

# **FINANCING THE AGRICULTURAL SECTOR, A PANACEA FOR FOOD SECURITY IN NIGERIA**

## **ABSTRACT**

This study examined the impact of various sources of agricultural financing on food security in Nigeria using time series data that span a period from 1981 to 2020. To achieve the study, the Autoregressive Distributed Lag (ARDL) Model was employed to analyze the data. Food security in Nigeria was conceptualized as food availability proxied by agricultural output in Nigeria. As such, agricultural output was modelled by having commercial bank credit, agricultural credit guarantee scheme fund, and government expenditure on agriculture, inflation and interest rate as independent variables. The study employed time series data from 1981 to 2020. The estimated ARDL model suggested commercial bank credit to agriculture, agricultural credit guarantee scheme fund, government expenditure on agriculture and interest rate have a significant influence on food security measured by agricultural output. Consequently, to improve food security in Nigeria, this study recommended among others that commercial banks should be encouraged to channel their credit to agriculture, and the government should ensure more guarantees on loans to encourage farmers in accessing credit. Finally, to encourage access to food, effort should be made to improve the per capita income of the people in other to meet the demand for food.

**Key Words: Agricultural Finance, Food Security, ARDL.**

**Jel Codes: Q14, Q18, C22**

## **1. INTRODUCTION**

Food Security remains a major concern across the world as one in nine people on earth is suffering from hunger (Osabuohien, 2016). Theorists argued that food insecurity is attributed to the increasing population without a commensurate increase in food production. It could be rightly said that population and food production crises are in tandem with Malthus's theory of population growth. Malthus in his theory argued that food production grows in geometric progression while food production grows in an arithmetic progression.

Irrespective of the growing population, every human being needs food not just for energy giving but to sustain life in general. Hence the issue of food security could not be overemphasized because of its necessity to life through sustainable agricultural development. Agriculture was once the major source of the country's economy and source of foreign exchange prior to oil discovery in Nigeria. However, the economy post discovery of oil witnessed agricultural production gradually drop, due to less attention by the government, this led to the challenge of food insecurity, unemployment and youth restiveness. The neglect of agriculture as the mainstay of the economy by the federal government over the years also contributed to poverty and some social vices in society. However, combating food insecurity continues to be a major public policy challenge in developing countries. As such, over one billion people worldwide are undernourished, many more suffer from micronutrient deficiencies, and the absolute numbers

tend to increase further, especially in Sub-Saharan Africa (FAO 2008). Hence both the developed and developing countries make considerable efforts to increase their food production capacity.

Attainment of food security in any country is usually insurance against hunger, malnutrition, poverty and unemployment which slow down economic development (Davies, 2009). Generally, a country is food-secure when a majority of its population has access to food in sufficient quantity and quality consistent with decent existence at all times (Idachaba, 2004). It has been documented since the 1980s, that the achievement of food security requires paying attention to supply-side, which can be secured through agricultural production, commercial imports or food aid and on the demand-side food has to be safe, nutritious, and appropriate to meet food preferences (Devereux, Vaitla & Haunstein, 2008).

Undoubtedly, there are immense potentials in Nigeria's agricultural sector, which if properly managed would unleash income growth for farmers, food and nutritional security, and employment opportunities as well as elevate the country to the ranks of leading players in global food markets (FMARD, 2011). However, there are various barriers to repositioning Nigeria's agricultural sector. These include among others, an uncompetitive environment for agribusiness, underinvestment, corruption, lack of access to credits as well as quality agricultural inputs, weak implementation of policies, poor market access and national insecurity (Downie, 2017). The major threat to the agricultural sector is insecurity from both the Boko Haram and Fulani herdsmen. In the northeast of Nigeria, the sustained terrorist activities of the Boko Haram have had a negative impact on agricultural activities. Not only are farming activities incapable of being carried out in under an insecure environment, but domestic agricultural production is stifled, farming communities are displaced and access to regional markets is blocked (Eigege & Cooke, 2016). In addition to the Boko Haram group, the Fulani herdsmen have become a major threat to farming communities due to incessant attacks on these communities with attendant fatalities.

Besides the issue of insecurity, other important factors affecting food security are Credit facilities and infrastructure (Mubaraq, 2021; Vietnam, et al, 2020; Nakazi & Nathan, 2020; Chude & Chude, 2013; Sers & Mughal, 2019; Agaptus, John & Modupe, 2019). It is in this regard that successive governments in Nigeria came up with different programmes and policies starting from 1974 to a more recent of 2016. Specific among these programmes include; the National Accelerated Food Production project (NAFPP), set up in 1972; National Cereals Research Institute (NCRI) in 1974, the Agricultural Credit Guarantee Scheme Fund in 1978; Abakaliki

Rice Project in 1978; Green Rice Project in 1986; Agricultural Development Project (ADP) in 1987; Nigeria Agricultural Cooperative Bank (NACB) in 1988.

In addition to the National Special Food Security Programme aimed at offering a practical vehicle for piloting and eventually extending the application of innovative low-cost approaches both technical and institutional to improve the productivity and sustainability of the agricultural system with the ultimate objective of contributing to better livelihoods for poor farmers on a sustainable basis; the National Fadama Development Project (Fadama I, II, and III) aimed at addressing some of the factors that militate against the full realization of the potential benefit of agricultural production activities. According to Blench and Ingawa (2003), the Fadama projects were aimed at increasing the incomes of Fadama users who depend directly or indirectly on Fadama resources by empowering communities to take charge of their own development schedules. Most recent among these programme and policies are the NIRSAL Anchor Borrower's Programme of the Central bank of Nigeria; multinational New Rice for Africa in 2000; the Ibom Rice Project in 2001 and the Anchor Borrowers' Programme (ABP) in 2016 (Ayinde, Fatigun, Ogunbiyi, Ayinde & Ambali, 2018).

