Impact of Government Expenditure on Agriculture on Agricultural Sector Output in Nigeria (1981-2018)

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Abstract: **The present study evaluated the impact of government expenditure on agriculture on agricultural sector output in Nigeria for the period 1981-2018with time series data obtained from the Central Bank of Nigeria Statistical Bulletin and Annual Reports. Agricultural value added was specified as a function of labour force, capital expenditure, recurrent expenditure, agricultural loans, average annual rainfall, interest rate and economic reforms. The Augmented Dickey-Fuller unit root test used to test for stationarity of the data reveals that the time series data were stationary at I(0) and I(1). Bound test cointegration indicates a long run relationship in the model. The result of the ARDL model technique analysis reveals that capital expenditure is positively related to agricultural output and it is also statistically significant at 5 % in the current year (*P(t) = 0.0080*). It was understood that the impact of capital expenditure on agricultural output begins to weaken after one year (*P(t) = 0.0815*). However, recurrent expenditure has a negative and insignificant impact on agricultural output (*P(t) = 0.6657*). The study recommends that governments at all levels should intensify and increase expenditure on capital items in Agriculture sector. Procurement of capital expenditure by government should be effectively monitored. This will ensure that the right and durable equipment are procured. With respect to recurrent expenditure which negates output in the agricultural output, there is need for reorganization of overhead expenditures in the sector. Close monitoring and cut of overhead spending in the agricultural should be instituted in all government agencies related to agriculture in Nigeria.**

Keywords: **Government expenditure, ARDL, Bound test, Agricultural sector Output**

I. INTRODUCTION

Government involvement in economic activities could be traced to the emergence of the Keynesian school of thought in the early 1930s. The introduction of fiscal policy as a tool of macroeconomic management brought about the use of public expenditure to achieve stability in the economy. Fiscal policy refers to the use of government spending and tax policies to influence economic conditions especially macroeconomic conditions, including aggregate demand for goods and services, employment, inflation, and economic growth. It involves government's use of its expenditure and revenue plans to achieve desirable effects while avoiding those effects that are not desirable on a nation's output, production, and employment levels.

The role of agriculture in the development of any economy can never be over emphasized. Agriculture provides food for the citizens, raw materials for the industries, employment, and income for the farmers, enhances society's well-being. Prior to the discovery of crude oil in Nigeria and even before the civil war in the late 1960s, the Nigerian economy was predominantly agricultural. The revenue from crude oil was so huge that political leaders began to shift emphasis from agriculture to mining and quarrying. In spite of the neglect of the agriculture sector, agriculture still remains the mainstay of the Nigerian economy; directly, in terms of volume of employment opportunities it offers, as the sector provides for a significant proportion of the country's employed labor force; and indirectly, through the important linkages it provides with the rest of the economy (Udoh, 2011).

Government can directly influence activities in the agricultural sector directly and indirectly using both the capital expenditure and recurrent expenditure. Capital expenditure involves expenditure on the building of feeder roads in rural areas, silos, tractors and other equipment for farmers, resulting in increased output wellbeing of lives of people in those areas. Provision of loan facilities, subsidizing of farm input and financial support to farmers would make the agricultural sector more attractive and raising entrepreneurship in agribusiness, thereby leading to positive externalities to other sectors of the economy.

Over the years, the trend of agricultural output has been on the increase over the last four decades. Average annual agricultural output between the years 1981-1991 was ₦54.86. Between the years 1992-2002, agricultural output in Nigeria has risen to ₦1321.84 in agricultural output. The average figure for agricultural value added between 2003 and 2018 was ₦13,972.92 (CBN Annual Reports various issues). However, despite this increases in Agricultural output, the problem of food insecurity and poverty continue to bemoan Nigerians. The United Nations World Poverty Clock (2018) reported that 46 percent of Nigerians live in extreme poverty. By July 2020, this figure has increased to 50 percent. This poor outcome has been attributed to erratic and inefficient public expenditure on agriculture.

