Impact of Federal Government Agric-Sector Funding on Agricultural Output in Nigeria

Gushibet Solomon Titus[1] & Benjamin Gift Eno-obong[2]

[1 & 2] Department of Economics,
Faculty of Social Sciences,
University of Jos, Jos-Plateau State, Nigeria.

Abstract

The paper examined the impact of federal government agric-sector funding on agricultural output in Nigeria during the period 1986-2017. The variables of interest were budgetary allocation to agriculture, agricultural credit guarantee scheme, bank credit to agriculture, exchange rates and interest rates. The study employed the Auto-Regressive Distributed Lag (ARDL) model as the technique of analysis. The study found that budgetary allocation to agricultural sector had a positive and statistically significant impact on agricultural output in Nigeria in the long-run. Similarly, the study revealed that agricultural credit guarantee scheme and bank credits to agricultural sector have positive and statistically significant impacts on agricultural output in Nigeria in the long-run. Exchange rate had a negative and statistically insignificant impact on agricultural output both in the short-run and in the long-run. Interest rate had a positive and statistically significant impact on agricultural output. The paper recommended that, there is the need for government to increase budgetary funding for the agricultural sector in order to stimulate agricultural revolution that would reduce poverty, hunger, malnutrition and unemployment in the country. Since the budgetary allocation to agriculture revealed a possibility of stimulating agricultural output, governments at all levels should increase budgetary allocation or expenditure to the agricultural sector by at least 60% of current allocations in order to spur farmers and attract more investors into the sector. The paper also recommended that the Central Bank of Nigeria (CBN) should, as a matter of policy, direct all deposit money banks in Nigeria to allocate at least 50% of their loan portfolios to the agricultural sector at a single digit interest rate not exceeding 7% flat per annum, refundable in at least 4 years on prorata-basis. To achieve this, the CBN should take a risk guarantee of up to 50% of each of the loans granted through the deposit money banks by introducing an Agricultural Risk Guarantee Management Scheme (ARGMS), amongst other policy recommendations.

Keywords: Agricultural Output, Funding, Food, Employment, Exchange Rate, Interest Rate
JEL Code: Q18, Q19 H54, H59

Contribution/Originality
The paper's contribution is finding that government expenditure to agriculture dictated the direction of agricultural policy through the financing options (budgetary allocations, bank guarantee schemes fund, bank credit, exchange rate stability and interest rate movement) which constituted the major determinants of agricultural output growth in Nigeria.

1.0 Introduction

The desire of every nation and government across the world is to grow and develop their economies and make their citizens enjoy high standard of living. One of the most reliable sources of prosperity is agriculture which is as old as human history. Agriculture has over the ages been the engine of growth and development globally. It has never diminished in relative and strategic importance since the ancient civilisation and it remains so or even more attractive and popular today. It provides food to the populace and supplies raw materials to local industries, and lubricates other sectors, exports surplus agric-products to earn foreign exchange and provides revenue to government, offers employment and income to individuals, etc. World Bank (2020) corroborated that agriculture can help reduce poverty, raise incomes and improve food security for 80% of the world's poor, who live in rural areas and work mainly in farming.

[1]Corresponding Author's Email and Phone Number:gushibetsolomon@gmail.com; +234 (0)8035976256

Nonetheless, technological developments in agriculture have been influential in driving long-term growth and productivity in developed countries. For example, innovations in animal and crop genetics, chemicals, equipment, and farm organisation have enabled continuing output growth in the United States (Wang, Nehring & Mosheim, 2018). Herein lays the implication for poor and low income countries of the world whose agricultural practices are basically crude and subsistent in nature. In view of the foregoing, agricultural transformation has, from a policy point of view, become crucial. Adequate funding of the agricultural sector would serve as catalyst for economic transformation, diversification and sustainability (Adams & Mortimore, 1997). It implies that adequate funding is necessary to transform the sector. In Nigeria, government has been allocating funds to the agricultural sector for six decades, and whether these funds have improved agricultural output requires investigation.

Recall that prior to independence in 1960, Nigeria was not only self sufficient in food production but exported food to other countries, earning precious foreign exchange in the process. The great groundnut pyramids in the North; the rubber, timber, cocoa and palm plantations in the South, were great sources of wealth for the country. For example, in 1957 through the 1960s, agriculture formed a whopping 86% of Nigeria's export revenue, and by 1977, agricultural exports had dwindled to 6% and today, the figure is less than 3% (Atiku, 2020). How did the country go from being a net exporter of agricultural commodities to a net importer of food products? How did the country go from one that feeds itself to one that desperately depends on foreign imports for survival? These are probing questions demanding a rethink on strategies to rejuvenate the sector, and this study has become important in providing answers to these posers.

Nevertheless, despite the huge government expenditures to agriculture, the country has remained economically weak since independence. Efforts at agricultural development over the years have failed to improve the economy and incidences of poverty abound everywhere across Nigeria as agricultural productivity is declining, thereby making the sector unable to save the poverty situation in the country (Gushibet & Abimiku, 2017). A review of the sector depicts a gloomy picture. Performance is reflected in environmental degradation, rain-fed and peasant farming, mounting food deficits, declining GDP, falling export earnings, rising retail food prices, bourgeoning inflation, huge import bills, debilitating unemployment and escalating poverty. Consequently, hunger, insecurity, crime and criminality like kidnappings, armed robbery, killer herdsmen, 419, yahoo scammers, insurgency, banditry, and social vices such as drug abuse and addiction, prostitution, and slums have characterised the economy. These are evidences of misery that corroborated the pronouncement of the World Bank (2018) who declared that Nigeria has become the poverty capital of the world.