In view of government agricultural programmes, existing statistics from the Central Bank of Nigeria (2020) shows that the naira value of commercial bank credit to agriculture increased from ₦4.221 billion in 1990 to ₦25.278 billion in 1995. As at 2000, it was valued at ₦41.028 billion which increased to ₦48.561 billion in 2005, then ₦128.406 billion in 2010 before reaching ₦316.364 billion in 2012, and ₦449.29 billion as at 2015. By 2020, commercial banks' credit to agriculture rose to an average ₦934.85 billion. The continuous increase in commercial bank credit to agricultural sector indicate the commitment of financial institution to the growth of agriculture in Nigeria. Similarly, government capital expenditure increased from ₦3.486 billion in 1990 to ₦43.1492 billion in 1995. In 2000, government expenditure was valued at about ₦111.509 billion and rose to ₦265.035 billion in 2005. The year 2010 experienced capital expenditure of ₦412.2 billion. A decrease of ₦348.75 was recorded in 2015 and rise to all time high of ₦705.80 in 2020. The decrease in 2015 may be attributed to the political sphere where much government emphasis and expenditure were on electioneering activities. Similarly, Trend in annual volume of credits guaranteed by ACGSF revealed that there was a steady and consistent rise in Agricultural credit supply by the scheme. However, from 2010, there have been a consistent increase in the total credit supply from ₦1,861,097.10 of 2005 to ₦5,850,923.35 in 2010 and a further increase from ₦5,850,923.39 to ₦9,459,018.28 in 2015. Agricultural credit supply by the scheme dropped consistently from ₦9459018.28 in 2015 to as low as ₦

3037457.20 in 2020. The sudden decline was experienced between 2016 and 2020. This may be attributed to political transition in 2015, fall in federal revenue caused by the glut in crude oil price and increasing demand for expenditure on defence due to rising insecurity in Nigeria.

The above statistics show the commitment of commercial banks and the federal government to ensuring credit availability to the agricultural sector with the aim of ensuring a constant supply of food, hence food security. Nevertheless, the Nigerian National Bureau of Statistics revealed that 40% or 83 million Nigerians live in poverty and food shortage. It was estimated that the number of poor people who may suffer from lack of food will increase to 90 million, or 45% of the population, in 2022. This means that 40 percent of the total population, or almost 83 million people, lives below the country's poverty line of 137,430 naira (\$381.75) per year. Statistics on malnutrition measured by the prevalence of stunting growth for children below 5 years was measured at 31.5% in 2020 with a projection of 40% in 2021 (World Bank, 2020).

Similarly, acute food insecurity levels peaked from July–August 2019 when the number of people in crisis or worse situations reached almost 5 million, representing five percent of the population analysed in the 16 states and the Federal Capital Territory (FCT). The figure included around 3 million people in the three states known as BAY states of northeastern Nigeria, most of them in Borno (1.8 million), Yobe (945 000), and Adamawa (279 000). All 412 000 people classified in Emergency were in these three states. The remaining two million who faced crisis conditions were mainly in Sokoto, Katsina, Zamfara, Kaduna, Niger, Plateau, Bauchi, Gombe and Benue. These states are generally known as the food-producing States in Nigeria. As a result, the agricultural sector has significantly underperformed given its vast potential.

In addition to government efforts in ameliorating the growing food insecurity, many scholars such Osabohien, Afolabi and Godwin (2018), Akinriola and Okunola (2017), Bidisha, Khan, Imran, Khonder and Suhrawardyl (2017), Akudugu (2016), Chude and Chude (2013) Sers and Mughal (2019), Agaptus, John and Modupe, (2019), Ighodaro (2011), Zakaree, (2014) Patrick (2004). have carried out researches on the effect of agricultural financing on food security with no consensus on the determinants of food security in Nigeria. It is against this back drop that this study contribute to existing knowledge on the contribution of agricultural financing via commercial bank credit, ACGSF and government expenditure on food security in Nigeria.

## **2. LITERATURE REVIEW**

### **2.1 Theoretical Framework**

This study is anchored on financial intermediation theory of bank credit which emanates from the writings of early Bankers including Mises (1912) and much later popularized by great economists such as Keynes (1936), Gurley and Shaw (1955) and Stein (2014). The financial intermediation theory considers banks as financial intermediaries both individually and collectively, rendering them indistinguishable from other non-bank financial institutions in their behaviour, especially concerning the deposit and lending businesses, being unable to create money individually or collectively. The theory holds that banks are merely financial intermediaries, not different from other non-bank financial institutions as they gather deposits and lend them out. In other word, banks create liquidity by borrowing on short term basis and lending in long term long basis, meaning that banks borrow from depositors with short maturities and lend to borrowers at longer maturities (Dewatripont, Rochet, & Tirole, 2010).

This study is anchored on financial intermediation theory of credit because the theory confers two important benefits that makes it relevant to agricultural farmers. First, it supports the idea that borrowers undertake to borrow funds simply because they do not have sufficient funds for investment. Thus, farmers need more funds to invest in agriculture. As famers' income is augmented by credit, it will raise the level of investment in the agricultural sector as well as farmers' savings thereby increasing the efficiency in the allocation of financial funds in the system. Secondly, this theory expresses a proportional relationship between agricultural financing and agricultural output. As such, when there is a sustainable increase in agricultural output, there will be a relative increase in food security.