The trend of government expenditure in agriculture has been erratic and fluctuating over the past three decades. between 1981 and 1990, average capital expenditure by the federal government on agriculture was ₦0.938 billion. This trend increased to ₦6.103 billion between 1991 to 2000. Average capital expenditure on agriculture for the period 2001 to 2010 was ₦ 71.14. The figure for average capital expenditure for the period 2011 to 2018 was ₦72.06 (CBN Annual Reports 2018). A look at these average figures depicts an increasing trend when one looks at it from decade to decade. However, when the figures are viewed on annual basis, the trend becomes erratic and fluctuating.

This same trend is also observable when examining the trend of recurrent expenditure during the period under study. For example, annual recurrent expenditure on agriculture between 1981 and 1998 was below ₦2billon. However, the incoming civilian administration increased the figure for recurrent expenditure on agriculture to ₦59.32billion in the year 1999. By the next three years of 2000, 2001 and 2002, recurrent expenditure on agriculture fell to ₦6.34, ₦7.06, and ₦9.99 respectively. Between 2004 and 2011, average annual recurrent spending on agriculture rose to ₦29.40. Afterwards, the trend began to decline by 2012 and began rising again to ₦36.30, ₦50.26 and ₦53.99 for by 2016, 2017 and 2018 respectively (CBN Annual Reports 2018).

From the research point of view, few studies attempted to consider breaking down government expenditure into capital and recurrent to determine their individual impact on agricultural output (Zirra & Ezie 2017) but failed to examine the long run relationship and impact of both capital and recurrent expenditures on agricultural output. This is a gap which the present study intends to explore. Another lacuna observed in previous indigenous studies is the inability of previous models in this area of study to take economic reforms (Structural Adjustment Program SAP) that occurred during the period of this study into consideration. It is the belief of the researcher that the failure to consider the effect of the economic reform while modeling the impact of government expenditure on agricultural output will lead to results that do not reflect the realities of the time involved in the study. The present study accommodates these realities in its modeling. Therefore, the objective of this is to examine the impact of federal government's expenditure on agriculture on agricultural sector output in Nigeria for the period 1981-2018.

The introductory part of this study is followed by the review of literature as presented in the second section. The methodology, along with the model specification and the estimation techniques are presented in the third section. The results of the regression analysis are presented and discussed in the fourth section, while the conclusion and recommendation are presented in the final section

II. LITERATURE REVIEW

2.1 Conceptual Literature

Agriculture is the art and science of crop and livestock production. In its broadest sense, agriculture 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. The term agro-business has been coined to include all the technologies that relates to the total inputs and outputs of the farming sector. In this light, agriculture encompasses the whole range of economic activities involved in manufacturing and distributing the industrial inputs used in farming: the farm production of crops, animals and animal products, the processing of their materials into finished products and the provision of products at a time and place demanded by consumers. Agriculture was the key development that led to the rise of human civilization, with the husbandry of domesticated animals and plants (i.e., crops) creating food surpluses that enabled the development of more densely populated and stratified societies (Ogen, 2003).

Conceptually, agriculture is the production of food, feed, fiber and other goods by the systematic growing and harvesting of plants and animals. It is the science of making use of the land to raise plants and animals. It is the simplification of natures' food webs and the rechanneling of energy for human planting and animal consumption (Olorunfemi, 2008).

Public expenditure is a core instrument of governance used to promote economic growth which is an essential ingredient for sustainable development. The role of government expenditure is very vital in every economy irrespective of the economic system in place. Government expenditure includes all expenses incurred by the government for the maintenance of itself and provision of public goods, services and works needed to foster or promote economic growth and improve the welfare of people in the society. Government (public) expenditures are generally categorized into expenditures on administration, defense, internal securities, health, education, foreign affairs, etc. and has both capital and recurrent components (Aigheyisi, 2013).