These problems have motivated the paper; to investigate whether or not the allocated funds have improved agricultural productivity in Nigeria as basis for policy recommendations. The study believes therefore, that improving or revolutionising the agricultural sector would provide greater potentials for food sufficiency where surplus agricultural produce could be exported to other countries. This will not only increase agricultural output and foreign exchange earnings but also generate employment and facilitate poverty reduction in the country. The objectives of the study are; to examine the impact of federal government funding on agricultural output in Nigeria, and to investigate the causality between agricultural sector allocation and agricultural output in Nigeria. The paper is divided into five sections. The foregoing is the introductory section one, leading to section two which explains conceptual issues, gives the theoretical basis and make empirical review. Section three describes the technique of analysis, including model specification, unit root test, causality test and sources of data. While section four presents the result and discusses the findings of the paper, section five concludes with policy recommendations.

2.0 Literature Review

2.1 Conceptual Clarifications

Agriculture is the art and science of crop and livestock production which comprises the entire range of technologies associated with the production of useful products from plants and animals, including soil cultivation, crop and livestock management and the activities of processing and marketing of agro-products. According to Organisation for Economic Co-operation and Development (OECD, 2019), agricultural outputs are the main products from agricultural production. It comprises output sold (including trade between agricultural holdings); changes in stocks, output for final consumption, output produced for further processing by agricultural producers, and intra-unit consumption of livestock feed products. This study considers agricultural output to mean the value of production or yields from farming activities and enterprises including sundry farm income, agric-output or farm produce, income derived from contract work, turnover, re-investments and profits.

Therefore, agricultural output is the gross value of production (livestock, poultry, cash crops, and fishery) including all advance, intermediate and supplementary payments, that is, insurance received as a result of crop losses, produce consumed by households (and donations), produce consumed by labour, seed and feed used in the farm, and stock adjustment - closing stock minus opening stock (Food and Agriculture Organisation, FAO, 2015). This study describes agriculture as the cultivation of land, rearing of animals for the purpose of production of food for man, animals and raw materials for industries with far reaching multiplier effects for the socio-economic and industrial transformation of a country because of its multifunctional nature and usefulness.

Dandan (2011) posited that agricultural financing in the form of government expenditure would have a positive contributory effect on economic growth and development. Taiwo and Abayomi (2011) observed that agricultural allocation helps in the financing of such expenditure to provide essential infrastructural facilities - including transport, electricity, telecommunications, water and sanitation, waste disposal, education and health. Thus, in developing countries, public expenditure has an active role to play in reducing regional disparities, developing social overheads, creating infrastructure for economic growth in the form of transport and communication facilities, education and training, growth of capital goods industries, basic and key industries, research and development and so on (Bhatia, 2002). Agric-sector funding refers to the Federal government year-by-year budgetary allocation to the agricultural sector.

2.2 Theoretical Underpinning

Musgrave-Rostow's Theory

This theory takes government expenditure as a pre-requisite of economic development, whereby the level of expenditure directly determines the level of growth that a country will attend. The theory postulates that, investment especially public investment is measured as a percentage of the total investment of the economy; it is usually high at the initial stages of economic growth and development compared to the other later stages. The theory maintains that the government endures to fund investment goods in this stage (middle stages) of growth thereby stimulating growth of output in the long-run. It implies that the injection of more money into a particular sector will ensure increased productivity in that sector. This applies to the agricultural sector.

The Pro-poor Sustainable Economic Growth Theory

The pro-poor sustainable economic growth theory states that as risk and uncertainty arising from over dependence on one or very few sectors is minimised a sustainable growth rate is assumed. Furthermore, as the economy grows, it is assumed that the government concerned will be committed to the policy of equitable income distribution and poverty alleviation throughout the diversification process (pro-poor growth assumption). The 'trickle-down' effect is hereby assumed to be realised throughout the growth process (Philippe & Patrick, 1997). The assumption of this theory is that, as the economy grows and diversifies, its ability to counter the effect of natural disasters such as drought, floods, and outbreaks of cattle diseases is assumed to increase.

The government is to function in the economy to establish well-planned systems, which may need substantial funds to counter the effects of disasters. Hence, this theory assumes that, as an economy diversifies, the government concerned may collect enough taxes and other forms of revenue from various sectors – private sectors, mining and non-mining sectors, manufacturing sector, etc. The revenue obtained is assumed to be essentially pro-poor, i.e. the government is assumed to use the revenue prudently to improve the welfare of the poor. It is expected to increase the share that goes to aspects which benefit all people including the poor such as universal and vocation-oriented education, primary health and basic infrastructure.

The High Pay-Off Inputs Theory

The high pay-off inputs theory as developed by Schultz (1953) focuses on two aspects. First, how to create and provide to farmers the new higher pay-off technology embodied in new higher pay-off technology in capital equipment and other inputs. Second, how to increase the productivity of labour has become necessary. The theory suggests that output growth from the agricultural sector of a developing country depends predominantly upon the availability and price of modern pay-off inputs. This is when they succeed in producing and distributing these factors (non-traditional) agricultural factors (fertilizers, high yielding seeds, technology, human resource) cheaply, then investment in agriculture becomes profitable. The theory also suggests that the key to transforming a traditional agricultural sector into a productive source of economic growth is investment through more government allocations to the sector. This will make modern high pay-off inputs available to farmers especially in less advanced countries. The study was anchored on these three theories, each of which has its place and relevance in this paper.

2.3 Empirical Review

Several studies have shown that agricultural financing is capable of enhancing agricultural productivity and output growth, reducing poverty and unemployment, and increasing food security. An impetus to this analogy was given by the World Bank (2020) who reported that agriculture is a catalyst for reducing poverty, raising incomes and improving food security for 80% of the world's poor, who live in rural areas and work mainly in farming. The empirical review hereunder substantiates this reality with pieces of empirical evidence.