## **2.4 Empirical Literature Review.**

The relevance of credit facilities to Nigeria's agricultural sector is not in doubt. Its provision is an effective policy thrust that drives agricultural commercialization and food self-sufficiency. Empirical literature revealed that access to credit facilities enables farmers to satisfy their cash desires encouraged by the agricultural production cycle and consumption requirements (Osabohien, Afolabi & Godwin, 2018; Zakaree, 2014; Petrick, 2004). In addition, one of the most challenging factors to agricultural productivity is the inability of farmers to gain access to credit due to the perceived risk and volatility of the sector (Osabohien et al., 2018). Most important one being that banks and other financial institutions are still very reluctant to fund agricultural projects which is evident by stringent credit conditions. Also, it is on record that, food security is a function of adequate food production as well as income to meet the households' nutritional level (Abdul-Jalil, 2015). Agricultural credit facility to farmers could be

in the form of funds for the purchase of resources (input and capital) that will propel increased food production.

Mubaraq (2021) posited that the credit financing deficit is one of the problems militating against the performance of agriculture in Nigeria. Against this background, he employed threshold regression to analyze the impact of the Agricultural credit guarantee scheme fund (ACGSF) on agricultural performance in Nigeria between 1981 and 2019. The performance of agriculture was captured using real agricultural Gross Domestic Product (GDP). Annual time series data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development Indicators (WDI). The results revealed a U-shaped relationship between real agricultural GDP and ACGSF. In addition, ACGSF has significant positive effects on real agricultural GDP at 1060389 (₦' thousand) and 5951809 (₦' thousand) thresholds. Similarly, Reuben, Nyam and Rukwe (2020) assessed the impact of ACGSF on agricultural output in Nigeria from 1998 to 2017 using the OLS technique. The results showed that ACGSF has a significant positive effect on agricultural output. Similarly, Eyo, Nwaogu and Ageson (2020) analyzed the effect of the agricultural credit guarantee scheme (ACGSF) on agricultural output in Nigeria using the OLS technique. The findings showed a significant positive impact of ACGSF on agricultural output. Okafor (2020) examined the effect of commercial banks' credit and ACGSF on agricultural development in Nigeria using the Augmented Dickey-Fuller test, Phillip-Perron test and OLS technique. The results revealed that banks' credit to agriculture and ACGSF have no significant effects on agricultural output.

In Vietnam, et al (2020) examined the impact of bank credit on agriculture performance from 2004Q4 to 2016Q4 using Indicator Saturation (IS) break test, ARDL bounds test and Toda-Yamamoto Granger causality test. Their findings revealed that agricultural credit has a significant positive influence on agricultural output in both the short-run and long-run. Also, a unidirectional causality exists running from agricultural credit to agricultural output. Employing Panel Autoregressive Distributed Lag Model (PARDL) and Vector Error Correction Model (VECM)

Ngong, Thaddeus & Onwumere (2020), examined banking sector development and agricultural productivity in the Central African Economic and Monetary Community (CEMAC) from 1990 to 2018 using the Panel Autoregressive Distributed Lag Model (PARDL) and Vector Error Correction Model (VECM). The findings revealed long-run relationship between banking sector and agricultural productivity. Also, bi-directional causality exists between banking sector and

agricultural productivity in the CEMAC region. Contrary to the Vietnam, et al (2020), the PARDL result revealed no significant contribution of bank credits to agricultural productivity in CEMAC. Study in Turkey with time series data from 1998 to 2016 using the Ordinary Least Squares (OLS) technique. The results showed significant positive impact of agricultural credit on agricultural output (Bahsi & Cetin, 2020). Similar study in Nigeria using the Autoregressive Distributed Lag (ARDL) approach reported that credit have significant positive impact on agricultural output in the long run. While in the short run, bank credit do not have an on agricultural output (Nakazi & Nathan, 2020). Using ARDL technique to analyze quarterly time series data of commercial banks' credit on agricultural growth in Uganda from 2008Q3 to 2018Q4, the findings has no consensus with Nazaki and Nathan (2020). It was concluded banks' credit have no significant impact on agricultural output in both long-run and in the short-run. In a similar study, Bangladesh, Islam (2020) examined the effect of agricultural credit on agricultural productivity in Bangladesh from 2000 to 2019 using ARDL. The findings showed significant positive effects of agricultural credit on agricultural productivity in the short- and long-run.

Using an Error Correction Model, Emenuga (2019) investigated the effect of commercial bank on real sector development in Nigeria for 37 years (1981-2017). The result showed that there exists a long-run relationship between bank credit and Agricultural development in Nigeria. The study found that the ECM is negative and statistically significant at 5% level of significance. Furthermore, commercial banks' credit to Agriculture and ACGSF were positively related to Agricultural development while the interest rate was found to be negatively related to Agricultural development in Nigeria. A supporting study by Osabohien, Afolabi and Godwin (2018) who employed the ARDL technique to examine the potential of agricultural credit facilities in terms of commercial bank credit to agriculture and agricultural credit guarantee scheme fund (ACGSF) and their corresponding interest rates to farmers towards increasing agricultural production. It was revealed that the contribution of commercial banks' credit and ACGSF was not significant but contributed positively to increasing food security in Nigeria. A Similar study was carried out by Anyanwu, Offor, Adesope and Ibekwe, (2017) used Ordinary Least Squares (OLS) techniques to analyze the impact of commercial banks' credit on agricultural productivity in Nigeria the study concluded that there is no positive relationship between commercial banks credit and ACGSF on agricultural productivity.