Government expenditure is a major component of national income as seen in the expenditure approach to measuring national income: $(Y = C+I+G +(X - M))$. This implies that government expenditure is a key determinant of the size of the economy and of economic growth. However, it can be used to expand the economy or deflate it. It could significantly boost aggregate output, especially in developing countries where there are massive market failures and poverty traps, and it could also have adverse consequences such as unintended inflation and boom-bust cycles (Wang and Wen, 2013). The effectiveness of government expenditure in expanding the economy and fostering rapid economic growth depends on whether it is productive or unproductive. All things being equal, productive government expenditure would have positive effect on the economy, while unproductive expenditure would have the reverse effect (Aigheyisi, 2013). Government expenditure is categorized into capital or recurrent.

Capital expenditure refers to the amount spent in the acquisition of fixed (productive) assets (whose useful life extends beyond the accounting or fiscal year), as well as expenditure incurred in the upgrade/improvement of existing fixed assets such as lands, building, roads, machines and equipment, etc., including intangible assets. Expenditure in research also falls within this component of government expenditure. Capital expenditure is usually seen as expenditure creating future benefits, as there could be some lags between when it is incurred and when it takes effect on the economy.

Recurrent expenditure on the other hand refers to expenditure on purchase of goods and services, wages and salaries, operations as well as current grants and subsidies (usually classified as transfer payments). Recurrent expenditure, excluding transfer payments, is also referred to as government final consumption expenditure. The annual budget spells out the direction of the expected expenditure, as it contains details of the proposed expenditure for each year, though the actual expenditures may differ from the budget figures due, for example, to extra-budgetary expenditures or allocations during the course of the fiscal year (Aigheyisi, 2013).

2.2 Theoretical Literature

The Keynesian school of thought suggests that government spending can contribute positively to sectorial growth (like the agricultural sector) in the economy. Thus, an increase in government expenditure is likely to lead to an increase in employment, profitability and investment through multiplier effects of agricultural growth on aggregate demand. Consequently, government expenditure increases the aggregate demand which brings about an increased output depending on expenditure multipliers. Keynes regards public expenditures as an exogenous factor which can be utilized as a policy instruments to promote growth.

The neoclassical growth model serves as the theoretical foundation of the study credit to Solow (1956) and Swan (1956). This theory states that output (growth) is a function of capital stock and labour given the state of technology. This technology is a factor which is improved upon by investment in research, education and training. The result is meant to improve the capital stock and the quality of labour force.

The Solow model focuses on a closed economy where output Q is produced by the factors labour, L, technology, A and capital, K. The production function takes the form:

$$Q_t = Af(K_t, L_t) \quad .(1)$$

where t denotes time. The critical assumption of the production function is that it shows constant returns to scale; Solow (1956) departs here from the classical assumption of scarce land or any non-augmentable resources. Romer (1986) interprets the assumption of constant returns to imply that the economy under consideration is big enough that the gains from specialization have been exhausted. Technically speaking, the neoclassical production function is homogenous of degree one and implies that both factors must be available, or else output would equal zero (i.e. the economy would not exist). The function allows for an unlimited substitutability between capital and labour, which means that to produce any given output, any amount of capital can be efficiently used with the appropriate amount of labour. To make this model amenable for this present study, we embark on a model specification which specifies agricultural output as a function of agricultural expenditure and other factors that spur growth

A review of current empirical studies in this area of though is imperative. Okorie, Osabuohien & Oaikhenan (2020) examine the effects of electricity consumption and government agricultural spending on agricultural output (AGOP) in Nigeria for the period 1981 to 2017. The Philip Peron’s unit root test showed that the time series data were not stationary at levels. The ARDL result shows that poor electricity supply has significantly retarded the level of agricultural output in Nigeria while public agricultural spending indicates a weak positive lag effect on agricultural sector performance. Osabohien, Adeleye, & De Alwis, (2020) used cointegration equations to examine the impact of agro-financing impacts on food production in Nigeria for the period 1981–2018. After testing the time series data for stationarity, the Canonical Cointegration regression approaches show that agro-financing is statistically significant in explaining the level of food production in Nigeria. One percent increase in farmers' access to agricultural finance is associated with an increase in food production by 0.002%–0.006%.