Chandio, Jiang, Rehman and Jingdong (2016) examined the impact of government expenditure on agricultural sector and economic growth in Pakistan over the period 1983-2011 with time series data collected from Pakistan Statistical Year Books and Economic Survey of Pakistan. The study applied ADF unit root test, Johansen cointegration test and ordinary least squares (OLS) technique as analytical tools to analyse the data. The result of Johansen cointegration test showed that there exists a long-run relationship among government expenditure on agriculture, agricultural output and economic

growth in Pakistan. On the other hand, the empirical result of the regression analysis revealed that agricultural output and government expenditure have significant influence on economic growth of Pakistan. It was also found that the agricultural sector was being confronted by some challenges like inadequate funding, underdeveloped infrastructure, poor agricultural marketing activities, and shortage of irrigation facilities, etc. The study therefore recommended that the Pakistani government should increase its expenditure to agriculture in order to enhance agricultural productivity and economic growth.

Jambo (2017) investigated the impact of government spending on agricultural growth in Zambia, Malawi, South Africa and Tanzania, during the period 2000-2014. Vector error correction model (VECM) was used to test the impact of public expenditure, private investment and net rate on agricultural output growth. The result from the analysis revealed that agricultural growth responds differently to the agricultural spending types across the countries. In Zambia, the bulk of public expenditures were to support the Input Subsidy Programmes (ISPs) and Price Support Programmes (PSPs). However, the empirical analysis indicated that infrastructure development, which mainly received top priority, was more growth enhancing among the spending. The result also suggested a negative relationship between agricultural growth and expenditures on ISPs, PSPs and agricultural research in Zambia. In the case of Malawi, the result of the empirical analysis indicated that the spending on agricultural research has a higher impact on growth, and unlike Zambia there is evidence of a positive relationship between agricultural growth and spending on PSPs. While infrastructure development in Tanzania received the bulk of the budget, the regression result indicated a negative relationship between spending on infrastructure and long-run economic growth. In contrast, South Africa allocates public expenditure to spending categories with the highest returns.

Karimou (2018) studied the impact of agricultural output on economic growth in Benin Republic for the period 1961-2014 using a vector error correction model (VECM). The result revealed a long-run relationship between agricultural output, industrial output, capital and GDP. It was also found that agricultural output had a significant impact on GDP in Benin Republic.

Okezie, Nwosu and Njoku (2013) probed the relationship between Nigeria's expenditure on agriculture and agricultural output from 1980 to 2011, using vector error correction model (VECM) and pair wise Granger causality. A weak causal relationship between the two variables was found, and concluded that any reduction in government expenditure on agriculture would have negative repercussion on economic growth in Nigeria. Udoh (2011) explored the relationship between public expenditure, private investment and agricultural output growth in Nigeria using annual data for the period 1970-2008. The bound test and autoregressive distributed lag model were used to analyse both short and long run impacts of public expenditure, private investment (both domestic investment and foreign direct investment) on agricultural output growth in Nigeria. The results showed that public expenditure has a positive influence on the growth of agricultural output. Itodo, Apeh and Adeshina (2012) examined the impact of government expenditure on agriculture and agricultural output in Nigeria using Cobb-Douglas production function and multiple regression technique to estimate the data from 1975-2010. The result revealed a positive but insignificant impact of government expenditure on agricultural output growth in the country.

Iganiga and Unemhilin (2011) applied vector error correction model (VECM) to annual data spanning 1970-2008 to examine the impact of federal government agricultural sector expenditure on agricultural output in Nigeria. The result showed that federal government capital expenditure is positively related to agricultural output in Nigeria. This is in consonance with the findings of Shenggen, Peter and Sukwu (1998) who found that government spending enhances the growth in

agricultural productivity by applying ordinary least squares to make empirical analysis of government spending, growth and poverty reduction on the agricultural sector of India. Shuaib, Igbinosun and Ahmed (2015) searched the impact of government agricultural expenditure on the growth of the Nigerian economy from 1960 to 2012. The study employed ordinary least squares to explore the possible links between government agricultural expenditure and economic growth. The result revealed that government agricultural expenditure has a significant direct relationship with economic growth. Ishola (2013) explored the average contribution of the agricultural sector to the national earnings of Nigeria over the period 1981-2010. It was found that there exists a significant and positive relationship between government expenditure on agriculture and economic growth in the country.

Francis (2013) has investigated the impact of federal government expenditure on agricultural sector using a simple regression with the view to analysing the data which indicated the impact of agricultural expenditure on its output from 1991 to 2010. A weak relationship between federal government expenditure and the agricultural sector in Nigeria was revealed. Oyakhilomen, Abdulsalam and Rekwot (2013) explored agricultural budgetary allocation and economic growth in Nigeria from an econometric perspective using multiple regression analysis technique, the results of the analysis showed that the relationship between agricultural budgetary allocation and economic growth in Nigeria is positive but not significant in the long-run, while the relationship is positive and significant only for the two year lagged values of agricultural budgetary allocation in the country.

From the foregoing reviews, most of the techniques adopted revolved around ordinary least-squares, error correction model and simple regression techniques. However, this work adopted Auto-Regressive Distributed Lag Model (ARDL) technique to empirically investigate the impact of federal government budgetary allocation to agriculture on agricultural output in the short-run and long-run, and to examine the causal relationship between federal government budgetary allocation to agricultural sector and agricultural output in Nigeria for the period 1986-2017, using the Granger causality technique. The ARDL technique is equally useful in addressing any case of bi-directional causation or auto-regressive behaviour in time series. Again, most of the studies reviewed concentrated on agricultural sector expenditure with respect to overall economic growth, but this study focused on federal government agric-funding in relation to agricultural sector output growth in Nigeria.