Using a nonlinear autoregressive distributed lag (NARDL) model to investigate the relationship between credit to agriculture and agricultural output in Nigeria from 1992 to 2015. Results show no evidence of asymmetry in the impact of credit on output growth in the agricultural sector

(positive and negative changes) in the short-run, but different equilibrium relationships exist in the long-run. The dynamic adjustments show that the cumulative agricultural output growth is mostly attracted by the impact of the positive changes in credit to agriculture with a lag of four quarters of the prediction horizon (Olowofeso, Adeboye, Adejo, Bassey & Abraham, 2017).

Using the multiple linear regression of ordinary least square (OLS) model, Orok and Ayim (2017) examined the impact of ACGSF on Agricultural Sector Development in Nigeria from 1981 – 2016. The result shows a negative and insignificant relationship between ACGSF and the agricultural sector development as proxied by its contribution to GDP.

Given the above review, this study contribute to improving on existing research by reconciling the varying opinions on the impact of agricultural credit on food security with emphasis in Nigeria. Contrary to previous studies, this study recognize the role of government in providing agricultural credit, infrastructure with the aim of enhancing food security in Nigeria. Periods covered by previous researches in this area may not be applicable to current period as Nigeria is currently faced with various economic challenges raging from floods, revenue falls due global oil price, global health issues caused by viruses to insecurity threatening the lives of farmers. This study therefore expand is scope to a more recent period of 2020. Also, given the dynamic nature of monetary variables, this study employs a more robust pre-estimation techniques, that is the Zivot and Andrews unit root test to test the stochastic behavior of financial variables that are employed in this study.

### **3. METHODOLOGY**

#### **3.2 Model specification**

This study adopted the model of Nakazi and Nathan (2020) who applied the Autoregressive Distributed Lag (ARDL) model approach to examine the short run and long run impact of commercial banks' credit on agricultural sector growth. The functional form of their model was stated as:

$$Q_t = f(BC_t, INT_t, INF_t) \tag{1}$$

Where:  $Q_t$  = Agricultural output over time,  $BC_t$  = Commercial bank credit to agricultural sector in Nigeria over time,  $INT_t$  = interest rate over time and  $INF_t$  = Inflation over time.

The ARDL specification of their model was presented as:

$$\Delta \ln Q_t = a_0 + a_1 \ln Q_{t-1} + a_2 \ln BC_{t-1} + a_3 \ln INT_{t-1} + a_4 \ln INF_{t-1} + \sum_{i=1}^k b_1 \Delta Q_{t-1} + \sum_{i=1}^k b_2 \Delta \ln C_{t-1} + \sum_{i=1}^k b_3 \Delta \ln INT_{t-1} + \sum_{i=1}^k \alpha_4 \Delta \ln INF_{t-1} + \mu_t \quad 2$$

The model of Nakazi and Nathan (2020) failed to identify the concept of food security as stated by Okuneye, Fabusoro, Adebayo and Ayinde (2005), Jones, Andrew, Francis, Ngunre, Sera, (2013), Ike, Jacobs, and Kelly (2015), Abdullahi (cited in eme, Onyishi, Uche, 2014). This study identified food security in terms of availability of food. As such, to achieve the objective, equation 2 was moderated to capture food availability proxied by output of agricultural commodities in Nigeria. Food availability addresses the case of sufficient quantities of food through domestic production within the country. The model is in line with the theoretical framework; financial intermediation theory which considers banks and other financial institutions as an intermediary that creates fund for short term and long term borrowing. With this, it's suffice to say that, the theory explains the relationship between bank credit and investment. In this case, bank credit are financial resources for investment and investment could be agricultural production.

Given the above, the model for this study is stated as:

$$AQ_t = f(BC_t, AC_t, GA_t, IF_t, IN_t) \quad 3$$

Where:  $AQ_t$  is agricultural output,  $BC_t$  is commercial banks credit to agriculture overtime,  $AC_t$  is agricultural credit guarantee scheme fund,  $GA_t$  is government expenditure on agriculture overtime,  $GI_t$  is government expenditure on infrastructure overtime and  $IF$  is inflation.

The econometric form of equation 3 is presented as:

$$\ln AQ_t = \alpha_0 + \alpha_1 \ln BC_t + \alpha_2 \ln AC_t + \alpha_3 \ln GA_t + \alpha_4 IF_t + \alpha_5 IN_t + \nu_t \quad 4$$

As noted by Gujarati and Porter (2009), the model in eqn 4 is in log form. Log transformation is used to reduce heteroscedasticity as well as skewness in a model. Equation 4 was estimated using the Autoregressive Distributed Lag Model (ARDL) estimation technique.

Theoretically, it is expected that in model 4, the estimated coefficients of commercial bank credit to agricultural sector (BC), agricultural credit guaranteed scheme fund (AC), government expenditure on agriculture, should have positive impact on food availability, while the estimated coefficients of inflation and interest rate should have a negative impact on food availability in Nigeria.

### 3.2 Sources of data

This study makes use of secondary data sourced from the Central Bank of Nigeria (CBN) publications and World development Indicator (WDI). Data on food availability is proxied by agricultural contribution to GDP, government expenditure on agriculture, , commercial bank credit to agriculture, interest rate and ACGSF were sourced from CBN Statistical Bulletin. Data on inflation proxied by consumer price index were sourced from WDI.