The study by Apata (2019) investigates the drivers of public-spending policy mechanisms that accounts for growth in the agricultural sector output in Nigeria and China using time series data for the period 1970-2016. The result of the of the Random-effects model shows that that the policy of public-expenditure (PUEXP) and intervention (INTEV) variables were significant but negative for Nigeria, while the variables were significant and positive for China. De & Dkhar, (2018) examine the short and long run relationship between government expenditure on agriculture and its allied sector and agricultural output of Meghalaya for the period 1984-85 to 2013-14. Bound test cointegration was used to test for long run relationship. The result of the ARDL estimation shows that reveals that in the long run, the effect of public expenditure through agriculture and allied activities, on agricultural output is significantly negative, while expenditures on education and transport on agricultural output are significantly positive.

Aina, & Omojola, (2017) examined the impact of government expenditure on agricultural sector performance in Nigeria for the period 1980 and 2013 using secondary data from the Central Bank of Nigeria Statistical bulletin . The result of the Error correction modeling shows that there is a significant and positive relationship between government expenditure on agriculture and agricultural production output. Iganiga & Unemhilin (2011) examine the effect of Federal government agricultural expenditure on the value of agricultural output. Co-integration and Error Correction methodology were used to analyze data. Result shows that Federal government capital expenditure is positively related to agricultural output. With a one-year lag period, it shows that the impact of government expenditure on agriculture is not instantaneous

Udoh (2011) estimates the relationship between public expenditure, private investment and agricultural output growth in Nigeria over the period 1970-2008. The bounds test and Autoregressive distributed lag (ARDL) modeling approach was used to analyze both short- and long-run impacts of public expenditure, private investment on agricultural output growth in Nigeria. Results of the error correction model show that increase in public expenditure has a positive influence on the growth of the agricultural output. Zirra & Ezie (2017) examines Government fiscal policy and Agricultural sector outputs in Nigeria between 1995 and 2014 using Fully Modified Ordinary Least Square (FMOLS) regression method. Findings from the study show that recurrent expenditure on agriculture is positive and statistically significant, while capital

III. METHODOLOGY

This research adopts the *Ex-Post Facto* research design. The study employed secondary annual time series data obtained from the Central Bank of Nigeria Statistical Bulletin for the period 1981-2018.

3.1 Unit Root test for Stationarity

The preliminary test for stationarity is done using the Augmented Dickey fuller Unit root test. The ADF equation is stated below:

$$\Delta y_t = \delta y_{t-1} + \sum_{i=1}^{P} \alpha i \Delta y_{t-i} + \mu_t \quad (1)$$

The testing procedure follows an examination of the student-t ratio for δ. The critical values of the test are all negative and larger in absolute terms than standard critical t-values, so they are called ADF statistics. If the null hypothesis cannot be rejected then the series Y_t cannot be stationary. The decision rule is to reject Ho, if the absolute ADF t-statistic > 5% critical values. If otherwise, accept Ho. Having determined the nature and stationarity of the time series data, the study checked if a long run relationship exists among the variables. . The Bound Test cointegration technique was used for this purpose

3.2 Bounds Test/Autoregressive Distributed lagged Model

The study uses the autoregressive distributed lag (ARDL) Bound testing procedure to examine the cointegration (long run) relationship between the dependent variables and the explanatory variables, as well as the short run dynamics. This method is preferred to Engle-Granger and Johansen techniques method of cointegration, (Pesaran, Shin & Smith, 2001). In this method, an F-test of the joint significance of the coefficients of the lagged levels of the variables is used to test the hypothesis of no cointegration among the variables against the presence of cointegration among the variables. The F-test has a nonstandard distribution irrespective of whether the variables are 1(0) or 1(1). Pesaran et al. (2001) put forward two sets of adjusted critical values that provide the lower and upper bounds used for inference. One set assumes that all variables are 1(0) and the other assumes that they are all 1(1). If the computed F-statistics falls above the upper bound critical value, then the null of no cointegration is rejected. If it falls below the lower bound, then the null cannot be rejected. Finally, if it falls between the lower and upper bound, then the result would be inconclusive, estimation could go on as long as the variables are I(0) and I(1) variables (Ilyas, Hafiz, Afzal & Tahir, 2010). Having determined the existence of cointegration, the Autoregressive distributed lagged model is used to estimate the regression coefficients.