3.0 Methodology

3.1 Sources of Data

This study utilised annual time series data for over 32 year period spanning from 1986 to 2017. Variables used for the study include Agricultural Output, Budgetary Allocation to Agriculture, Agricultural Credit Guarantee Scheme fund (all measured in billions of naira), Exchange Rate measured by the units of naira exchange for a unit of US dollar and interest rate measured by the percentage of borrowed money paid by borrowers on the money borrowed. These data were extracted mainly from Central Bank of Nigeria (CBN) Statistical Bulletin and various issues of the CBN bullion, and the CBN annual report and statement of accounts (various years).

3.2 Unit Root Test

The unit root test evaluates the behaviour of series over time. In other words, the test could be used to evaluate the stability or predictability of time series. If a series has unit root, it means the series is unstable or unpredictable and therefore may not be valid for prediction or forecasting. The test is also used to determine how series respond to shocks, and most importantly, it is carried out to determine

the efficiency of a series in making forecast and or policy. That is, it determines whether or not the result from a series could be used in making efficient policy. The Unit root test in this research study was conducted using the Augmented Dickey-Fuller (ADF) test because it takes care of possible auto-correlation in the error term by adding the lagged difference terms. Model for this test are stated below:

$$\Delta Y_t = \beta_t + \beta Y_{t-1} + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-1} + \mu_t, t=1,...,T \text{----------(1)}$$

Where; Y_t is the endogenous variable; Δ is the first difference operator, β_t is a deterministic term which may consist of the constant or drift and the trend; β and α_i are coefficients of Y_{t-1} and ΔY_{t-I} respectively; p is the number of lags and the difference terms, ΔY_{t-i} is added to eliminate serial correlation in the residual term μ_t. Further, the study used the Phillips Perron unit root test to complement the ADF test.

3.3 Autoregressive Distributed Lag (ARDL) model and Bounds Test for Cointegration

The study employed the Autoregressive Distributed Lag (ARDL) model approach of Pesaran, Shin and Smith (2001) to investigate the dynamic relationship between federal government agriculture expenditure and agricultural sector output in Nigeria. This approach has some econometric advantages over the Engle-Granger (1987) and the maximum likelihood based approach proposed by Johansen and Juselius (1990) and Johansen (1991) cointegration techniques. First, the ARDL model has inbuilt cointegration procedure called the bounds test for cointegration or long-run relationship. The bounds testing approach to co-integration is preferred to other conventional co-integration tests because it has several advantages over and above other conventional cointegration tests (Riti, 2016). The ARDL bounds test is more flexible when compared to other cointegration methods (Tursoy & Faisal, 2017). The ARDL bounds test was used to test the null hypothesis that there is no cointegration among the variables against the alternate hypothesis. If the calculated F-statistic is greater than the upper bound then the null hypothesis is rejected in favour of the alternate hypothesis and if it is below the lower bound then there is no cointegration. It is inconclusive if it falls between the upper and the lower bound.

Generally, the ARDL approach effectively corrects for a possible endogeneity in the explanatory variables. The ARDL approach can avoid the uncertainties created by unit root pre-testing as the test can be applied regardless of whether the series is I(0) or I(1) or both. Another advantage of the approach is that unlike other conventional tests for co-integration, it can be applied to studies that have small sample size (Narayan, 2004; 2005). Similarly, under this approach, all the variables are assumed to be endogenous and the long-run and short-run parameters of the model are estimated simultaneously.

3.4 Model Specification

In order to estimate the impact of agricultural sector funding on agricultural output, the study considers three sources of agric-sector funding while controlling for exchange rate and interest rate. The mathematical or functional specification of the model is thus specified;

$$AGOPT = f(ABA, ACGSF, CRF, EXR, ITR) \text{---------- (2)}$$

Where;
AOPT = Agricultural Output (₦ Billion)

AB = Agricultural Budgetary Allocation (₦ Billion)
ACGSF= Agricultural Guarantee Scheme Fund (₦ Billion)
CRF = Credit Facility (₦ Billion)
EXR = Exchange Rate (₦/US Dollar ratio)
ITR = Interest Rate (%)

The Autoregressive Distributed Lag (ARDL) specification of the model is as specified in equation 3.

$$\Delta \ln AGOPT_t = \beta_0 + \beta_1 AGOPT_{t-1} + \beta_2 ABA_{t-1} + \beta_3 ACGSF_{t-1} + \beta_4 CRF_{t-1} + \beta_5 EXR_{t-1}$$
$$+ \beta_6 ITR_{t-1} + \sum_{i=0}^{p} \varphi_7 \Delta AGOPT_{t-1} + \sum_{i=0}^{p} \varphi_8 \Delta ABA_{t-1} + \sum_{i=0}^{p} \varphi_9 \Delta ACGSF_{t-1}$$
$$+ \sum_{i=0}^{p} \varphi_{10} \Delta CRF_{t-1} + \sum_{i=0}^{p} \varphi_{11} \Delta EXR_{t-1} + \sum_{i=0}^{p} \varphi_{12} \Delta ITR_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \text{ ----} \quad (3)$$

Where;

$\Delta =$ is the difference operator, p is the lag length and ε_t is the uncorrelated error term. $\lambda =$ is the speed of adjustment parameter and *ECM* is the residuals series. The coefficient of the lagged error correction term (λ) is expected to be negative and statistically significant to further confirm the existence of a co-integrating relationship. Note that the part of equation (1) without the difference operator (Δ) is the long-run while the part with the difference operator is the short-run.

3.5 Granger Causality Test

In order to establish the direction of causality between budgetary allocation to agriculture, agricultural guarantee scheme fund, credit facility, exchange rate, interest rate and agricultural output, the Granger causality test was employed. The test was developed by Granger (1969). This test is important in this study because among other things, the test tells whether one variable predicts, and therefore causes the other. Models for the Granger-causality test are:

$$Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i Y_{t-1} + \sum_{j=1}^{p} \beta_j X_{t-i} + \varepsilon_t \text{ ---------- (4)}$$

$$X_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i X_{t-1} + \sum_{j=1}^{p} \beta_j X_{t-i} + \varepsilon_t \text{ ---------- (5)}$$

Where Y_t and X_t are series on which the Granger causality test is to be carried out, p = are the optimal lag length and m is the residual.