## 4. RESULTS AND DISCUSSION

To avoid the case of spurious regression in time series modelling, it is expedient to carry out unit root test to examine the time-series properties of the variables. Against other studies, this study employed the Zivot and Andrews unit root test, This approach was strongly supported by Perron (1989) who posited that a common problem with the conventional unit root tests such as the ADF, DF and PP tests, is that they do not allow for the possibility of a structural break (Perron, 1989). Consequently, the power to reject a unit root decreases when the stationary alternative is true and a structural break is ignored Perron (1997). As such, the standard test of the unit root hypothesis may not be reliable in the presence of structural change. As in conventional unit root test, to adjudge any variable stationary, its t-statistics value must be greater than the test critical values in absolute term at all levels of significance.

### Unit Root Test

**Table 1: Z-A Unit Root Test for Agricultural Output Model**

ZIVOT AND ANDREWS (Z-A TEST)									
Variables	At Level	Critical Values	Prob	Break Point	At First Difference	Critical Values	Prob	Break Point	Remarks
LAQ	-9.977	-4.93	0	2002	-6.928	-4.93	0.003	2002	I(0)
LBC	-3.748	-4.93	0.068	1992	-8.02	-4.93	0.018	2007	I(1)
LAC	-1.955	-4.93	0.401	2001	-5.663	-4.93	0.003	2001	I(1)
LGA	-2.047	-4.93	0.017	2010	-5.484	-4.93	0.001	2009	I(1)
IF	-6.828	-4.93	0.06	2010	-6.422	-4.93	0.023	2010	I(0)
IN	-4.343	-4.93	0.087	1989	-7.413	-4.93	0.005	1993	I(1)

**Source: Author's computation using Eviews 10**

Table 1 presents the result of the Z-A unit root test of variables in agricultural output model. The results shows that the log of agricultural output (LAQ) and inflation (IF) are both stationary at levels. While other variables; log of commercial bank credit to agriculture (LBC), log of agricultural credit guarantee scheme fund (LAC), log of government expenditure on agriculture

(LGA) and interest rate (IN) are stationary after first difference. The results are mixture of I(0) and I(1) and none of the variables is stationary at second difference, I(2), thus giving credence to the use of the ARDL framework developed by Shin et al. (2014). The Z-A test provides a more robust estimated values in the statistic. However, this study proceeds to investigating the long-run relationship among the variables using the Bounds test cointegration approach.

Sign. Level	Critical Value		Computed F-Statistics
	Lower (I <sub>0</sub> ) Bounds Test	Upper (I <sub>1</sub> ) Bounds Test	
10%	2.33	3.42	8.92
5%	2.80	4.01	K = 5
1%	3.90	5.42	n = 39

**Table 2: Bounds Test for Agricultural Output Model**

**Source: Author's computation using Eviews 10**

Following the results of the ARDL bounds test for agricultural output model presented in Table 2, the null hypothesis is rejected and the existence of a long-run relationship among variables in the agricultural output model is accepted. This is because, the computed F-statistic of 8.92 exceeds the upper bound at 5 per cent level of significance. Given the results of the Bound test, the ARDL model is estimated.

**Table 3. ARDL Lag length selection**

Lag Order Selection Criteria						
Endogenous variables: LQ LBC LAC LGA IF IN						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-473.0271	NA	7088.098	25.89336	26.15459	25.98545
1	-316.8879	253.1986*	11.02062*	19.39935*	21.22796*	20.04402*
2	-281.337	46.12017	13.24945	19.42362	22.81961	20.62086
3	-239.4063	40.79744	15.23348	19.10304	24.06641	20.85286

**Source: Author's computation using Eviews 10**

Table 3 shows the lag length selection criteria for estimating the ARDL model. All the criteria selected a 1 period lag for estimation.

**Table 4:****ARDL Long-run Results of Agricultural Output Model**

Dependent Variable: LQ				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBC	0.204005	0.100121	2.037585	0.0213
LAC	0.225068	0.10655	2.112323	0.004
LGA	0.429761	0.125116	3.4349	0.0008
IF	-0.000102	0.000595	-0.171733	0.8649
IN	0.044864	0.021502	2.086504	0.0127
C	0.508305	0.364902	1.39299	0.1114

**Source: Author's computation using Eviews 10**

The ARDL long-run result in table 4 shows that the estimated coefficient of commercial bank credit is positive significant and a 1 percent increase in commercial bank credit in the long-run on the average, lead to about 0.20 percent increase in agricultural output. It was revealed that a 1 percent increase in agricultural credit guarantee scheme on the average, lead to about 0.23 percent increase in agricultural output. The result also revealed that a 1 percent increase in government expenditure on agriculture, on the average, lead to about 0.43 percent increase in agricultural output. The result is positive and significant. The result of inflation is negative and not significant. Though, its estimated coefficient is in tandem with apriori expectation, but the contribution to agricultural output in the long-run is approximately zero (0). Finally, the estimated coefficient of interest rate is positive and not in conformity to apriori expectation. However, the result is significant and a 1 percent increase in interest rate, on the average lead to about 0.04 percent increase in agricultural output in Nigeria.