3.3 Model Specification

Going by the literature review, the study adopted Iganiga & Unemhilin (2011) model as specified below:

$$Q = AGVA = f(H) = f(CEXA, RECA, AGLNS, AAR, MPR,) \quad (2)$$

Where, AGVA = agricultural output, CEXA = capital expenditure on agriculture, REXA, recurrent expenditure on agriculture, AGLNS = agricultural loans to farmers, AAR, Average annual rainfall, MPR = interest rate,

Assuming, a labour intensive production function, have:

$$AGVA = f(LAB, CEXA, RECA, AGLNS, AAR, MPR,) \quad (3)$$

To accommodate economic reforms on the modeling, a dummy variable (DO1) is added in equation 3 above, the new model is specified as follows:

$$AGVA = f(LAB, CEXA, RECA, AGLNS, AAR, MPR, DOI) \quad (4)$$

Taking logarithm of both sides, the stochastic model is expressed as follows:

$$LAGVA_t = \beta_0 + \beta_1 LLAB_t + \beta_2 LCEXA_t + \beta_3 LREXA_t + \beta_4 LAGLNS_t + \beta_5 AAR_t + \beta_6 MPR_t + \beta_7 DO1_t + \mu_t \quad (5)$$

Where:

LAGVA = log of Agriculture output (dependent variable)

The independent variables are: LLAB = Log of labour force, LCEXA = Log of capital expenditure in Agriculture, LREXA = Log of recurrent expenditure in Agriculture

LAGLNS = Log of agriculture loans to farmers, AAR = Average Annual rainfall

MPR = Interest Rate, D01 = dummy variable for economic reform. D = 1 for period of deregulation, (1986-2019), D=0 period of regulation (1981-1985)

β_0= Constant., β_1, β_2, β_3, $\beta_{4:}$ $\beta_{5:}$ $\beta_{6:}$ are the relative slope coefficients and partial elasticity of the parameters, μt = stochastic error term

A priori expectations:

$f^1\beta_1 > 0$, $f^1\beta_2 > 0$, $f^1\beta_3 > 0$, $f^1\beta_4 > 0$, $f^1\beta_5 > 0$, $f^1\beta_6 < 0$, $f^1\beta_7 > 0$

However, with the assumption of cointegration of the variables in Eqn. 5, the short run dynamics of the autoregressive distributed lag model (ARDL) is therefore specified in equation 6.

$$\Delta AVGA_t = \alpha_0 + \alpha_{1i}\sum_{i=1}^{q}\Delta AVGA_{t-i} + \alpha_{2i}\sum_{i=0}^{q}\Delta LLAB_{t-i} + \alpha_{3i}\sum_{i=0}^{q}\Delta LCEXA_{t-i} + \alpha_{4i}\sum_{i=0}^{q}\Delta LREXA_{t-i} + \alpha_{5i}\sum_{i=0}^{q}\Delta LAGLNS_{t-i} + \alpha_{i6}\sum_{i=0}^{q}\Delta AAR_{t-i} + \alpha_{i6}\sum_{i=0}^{q}\Delta MPR_{t-i} + \alpha_{7i}\sum_{i=0}^{q}\Delta DO1_{t-i} + \varphi ECM_{t-1} + \mu_t \quad (6)$$

φ = error correction coefficient (speed of adjustment from the short run to the long run equilibrium after a shock). The researcher employed the use of Eviews 9.0 Econometric software for the data analysis. This choice is because of the availability of ARDL tool in the software.