4.0 Results and Discussion

Prior to the estimation of the ARDL and Granger causality models, the study tested for the presence or otherwise of unit root, so as to avoid spurious estimates and the results is presented on Table 4.1.

Table 4.1: ADF and PP Tests for Unit Root Test (Stationarity Tests)

	Augmented Dickey Fuller (ADF) Test			Philips Perron (PP) Test		
Variable	ADF Statistic @ Level	ADF Statistic @ 1st Difference	Order of Integration	PP statistic @ Level	PP statistic @ 1st Difference	Order of Integration
AGOPT	-0.044840	-4.253421*	I(1)	0.277407	-3.820368*	I(1)
ABA	-4.949962*	-	I(0)	-2.294097	-6.198576*	I(1)
ACGSF	-0.958522	-5.196827*	I(1)	-0.962621	-5.028311*	I(1)
CRF	-1.527142	-6.428509*	I(1)	-2.372213	-6.070859*	I(1)
EXR	-2.435170	-4.983892*	I(1)	-2.878330	-5.570570*	I(1)
ITR	-3.971743*	-	I(0)	-3.955697*	-	I(0)

*Note: * indicates absence of unit root (stationarity) at 5% level of significance*

The results of the unit root test in Table 4.1 indicated a mixed order of integration for both the ADF and PP tests. This suggests that some of the variables achieved stationarity at level I(0) while others at first difference I(1). For the ADF test, ABA and ITR achieved stationarity at level while AGOPT, ACGSF, CRF and EXR achieved stationarity at first difference. Turning to the PP test, the result showed that all the variables except ITR achieved stationarity at first difference, while ITR achieved stationarity at level. Given the mixed order of integration for both tests and since none of the variables became stationary at second difference I(2), it is clear from the result that none of the variables is integrated of order two which indicates the appropriateness of the choice of ARDL approach.

Further from the unit root test, the study estimated the ARDL bounds test and the result presented in Table 4.2.

Table 4.2: Bounds Co-integration Test Result

F-Statistics	K	Significance Level	Lower Bounds	Upper Bounds
6.795470	**5**	**10%**	2.2.6	3.35
		5%	2.62	3.79
		1%	3.41	4.68

Source**:** Authors Computation using Eviews 10

From the bounds test results above showed that, the calculated F-statistic is greater than the critical Value Bounds for Upper bound I(1), at 5% level of significance, thus we conclude that, there is co-integration. That is, there exist a long run relationship between government budgetary allocation and agricultural output. Therefore, we further estimated the short and long-run relationship and the result presented on Table 4.3.

Table 4.3: Short and Long Run ARDL Estimates

Variable	Coefficient	Long run Std, Error	t-Statitic	Prob.
LOG(EXR)	-0.293742	0.161340	1.820636	0.0845
LOG(ABA)	0.230116	0.086623	2.656535	0.0156
LOG(ACGSF)	0.476406	0.150151	3.172856	0.0050
LOG(CRF)	0.167620	0.083677	2.003186	0.0596
ITR	0.028961	0.023181	1.249358	0.2267
		Short Run		
Constant	-1.782821	0.271749	-6.560537	0.0000
DLOG(EXR)	-0.108164	0.071090	-1.521514	0.1446
DLOG(EXR(-1))	-0.125369	0.068803	-1.822151	0.0842
DLOG(CRF)	0.051606	0.050447	1.022990	0.3192
DLOG(CRF(-1))	0.125074	0.050797	2.462227	0.0235

ECT	-0.466372	0.064986	-7.176525	0.0000
R-squared	0.656723			
DW Stat	1.955638			
F-statistic	12.09597			
Prob(F-statistic)	0.000006			

Source**:** Authors Computation using Eviews 10.

The long-run result in Table 4.3 shows that exchange rate (EXR) has a negative and statistically insignificant relationship with agricultural output (AGOPT). A unit increase in EXR could lead to decrease in AGOPT by 0.29.37% in the long-run. This finding is inconsistent with the *a priori* expectation of the study and contradicts the work of Ogboru and Alabi (2018) who tested the impact of exchange rate on the Nigerian GDP with a secondary data spanning from 1986-2015 obtained from the central bank bulletin (various issues) and whose result was positive, and that capital flow into the country are used to purchase equipment from abroad to increase production which will in turn cause economic growth.

The result also revealed that agricultural budgetary allocation (ABA), agricultural guarantee scheme fund (ACGSF) and credit facility (CRF) have positive and significant relationship with AGOPT while interest rate (ITR) have positive but insignificant relationship with AGOPT in the long-run. A unit increase in ABA, ACGSF, CRF and ITR lead to increase in AGOPT by 0.23%, 0.48%, 0.18% and 0.03% respectively. The positive and significant effect of ABA, ACGSF and CRF on AGOPT is expected because increase in these sources of agricultural funding directly could lead to increase in investment in the sector in terms of both expansion and start-up. The positive effect of interest rate on agricultural output is not in line with the *a priori* expectation and is inconsistent with the work of Bako (2018) who found that higher rate of interest is inimical to agricultural investment. However, the positive relationship of ITR with AGOPT could be attributed to the fact that an increase in ITR would induce agriculturists to work more to repay the loans (principal and interest) so that agriculturists will retain a portion of the profit for expansion, thereby facilitating agricultural output growth.

The short-run analysis would show from the result in Table 4.3 that exchange rate (EXR) has a negative and statistically insignificant relationship with agricultural output (AGOPT). A 1% increase in EXR would lead to decrease in agricultural output by 0.11%. Evident from the result is that credit facility (CRF) revealed a positive and statistically insignificant relationship with AGOPT in the short-run. This implies that a 1% increase in CRF will cause AGOPT to increase by 0.05%. In the preceding year, CRF showed again a positive relationship with AGOPT. The absence of budgetary allocation to agriculture, agricultural credit guarantee scheme fund and interest rate in the short-run revealed that they do not have any relationship with agricultural output in the short run.