**Table 5:****ARDL Short Run Results for Agricultural Output Model**

ARDL Error Correction Regression				
Dependent Variable: D(LQ)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LBC)	0.382051	0.13891	2.750349	0.0026
D(LAC)	0.292261	0.113991	2.563895	0.0061
D(LGA)	0.404849	0.120616	3.356512	0.0008
D(IF)	0.280886	0.110005	2.553393	0.0369
D(IN)	-0.301898	0.132734	-2.274459	0.0235
CointEq(-1)*	-0.177672	0.04381	-4.055471	0.0004
R-squared	0.779336	Adjusted R-squared		0.767409
Durbin-Watson stat	2.200585			

**Source: Author's computation using Eviews 10**

The estimated ARDL short-run agricultural output model in table 5, shows that, a 1 percent increase in commercial bank credit, on the average lead to about 0.38 percent increase in

agricultural output in Nigeria. Meaning, the commercial bank credit elasticity to agricultural output is 0.38. The result is positive and significant. This result support the outcome of Nazaki and Nathan (2020), Emenuga (2019). It however, disagreed with the study of Okafor (2020) Osabohien etal (2018) Adesope and Ibekwe (2017). The estimated coefficient of agricultural guarantee scheme fund shows that a 1 percent increase in agricultural guarantee scheme fund, on the average lead to about 0.29 percent increase in agricultural output in Nigeria. The result is positive and significance. This result supported the works of Mubarak (2021), Emenuga (2019) and disagree. with the findings of Orok and Ayin (2017). The short-run result further revealed that a 1 percent increase in government expenditure on agriculture, on the average, lead to about 0.40 percent increase in agricultural output in Nigeria. The result revealed that a 1 unit increase in inflation, on the average, lead to about 0.28 unit increase in agricultural output in Nigeria. The result is positive and significance. However, the estimated coefficient of inflation did not conform to apriori expectation. The result finally revealed that, a 1 unit increase in interest rate, on the average, lead to about 0.30 units decrease in agricultural output in Nigeria.

The result of the model finally revealed that the coefficient of the error correction term follows a priori expectation in that the estimated coefficient is less than one, negative and statistically significant at 5 percent significant level. This implies that the speed of adjustment of the model from short-run shock to their long-run equilibrium is about 18 percent.

## **5. CONCLUSION AND RECOMMENDATIONS**

The study examined the impact of various sources of agricultural finances on food security in Nigeria. Studies in this area are yet to have consensus on the impact of agricultural credit on food security. This study therefore, reconcile studies in this area. In addition and against previous studies, this study conceptualized food security as availability of food. That is food security can be defined as the continuous increase in the output of food produced by agricultural sector of a country. In view of this and on the frame work of financial intermediation theory, the study employed autoregressive distribute lag model to estimate food security in terms of its availability. In the food availability model, availability was proxied by agricultural output as dependent variable and commercial bank credit to agricultural sector, agricultural credit guarantee scheme fund, federal government expenditure on agriculture, inflation and interest rate were the independent variables.

The ARDL Bounds test for conitegration revealed the presence of long-run equilibrium relation among variables. Based on the result of the estimated ARDL models, this study therefore

conclude that commercial bank credit to agriculture, agricultural credit guarantee scheme fund, government expenditure on agriculture are strong determinant of food availability in Nigeria. Further increase in these variables will stimulate production of food by agricultural sector. Inflation may be significant but failed to comply with a priori expectation. That is increase in general price level may encourage agricultural activities in Nigeria. This study finally revealed the significance of interest rate to agricultural output. It shows that continuous increase in interest rate will lead to fall in agricultural output. Meaning, farmers may be discourage to borrow for agricultural purpose. Conclusively, these variables are stimulus of agricultural out, hence, increase in the supply of food.

In view of the above and to stimulate food security in Nigeria, this study therefore recommend that banks should be encouraged through financial sector policies and reforms to make available credit facilities to preferred sectors like agriculture. Similarly, the agricultural credit guarantee scheme should be more strengthened towards guaranteeing agricultural credit. This will no doubt increase food production in Nigeria.

Government in her fiscal responsibility should increase allocation to agricultural sector with the aim of providing infrastructure and other incentives to farmers.

Finally, policies to encourage domestic and foreign investors in Nigeria should be entrenched. This will reduce unemployment, encourage per capita income, hence there will be access to food.

## **REFERENCE**

- Abdul-Jalil, M.A. (2015). Determinants of access to credit and its impact on household food security in Karaga district of the Northern region of Ghana. Doctoral dissertation, Kwame Nkrumah University of Science and Technology, Ghana: 123p
- Agaptus N. John S. O. & Modupe B. A. (2019) National insecurity and the challenges of food security in Nigeria. *Academic Journal of Interdisciplinary Studie*, 8(4), 9-20.
- Akinriola, O. O. & Okunola, A. M. (2017). Performance analysis of Nigerian agricultural credit guarantee scheme: Bounds test approach to cointegration. *Journal of Development and Agricultural Economics*, 12(2), 75 – 83.
- Anyanwu, S.O., Offor, U.S., Adesope, O.M. and Ibekwe, U.C. (2017). Structure and growth of the GDP (1960-2008): implication for Small and Medium Enterprises in Nigeria, *Global Advanced Research Journal of Management and Business Studies* 2(6): 342- 348.
- Awotide, B. A., Abdoulaye, T., Alene, A. & Manyong, V. M. (2015). Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria. Paper presented at the International Conference of Agricultural Economists (ICAE), Milan, Italy.