IV. RESULTS AND DISCUSSIONS

The result of the unit root test of stationarity is presented in Table 4.1

Table 4.1: Result of ADF Unit Root Test of the variables

	Levels		*First Difference*		
Variables	*ADF test statistic*	*5% critical values*	*ADF test statistics*	*5% critical values*	*Order of integration*
LAGVA	-1.968344	-2.943427	-3.886221	-2.945842	I(1)
LLAB	-3.344703	-2.943427	-	-	I(0)
LCEXA	-0.539035	-2.948404	-7.432402	-2.948404	I(1)
LREXA	-2.010390	-2.948404	-8.443264	-2.945842	I(1)
LAGLNS	-0.990572	-2.943427	-5.421275	-2.945842	I(1)
AAR	-3.156088	-2.943427	-`	-	I(0)
MPR	-3.212879	-2.943427	-	-	I(0)

Source: Eviews 9 Output for the Result of ADF unit root test of the variables

The result in Table 4.1 shows that the time series variable are either stationary at levels or at first difference. Agriculture value added (LAGVA), capital expenditure (LCEXA), recurrent expenditure (LREXA), and agricultural loans (LAGLNS) were all stationary at first difference, I(1). However, labour force (LLAB), Average annual rainfall (AAR) and interest rate (MPR) are stationary at level, I(0).

The lag length for the autoregressive distributed lag model of objective one was done using Akaike Information. The study selected maximum lag lengths of 6 and 8 for the dependent and independent variables respectively, which produced Autoregressive Distributed Lag (ARDL) model presented in figure 4.1. The result of the lag length selection showed that after 20 evaluations, the selected ARDL (3, 3, 2, 3, 3, 3, 2, 2) has the minimum information (3.10) based on AIC.

Bound Test Cointegration

Table 4.2: Result of Bound test: Null hypothesis: No long run relationship exists

Test Statistic	Value	K	Bound Test	
			Lower bound	upper bound
F-statistic	8.251666	*7*	*2.32*	*3.5*

Source: Eviews 9 Output for the Result of bound test (cointegration of the variables)

Table 4.2 presents the result of Bound Cointegration test. The result shows that the value of F-statistic (8.251666) exceeds the upper bound and lower bound values of Pesaran test statistic at 5% level of significance. This is an indication that there is long run association among the variables in the model.

Table 4.3: Result of ARDL Model Estimation:

ARDL Cointegrating And Long Run Form				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAGVA(-1))	0.389473	0.116778	3.335169	0.0157
D(LAGVA(-2))	0.197609	0.139808	1.413434	0.2072
D(LLAB)	-2.157273	0.956458	-2.255482	0.0650
D(LLAB(-1))	-4.194002	1.252738	-3.347869	0.0155
D(LLAB(-2))	3.415828	1.468026	2.326818	0.0589
D(LCEXA)	0.139355	0.035791	3.893560	0.0080
D(LCEXA(-1))	0.094633	0.045267	2.090545	0.0815
D(LREXA)	-0.014733	0.032438	-0.454173	0.6657
D(LREXA(-1))	-0.014477	0.041966	-0.344972	0.7419
D(LREXA(-2))	-0.174965	0.039213	-4.461923	0.0043
D(LAGLNS)	-0.088409	0.043895	-2.014098	0.0906
D(LAGLNS(-1))	0.097929	0.047925	2.043391	0.0870
D(LAGLNS(-2))	-0.208310	0.046557	-4.474316	0.0042
D(AAR)	0.005199	0.002555	2.034922	0.0881
D(AAR(-1))	0.003491	0.002259	1.545409	0.1732
D(AAR(-2))	-0.005690	0.003311	-1.718371	0.1365
D(MPR)	0.004203	0.010760	0.390647	0.7096
D(MPR(-1))	-0.017888	0.005603	-3.192626	0.0188
D(DO1)	0.554584	0.121180	4.576547	0.0038
D(DO1(-1))	0.376182	0.159199	2.362971	0.0561

CointEq(-1)	-0.238904	0.092818	-2.573911	0.0421
Cointeq = LAGVA - (-5.5930*LLAB + 0.1313*LCEXA + 0.9016*LREXA +				
0.5061*LAGLNS + 0.0140*AAR + 0.0750*MPR -0.1999*DO1 + 95.2079)				

The result of the short run coefficients is presented in Table 4.3. The lagged value of agriculture value added (LAGVA) was positive and statistically significant (*P(t) = 0.157*) after the first year. Labour force, (LLAB) was negatively related to agricultural value added, but not statistically significant (*P(t) = 0.157*) 5 per cent, however, it became significant after the first year (*P(t) = 0.0155*). This outcome of the labour force may not not meet economic expectations, since labour is expected to impact positively on agriculture directly. The reason is because the effort of labour manifested in the agricultural yield after harvest, which usually takes up to one year. The result indicates that an increase in one unit of labour leads to a decline of 2.16 units of output in the current year. This means that marginal productivity of labour is declining.