The value of the error correction term is -0.466372, this implies that 46% departure from the long-run equilibrium is corrected each period. The negative sign observed on the error correction term signifies that the error correction mechanism has the tendencies to drive the short run process into a long run stable equilibrium. Further, the joint goodness of the model revealed a coefficient value of 0.656723. This indicates that 65% variation in the agricultural output is explained by the independent variables while the remaining 35% is caused by other unknown factors captured by the error term. The coefficient value of the F-Statistic is 12.09597 and its Prob. Statistic value (p-value) is 0.000006 which is less than the 5% level of significance. This value implies that the overall model performed well and is statistically significant. Hence, we can conclude that the result based on this model is highly reliable for making inference and policies. The Durbin Watson statistic value of 1.955638 was applied to check the issue of serial correlation, implying that there was no autocorrelation problem in the model.

Furthermore, the study conducted pairwise Granger causality test to evaluate the nature and direction of causality (cause and effect relationship) among the variables of the study and most importantly, between the dependent variable and the independent variables. The result of the pairwise Granger causality is presented on Table 4.4.

Table 4.4: Pairwise Granger Causality Test Result

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
LOG(ABA) does not Granger Cause LOG(AGOPT)	30	0.32069	0.7286
LOG(AGOPT) does not Granger Cause LOG(ABAA)		0.62308	0.5444
LOG(EXR) does not Granger Cause LOG(AGOPT)	30	4.74154	0.0180
LOG(AGOPT) does not Granger Cause LOG(EXR)		1.66522	0.2095
LOG(CRF) does not Granger Cause LOG(AGOPT)	30	1.56848	0.2282
LOG(AGOPT) does not Granger Cause LOG(CRF)		3.40598	0.0492
LOG(ACGSF) does not Granger Cause LOG(AGOPT)	30	1.00904	0.3789
LOG(AGOPT) does not Granger Cause LOG(ACGSF)		1.27948	0.2958
ITR does not Granger Cause LOG(AGOPT)	30	0.18134	0.8352
LOG(AGOPT) does not Granger Cause ITR		4.82224	0.0169

Source**:** Author's computation using E-views 10.

The pairwise Granger causality results in Table 4.4 indicate a unidirectional or one-way Granger causality running from EXR to AGOPT; from AGOPT to CRF and from AGOPT to ITR, given that the probability values of the respective causal relationships are less than 0.05. For instance, the probability of the causal relationship between EXR and AGOPT is 0.0180 which is less than zero, thereby leading to the rejection of the null hypothesis of no Granger causality. Similarly, the probability values for the causal relationship between AGOPT and CRF, and AGOPT and ITR are 0.0492 and 0.0169 respectively which permits the rejection of the null hypotheses of no Granger causality and the conclusion that there exists Granger causality. It implies that the Granger causality result affirms that there is evidence of one way causation between the variables used in the model with feedback in rare cases in which the ARDL model has fitted.

4.1 Diagnostics/Post Estimation Test

Table 4.5: Diagnostic Test result

Test	Main Model	Prob. Value
Normality	0.812239	0.666231
Serial Correlation	0.199534	0.8210
Heteroskedasticity	2.577696	0.0363

Source**:** Author's computation using E-views 10.

The diagnostic test or post estimation result in Table 4.5 reveals that the model has normal distribution, no serial correlation but non-homoscedastic. This however, does not pose any challenge to the study since the problem of heteroskedasticity is not a strong challenge in time series data but cross-sectional data. Furthermore, the results of the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMsq) tests in Figure 4.1 and 4.2 respectively indicate stability of the coefficients at 5% level of significance.

