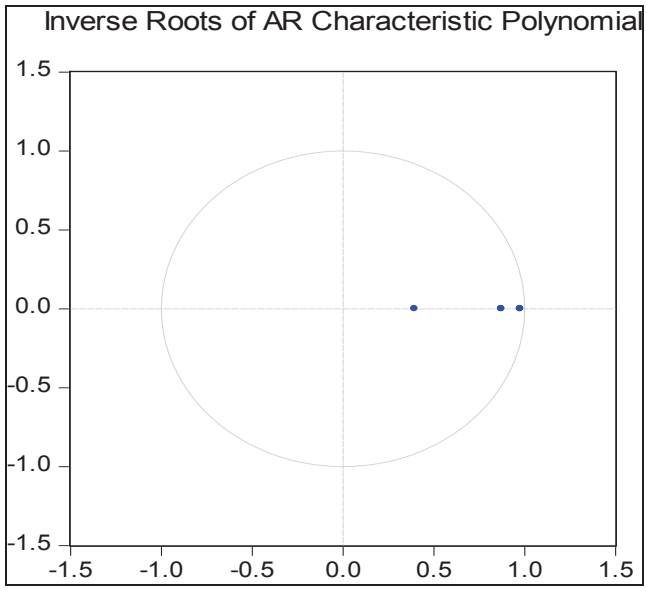


Source: *Authors' computation and EViews 7 Output*

4.7 Inverse Roots of AR

Figure 4.2 depicts the graph of AR inverse root of the VAR. The graph showed that all the polynomial roots fall within the unit circle. This outcome implies that the VAR model is stable or stationary and, as a result, the impulse response functions are reliable.

Figure 4.2: Graph of AR Inverse Root



Source*: Authors' computation and EViews 7 Output*

4.8 Variance Decomposition

Table 9 provides the portion of the forecast error variance of each variable that is attributed to its innovation and innovations in another variable. The own shocks of AGP constitute a significant source of variation in its forecast error in the time horizon, ranging from 100% to 71.92%. Ten years later, variation in AGP is accounted for by ACGSF (4.46%) and CLA (23.60%). This result implies that the predominant source of variation in agricultural production is commercial loans to the agriculture sector while the agricultural credit guarantee scheme fund accounts for a very low variation.

Table 9: Variance Decomposition of LOG(AGP)

Period	S.E.	LOG(AGP)	LOG(ACGSF)	LOG(CLA)
1	0.125825	100.0000	0.000000	0.000000
2	0.183159	91.86255	0.239270	7.898176
3	0.230996	85.12970	0.648381	14.22192
4	0.272107	80.74848	1.144740	18.10679
5	0.308069	77.89092	1.688591	20.42048
6	0.340046	75.93679	2.255054	21.80816
7	0.368867	74.52677	2.826729	22.64650
8	0.395115	73.45828	3.391307	23.15042
9	0.419210	72.61456	3.940298	23.44514
10	0.441459	71.92593	4.468097	23.60598

Source: Authors' Computation and EViews 7 Output.

5 Conclusions

It was established that credit supply to the agricultural sector through the commercial banks' loans and advances have a significant impact on agricultural production. However, it is evident from the outcome of the study that the agricultural credit guarantee scheme fund has no significant impact on agricultural production. This may be as a result of some challenges affecting the effectiveness of the scheme. Some of the challenges include a high rate of loan default by farmers; lack of full cooperation by participatory banks; and the failures of government to extend the rural branch network to cover the rural farmers (Akinleye et al., 2005; Nwosu et al., 2010).

Hence, for the scheme to remain relevance and effective in its activities, it is importance that the government ensures:

- the rate of default in loan repayment is minimized to the barest minimum;
- there is a timely disbursement of loans to farmers;
- participatory banks in the scheme are encouraged and motivated;
- the extent of the frequency of loan monitoring is increased;
- there is a proper assessment of credit needs of farmers.

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Appendices

Table 10: Data on CLS, ACGSF, AGP

Year	CLA	ACGSF	AGP
1981	590.6	35.6424	19529.82
1982	786.6	31.7639	22556.32
1983	940.4	36.3075	26436.86
1984	1052.1	24.6549	33777.24
1985	1310.2	44.2436	38244.54
1986	1830.3	68.4174	39933.07
1987	2427.1	102.1525	57579.54
1988	3066.7	118.611	86584.6
1989	3470.5	129.3003	120060.2
1990	4221.4	98.4945	122230.6
1991	5012.7	79.1074	144703.5
1992	6978.9	91.9531	217419.7
1993	10753	80.8458	350047.1
1994	17757.7	104.463	528951.8
1995	25278.7	164.1331	940305
1996	33264.1	225.5195	1275752
1997	27939.3	242.0283	1445147
1998	27180.7	219.1442	1600576
1999	31045.7	241.839	1704823
2000	41028.9	361.449	1801483
2001	55846.1	728.5454	2410051
2002	59849.7	1050.982	2847115
2003	62102.8	1151.015	3231444
2004	67738.6	2083.745	3903759
2005	48561.5	9366.393	4752979
2006	49393.4	4195.1	5940237
2007	149578.9	4087.448	6757868
2008	106353.8	6497.959	7981397
2009	135701.3	8328.566	9186306
2010	128406	7840.497	10310656
2011	255205.3	10028.99	11593434
2012	291325	9332.484	13413842
2013	348150	9256.677	14709105

Source: Compiled from CBN Statistical Bulletin, of 2014

Note:

CLA: Commercial Loans and Advances to the Agricultural Sector
ACGSF: Agricultural Credit Guarantee Scheme Fund
AGP: Agricultural Production