The relationship between capital expenditure (LCEXA) and agricultural output is positive and statistically significant in the current year (*P(t) = 0.0080*) at 5 per cent. This means that one unit increase in capital expenditure leads to 0.14 per cent increase in agricultural output. At the end of one year, the impact of capital expenditure on agricultural output begins to wear off as the probability of the t-statistic becomes weakly significant (*P(t) = 0.0815*). The result shows that the effect of the capital expenditure begins to wear off by the second year. Udoh (2011) and Iganiga & Unemhilin (2011) agree with the present study that that increase in public expenditure has a positive influence on the growth of the agricultural output.

The relationship between recurrent expenditure and agricultural output is negative and not statistically significant (*P(t) = 0.6657*) at 5 per cent at the current year. One unit increase in recurrent expenditure leads to 0.015 unit decline in agricultural output over the period under study. The present finding is corroborated by Apata (2019), De & Dkhar, (2018) revealed that the policy of public-expenditure (PUEXP) variables were significant but negative in determining agricultural GDP.

Agricultural loans is negative but weakly significant in determining agricultural output in the current year (*P(t) = 0.0906*). One per cent increase in agricultural loans lead to 0.09 percent decrease in agricultural output. As a result, the outcome of the impact of the agricultural loans becomes negative and significant after one year lag (*P(t) = 0.0042*). The implication of this finding is that the loans for agriculture are not directed for agricultural purposes but for other means. This outcome is in contrast with the study by Osabohien, Adeleye, & De Alwis, (2020) which reveals that agro-financing is statistically significant in explaining the level of food production in Nigeria.

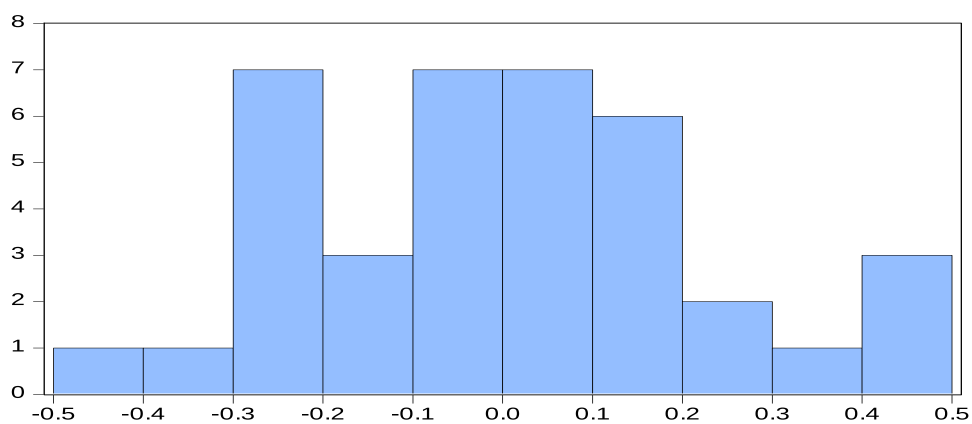
The relationship between average annual rainfall and agricultural output is positive as expected, but it was not statistically significant (*P(t) = 0.0881*) at 5 percent in the current year. Interest rate (MPR) was positive and not statistically significant (*P(t) = 0.7096*)at the current year. However, the behavior conforms to *a priori* expectations and became statistically significant after one year (*P(t) = 0.0188*). The dummy variable for economic reforms (SAP) is positive and statistically significant at the current year (*P(t) = 0.0038*), and even after the first year lag (*P(t) = 0.0561*). The error correction term satisfies economic expectations. It is negatively signed and statistically significant at 5 per cent. The ECM term shows that 23.89 percent of shocks within the system is corrected with one year by the economy.