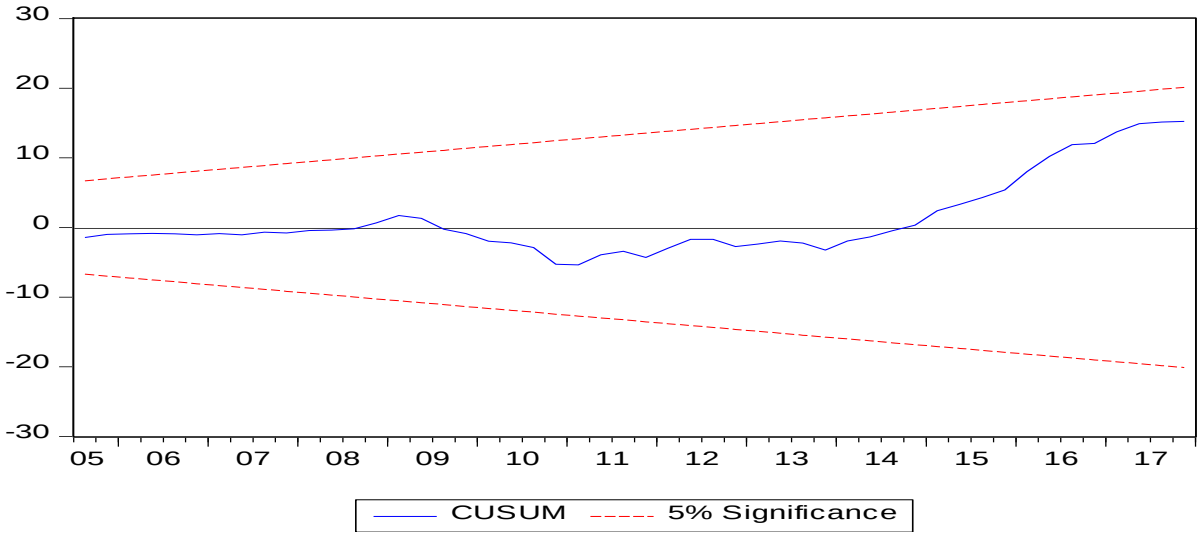

Figure 4.1: Cumulative Sum of Recursive Residual

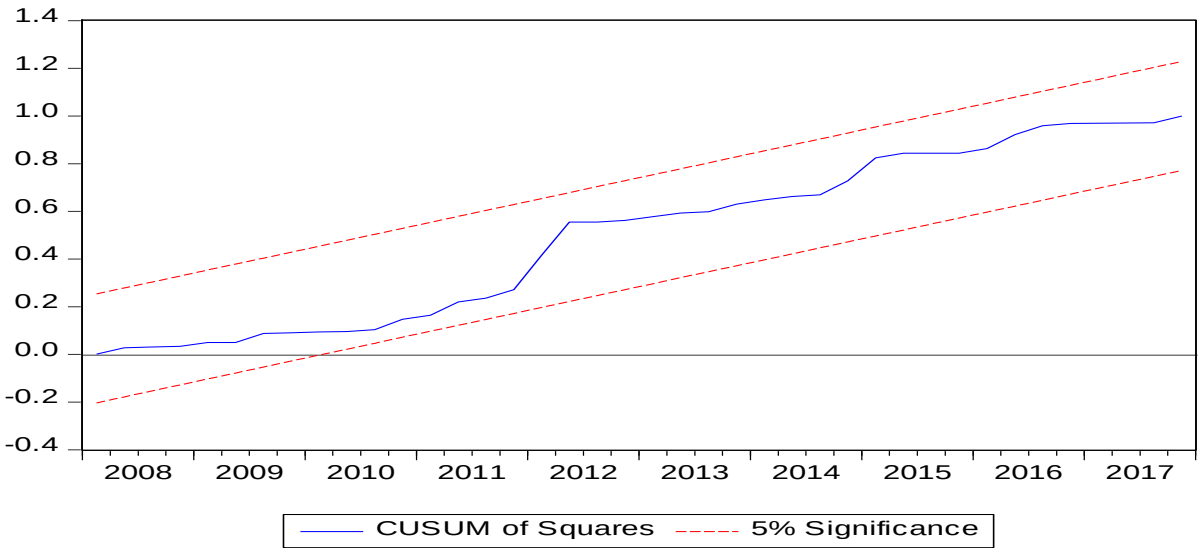

Figure 4.2: Cumulative Sum of Squares Recursive Residual

5.0 Conclusion and Policy Recommendations

Based on the objective of this study, the result showed that budgetary allocation to agricultural sector has a positive stimulating effect on agricultural output in Nigeria, thus the finding is in line with the a priori expectation. The policy implication is that a unit increase in budgetary allocation to the Nigerian agricultural sector will bring about a positive unit increase in agricultural output. Agricultural Credit Guarantee Scheme of the federal government aimed at improving the agricultural sector's performance has had a significant positive influence on agricultural sector in Nigeria. It implies that increasing the supply of some needed agricultural inputs and/or equipment through some set programmes would help boost agricultural output in the country. Credit facility from the banks to the agricultural sector showed a positive but insignificant impact on agricultural output. Its impact is not significant because of the rate of interest charged on the amount released to the agricultural sector for investment. Although from the result, interest rate revealed a positive but insignificant relationship with agricultural output, it makes the agriculturists work harder than they should, to live well, make profit, and increase output. In the future, the farmers are likely bound to face health challenges which may result in decreased agricultural output. This agrees with the postulation of the Keynesian economists who averred that higher interest rate is inimical to investments.

Considering the importance of agriculture to economic growth and development, and since budgetary allocation has proven to have a positive and statistically significant impact on agricultural output, agricultural budgetary allocation should be increased to encourage the development of a functional agriculture in Nigeria so as to achieve an improved and sustained level of performance in the sector. Therefore, the policy implication is that the Nigerian government should give greater attention to revolutionary agriculture with more budgetary funding for the sector. The following recommendations (with implementable strategies) are hereby proffered;

i. Since the budgetary allocation to agriculture from the findings of the study has revealed a possibility of stimulating agricultural output, it is important that government budgetary allocation or expenditure to the agricultural sector is increased appreciably in order to spur farmers and attract more investors into the sector. This would stimulate agricultural revolution capable of reducing hunger, malnutrition, unemployment and poverty in the country. To achieve this, governments at all levels (Federal, State and Local Government) should increase budgetary funding (allocations) to the agricultural sector by at least 60% of current allocations to kick-start agricultural revolution in the country.

ii. The Central Bank of Nigeria (CBN) should, as a matter of policy, direct all deposit money banks in Nigeria to allocate at least 50% of their loan portfolios to agriculture at a single digit interest rate of not more than 7% flat per annum, refundable in at least 4 years on prorata-basis. To achieve this, CBN should take a risk guarantee of up to 50% of each of the loan granted through the deposit money banks by introducing an Agricultural Risk Guarantee Management Scheme (ARGMS) to manage and monitor credit utilisation and support genuine losses. This would motivate farmers and arouse their consciousness in revolutionary agriculture and as a profitable venture.

iii. Government should henceforth allocate 50% of Nigeria's oil revenue to fund diversification schemes such as agricultural infrastructures, intervention schemes and subsidies for small and large scale structured irrigation faming, animal husbandry, crop production, cash crop farming, etc. This will greatly enhance growth of domestic output, employment and income in the economy.

References

Adams, W. M., & Mortimore, M. J. (1997). Agricultural intensification and flexibility in the Nigerian Sahel *Geographical Journal 5*(2), 150-160.

Atiku, A. (2020). How to pull Nigeria from the Brink. Unpublished paper/unpublished material, April 30.