- Awoyemi T.T., Odozi, J.C., Otekunrin O.A., Ehirim N.C (2015). Efficient Resource Use: Does Human Capital Matter? The Case of Cassava Production farmers in Oyo State, Nigeria. *International Journal of Agriculture and Rural Development* 18(1), 2064-2074.
- Ayinde, I.A (2019). Food Security in Nigeria: Impetus for Growth and Development. Nigerian Institute of Town Planners (Ogun State Chapter) Waheed Kadiri Annual Lecture 2019. (2 July 2019).
- Ayinde, O. E; Fatigun, O; Ogunbiyi, K; Ayinde, K; & Ambali, Y.O. (2018). Assessment of Central Bank intervention on rice production in Kwara State, Nigeria: A case study of Anchor Borrower's Program. A Paper Presented at the 30<sup>th</sup> International Conference of Agricultural Economists, July 28<sup>th</sup> –August 2<sup>nd</sup>, Vancouver, 434-467.
- Ayinde, O.E, (2008) Empirical Analysis of Agricultural growth and unemployment in Nigeria. *African journal Agric. Res.* 3(7) 465.
- Bahsi, N. & Ceti, E. (2020). Determining agricultural credit impact on agricultural production value in Turkey. *Ciencia Rural*, 50(11), 1 – 13.
- Bidisha, S.H., Khan, A., Imran, K., Khondker, B.H. and Suhrawardy, G.M. (2017). Role of credit in food security and dietary diversity in Bangladesh, *Economic Analysis and Policy*, 53,33-45.
- Blench R, Ingawa SA (2003). A Practical Guide for National Fadama Development Project II Facilitators in Conflict Analysis and Management. Federal Government of Nigeria Project Coordinating Unit/ World Bank. Abuja, Nigeria.
- Brooks, C. (2008). *Introductory econometrics for finance*. (2<sup>nd</sup> ed.). New York: Cambridge University Press.
- CBN (2019). *Statistical Bulletin*, Abuja: CBN Publications.
- CBN (2020). *Statistical Bulletin*, Abuja: CBN Publications.
- Chude, P.N. & Chude, D.I. (2013). Impact of Government Expenditure on Economic Growth in Nigeria. *International Journal of Business and Management Review*. 1(4), 64-71.
- Davies AE 2009. Food security initiatives in Nigeria: Prospects and challenges. *Journal of Sustainable Development in Africa*, 11(1), 186-202.
- Demirguc-Kunt, A. & Levine, R. (1996). Stock market, corporate finance and economic growth: An overview. *The World Bank Economic Review*, 10, 223 – 239.
- Devereux,S, Vaitla B, & Haunstein, S.S. (2008). Seasons of Hunger: Fighting Cycles of Quiet Starvation among the World's Rural Poor. London: Pluto Press.
- Downie, R. (2017). Growing the agriculture sector in Nigeria. A Report of the CSIS Global Food Security Project. Retrieved from [https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170317\\_Downie\\_AgricultureSectorNigeria\\_Web.pdf](https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170317_Downie_AgricultureSectorNigeria_Web.pdf).
- Eigege, J. & Cooke, J. (2016). Tracing the roots of Nigeria's agricultural decline. Center for Strategic and International Studies (CSIS). Retrieved from [https://csis-prod.s3.amazonaws.com/s3fspublic/publication/160505\\_Eigege\\_NigeriasAgriculturalDecline\\_Web.pdf](https://csis-prod.s3.amazonaws.com/s3fspublic/publication/160505_Eigege_NigeriasAgriculturalDecline_Web.pdf)
- Emenuga, P.E. (2019). Effect of Commercial banks' credit on agricultural productivity in Nigeria. *Acta Universitatis Danubius*, 15(3), 417-428.

- Eyo, E. O., Nwaogu, M. A., & Agenson, M. E. (2020). Agricultural credit guarantee in Nigeria and the uncertainties of the macroeconomic environment. *International Journal of Economics and Financial Issues*, 10(20), 20 – 29.
- Fan, S., Zhang, L., & Zhang, X. (2000). Growth and Poverty in Rural China: The Role of public Investments. EPTD Discussion paper 66. Washington, D.C
- FAO (1984). Forward looking strategies, women in agriculture and rural development Rome.
- FAO (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action. FAO, Rome, Italy. Available at: <http://www.fao.org/wfs/>
- FAO 2008. The State of Food Insecurity in the World. Food and Agriculture Organization, Rome.
- Florence, N. & Nathan, S. (2020). The effect of commercial banks' agricultural credit on agricultural growth in Uganda. *African Journal of Economic Review*, 3(1), 162 – 175.
- FMARD (2016). The agriculture promotion policy (2016 – 2020): Building on the successes of the ATA, closing key gaps. Retrieved from [https://fscluster.org/sites/default/files/documents/2016-nigeria-agric-sector-roadmap\\_june-15](https://fscluster.org/sites/default/files/documents/2016-nigeria-agric-sector-roadmap_june-15).
- Food and Agricultural Organization (2008), Global Food Security: Issues and Prospects. Rome: FAO.
- Food Security Portal (2016). Latest FAO Food Price Trend Reports Decline in International Cereal Prices. Retrieved 25<sup>th</sup> October, 2021 from <http://www.foodsecurityportal.org/latest-fao-food-pricetrend-report-reports-decline-international>.
- Fowowe, B. (2020). The effects of financial inclusion on agricultural productivity in Nigeria. *Journal of Economics and Development*, 22(1), 61 – 79.
- Fiday, O.A., Chris, O., Ikechukwu, K. & Fredrick, I. (2016). Credit Supply and Agricultural Production in Nigeria: A Vector Autoregressive (VAR) Approach. *Journal of Economics and Sustainable Development*, 7(2),131 -143.
- Gujarati, D. N. & Porter, D. C (2009). *Basic Econometrics, international edition*, McGraw-Hill Publication.
- Idachaba F (2004). Food Security in Nigeria: Challenges under Democratic Dispensation. Paper presented at Agricultural and Rural Management Training Institute (ARMTI) ARMTI Lecture, Ilorin, March 24, 2004, 1-23.
- Igba, C.E. (2003) Family and food insecurity in Nigeria. *Journal of Lome Economics Researcher*, 5(2), UNEP.
- Jensen, M. & Murphy, K. (1990). Performance pay and top management incentives. *Journal of Political Economy*, 36, 893 – 898.
- Levine, R. (1991). Stock markets, growth, and the tax policy. *Journal of Finance*, 46, 1445 – 1465.
- McKinnon, R. I. (1973). *Money and capital in economic development*. Washington D.C., United States: Brookings Institutions.
- Mubaraq, S.(2021). Agricultural credit guarantee scheme fund (ACGSF) and agricultural performance in Nigeria: A threshold regression analysis. *MPRA paper Institute for*

*Research in Africa (IFRA)*, University of Ibadan, Nigeria, Erudite Millennium LTD.  
Retrieved from <https://mpr.ub.uni-muenchen.de/105564/> MPRA Paper No. 105564.

Nakazi, F. & Nathan, S. (2020). The Effect of Commercial Banks' Agricultural Credit on Agricultural growth in Uganda. *African Journal of Economic Review*, 7(1), 162 – 175.

Narayan, P.K., & Smyth, R., (2005). The residential demand for electricity in Australia: an application of the bounds testing approach to cointegration. *Energy Policy*, 33, 457-464.

NBS (National Bureau of Statistics) and the World Bank (2018). Conflicts and violence in Nigeria: Results from the North-East, North-Central and SouthSouth Zones. Retrieved from: <http://documents.worldbank.org/curated/en/111851538025875054/Conflicts-and-violence-Resultsfrom-the-North-East-North-Central-and-SouthSouth-Zones>

Ngong, C. A., Thaddeus, K. J. & Onwumere, J. U. (2020). Banking sector development and agricultural productivity in Central African Economic and Monetary Community (CEMAC). *Journal of Agricultural Science and Technology*, 10, 68 – 82.

Okafor, C. A. (2020). Commercial banks credit and agricultural development in Nigeria. *International Journal of Business & Law Research*, 8(3), 89 – 99.

Olowofeso, O.E., Adeboye, A.A., Adejo, V.T., Baseey, K.J. & Abraham, O. (2017). Agricultural Sector Credit and Output Relationship in Nigeria: Evidence from Nonlinear ARDL. *CBN Journal of Applied Statistics* 8(1):101 – 122.

Oriola, E.O. (2009). A Framework for Food Security and Poverty Reduction in Nigeria. *European Journal of Social Sciences*, 8 (1), 132-139.

Osabohien, R., Afolabi, A. and Godwin, A. (2018). An Econometric Analysis of Food Security and Agricultural Credit Facilities in Nigeria. *The Open Agriculture Journal*, 12, 227 – 239.

Osabuohien, E. (2016). Economy without Buffer must Experience Shocks. *Daily Times*, Monday June 20, p. B8.

Perron, P. (1989). The great crash, the oil price shocks and the unit root hypothesis. *Econometrica*, 57, 1361-1401.

Perron, P. (1997). Further evidence on breaking trend functions in macroeconomic variables. *Journal of Econometrics*, 80, 355-385.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 289-326.

Petrick, M. (2004). A microeconomic analysis of credit rationing in the Polish farm sector. *European Review of Agricultural Economics*, 31(1), 23-47.

Reisinger, J. (2014) Food and Agriculture-FAO Paper: Premise's Data in Brazil Predicts Food Trends 25 Days in Advance of Official Monthly Releases, December.

Reuben, J., Nyam, C. M. & Rukwe, D. T. (2020). Agricultural credit guarantee scheme fund and its effect on agriculture output in Nigeria. *Review of Agricultural and Applied Economics*, 23(2), 102 – 111.

- Schumpeter, J. A. (1912). *The theory of economic development: An inquiry into profits, capital, credit, interest and the business cycle*. New Jersey, United States: Transaction Publishers.
- Sers, C.F. & Mughal, M. (2019). From Maputo to Malabo: public agricultural spending and food security in Africa. *Applied Economics*, 51(46), 5045–5062
- Shaw, E. S. (1973). *Financial deepening in economic development*. Oxford, United Kingdom: Oxford University Press.
- United Nations Development Programme-UNDP. (2005). *Human Development. Report 1994*, New York: Oxford University Press
- World Bank 1986. *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*. Washington DC: World Bank.
- World Bank, 2007. *Climate Change adaptation in Africa: a microeconomic analysis of livestock choice*. World Bank Policy Research Working Paper No. 4277, July 2007.
- World Data Lab (2020). Retrieved from: <https://worldpoverty.org/headline> Accessed 20 October, 2021.
- World Food Summit (2003), *Agriculture and Sustainable Development*, Rome: FAO.
- Wu, J., Hou, H. & Cheng, S. (2010). The dynamic impacts of financial institutions on economic growth: Evidence from the European Union. *Journal of Macroeconomics*, 32, 879 – 891.
- Zakaree, S.S. (2014). Impact of Agricultural Credit Guarantee Scheme Fund (ACGSF) on Domestic Food Supply in Nigeria. *British Journal of Economics, Management and Trade* 4(8), 1273-1284.