Bako, D. M. (2018). Role of government funding of agricultural sector and economic growth in Nigeria. An unpublished material/paper

Bhatia, H. L. (2002). *Public Finance* 25th Edition, Vikas Publishing House, PVT Ltd, India.

Chandio, A. A., Jiang, Y., Rehman, A., & Jingdong, L. (2016). Impact of government expenditure on agricultural sector and economic growth in Pakistan *American-Eurasian Journal of Agricultural & Environmental Science 16*(8), 1441-1448.

Dandan, M. M, (2011). Government Expenditures and Economic Growth in Jordan, International Conference on Economics and Finance Research, IPEDR, Vol. 4, IACSIT Press, Singapore, pp 40-47.

Engle, R. F., & Granger, C. W. J. (1987). Cointegration and error correction: Representation, estimation and testing. *Econometrica 55,* 251-275.

Francis, I. U. (2013). The impact of federal government expenditure on the agricultural sector in Nigeria. *PATNSUK Journal 9*(9), 114-122.

Food and Agriculture Organisation (FAO, 2015). The economic lives of smallholder farmers: An analysis based on household data from nine countries. Food and Agriculture Organisation of the United Nations, Rome fao.org/3/i5251e/i5251e.pdf

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica 5,* 424-438.

Gushibet, S. T., & Abimiku, A. C. (2017). Rising poverty levels in Nigeria: Does improving Agricultural Productivity for Poverty Reduction Matter? *International Journal of Advanced Studies in Economics and Public Sector Management 5*(1), 256-271.

Iganiga, B., & Unemhilin, D. (2011). The impact of federal government agricultural expenditure on agricultural output in Nigeria *Journal of Economic Research 2*(2), 81-88.

Ishola, S. A. (2013). Government expenditure on agricultural sector and economic growth in Nigeria: 1981-2010. IOSR *Journal of Humanities and Social Science 8*(4), 62-67.

Itodo, A.I, Apeh S., & Adeshina, S. (2012). Government expenditure on agriculture and agricultural output in Nigeria (1975-2010). *Journal of Agriculture and Veterinary Sciences 4,* 7-22

Jambo, N. (2017). The impact of government spending on agricultural growth: A case of Zambia, Malawi, South Africa and Tanzania. Thesis for Master of Science in Agriculture submitted to the Department of Agricultural Economics, Faculty of Agric Sciences, Stellenbosch University *Sun scholar Research Repository.* core.ac.uk/reader/188225310.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models *Econometrica 59* (6), 1551-1580.

Johansen S., & Juselius, K. (1990). The full information on maximum likelihood procedure for inference on cointegration with application to the demand for money *Oxford Bulletin of Economics and Statistics 52*

Karimou, S. M. (2018). *Impact of agricultural output on economic growth in West Africa: Case of Benin*. Being a paper presented at the international Conference of Agricultural Economists at Vancouver, Canada, August 18.

Narayan, P. K. (2004). Reformulating Critical Values for the Bounds F-statistics Approach to Cointegration: An Application to the Tourism Demand Model for Fiji. Monash University, Department of Economics.

Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. Applied Economics, 37(17), 1979–1990. doi:10.1080/00036840500278103

OECD (2019), *Trends and Drivers of Agri-environmental Performance in OECD Countries*, OECD Publishing, Paris, https://dx.doi.org/10.1787/b59b1142-en.

Ogboru, I., & Alabi, O. R. (2018). Effect of capital flight on economic growth in Nigeria: 1986-2015 *Journal of Economics and Financial Issues 4*(1), 122-142.

Okezie, A. I., Nwosu, C., & Njoku, A. C. (2013). An assessment of Nigerian expenditure on the agricultural Sector: Its relationship with agricultural output *Journal of Economic and International Finance 5*(5), 177-186.

Oyakhilomen, O., Abdulsalam, Z., & Retkwot, G. Z. (2013). Agricultural budgetary allocation and economic growth in Nigeria: Implications for agricultural transformation in Nigeria *Journal of Sustainable Development 10*(1), 16-27.

Pesaran, H. M., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships *Journal of Applied Econometrics 16*(3), 289-326.

Phillipe, A., & Patrick, B. (1997). A theory of trickle-down growth and development. *The Review of Economic Studies 64*(2), 151-172.

Shenggen, E., Peter, H., & Sukwu, T. (1998). Government spending growth and poverty: An analysis of interlinkages in rural India *Environmental and Production Technology Division*.

Schultz, T. W. (1953). *The economic organisation of agriculture* New York, McGraw-Hill

Shuaib, I. M., Igbinosun, F. E., & Ahmed, A. E. (2015). Impact of government agricultural expenditure on the growth of the Nigerian economy Asian Journal of Agricultural Extension, Economics and Sociology 6(1), 23-33. https://doi.org/10.9734/AJAEES/2015/15369.

Taiwo, M., & Abayomi, T. (2011). Government expenditure and economic development: Empirical evidence from Nigeria *European Journal of Business and Management 3*(9), 27-36.

Tursoy, T., & Faisal, F. (2017). Re-testing for financial integration of the Turkish Stock Market and the US Stock Market: An Evidence from cointegration and error correction models *Romanian Statistical Review 65*(2), 43-55.

Udoh, E. (2011). An examination of public expenditure, private investment and agricultural sector growth in Nigeria: Bounds testing approach. *International Journal of Business & Social Science 13*(2), 285-292.

Wang, S. L., Nehring, R., & Mosheim, R. (2018). *Agricultural Productivity Growth in the United States: 1948-2015*. Economic Research Service, U.S. Department of Agriculture (USDA) ers.usda.gov/amber-waves/2018/march/agricultural-productivity-growth-in-the-united-states-1948-2015

World Bank (2018). Nigeria is poverty capital of the world. World Bank Development Report, United States: Washington DC

World Bank (2020). Agriculture and Food. wordbank.org/en/topic/agriculture/overview