In the long run results of the ARDL, none of the explanatory variables are statistically significant at 5 percent. This could be justified and attributed to the fact that agricultural output in Nigeria mainly consists of perishable commodities which are usually harvested and consumed within the shortest possible time.

Post Estimation Test

Normality Test

Normality test is essential to ascertain the distribution of the data set in the model. It could be seen in figure 4.2 that the null hypothesis that the variables are normally distributed is to be rejected since the probability value of Jarque-Bera is greater than 0.05, at 0.864355 This means that the variables follow normal distribution.



Series: Residuals	
Sample 1981 2018	
Observations 38	
Mean	-1.23e-14
Median	-0.005839
Maximum	0.488228
Minimum	-0.475439
Std. Dev.	0.218869
Skewness	0.179853
Kurtosis	2.766024
Jarque-Bera	0.291544
Probability	0.864355

Serial Correlation LM test of the selected ARDL Model

Table 4.4 Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	3.910295	Prob. F(2,4)	0.1145
Obs*R-squared	23.15626	Prob. Chi-Square(2)	0.0000

Serial correlation test was conducted using the Breusch-Pagan Serial correlation LM test. From table 4.4 above, it can be seen that the probability Chi-Square (*0.000*) is less than 0.05 at 5% significant level. We conclude that the residual in our short-run ADRL model is serially correlated.

Heteroscedasticity Test:

This test was conducted using the Breusch-Pagan LM test. The result of table 4.5 shows that the probability of the Obs*R-square (*0.5635*) is greater than 0.05. In that, we do not reject the null hypothesis of homoscedasticity or constant variance of the residual.

Table 4.5: Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.771691	Prob. F(7,30)	0.6154
Obs*R-squared	5.798281	Prob. Chi-Square(7)	0.5635
Scaled explained SS	3.161172	Prob. Chi-Square(7)	0.8697

Stability Diagnostic Test

Stability of the short run model was tested using CUSUM test and CUSUM of Squares test. The idea behind this test is to reject the hypothesis of model stability if the blue line lies outside the dotted red lines otherwise, the model is said to be stable. The result of this test is presented in figure 4.3a and 4.3b. The result of the CUSUM and CUSUM square test shows that the blue lines lies inside the dotted red line which indicates that the model is dynamically stable.

Test for Model Specification

Table 4.6 Ramsey RESET Test			
Equation: UNTITLED			
Omitted Variables: Squares of fitted values			
	Value	Df	Probability
t-statistic	1.116806	29	0.2732
F-statistic	1.247255	(1, 29)	0.2732
Likelihood ratio	1.600165	1	0.2059

This test is a specification test that helps to check if the model estimated was correctly specified. It makes use of F-statistic and the null hypothesis is that the model was correctly specified. This is to be rejected if the probability value of F-statistic is less than 0.05. Otherwise, the null hypothesis is not to be rejected. Table 4.6 shows that the probability value of F-statistic is greater than 0.05 indicating that the null hypothesis is not to be rejected at 0.05 levels. This implies that the model estimated was correctly specified.

V. CONCLUSION AND RECOMMENDATIONS

Government expenditure on agriculture is expected to be productive and boost agricultural output towards the eradication of hunger and poverty in developed economies. However, empirical studies have shown that most public expenditures (capital and recurrent) on this sector have been unproductive in many countries. The present study evaluates the impact of government expenditure on agriculture in Nigeria for the period 1981-2018. After examining the time series data for stationarity, the variables were found to be I(0) and I(1), hence the use of Bound test cointegration to test for long run relationship in the model. The result of the ARDL reveals that capital expenditure is positively related to agricultural output and it is also statistically significant at 5 % in the current year. One unit increase in capital expenditure leads to 0.14 per cent increase in agricultural output. This implies that capital expenditure on agriculture is highly productive towards growth in agricultural output. Therefore increased capital expenditure on agriculture by the government will lead to increased agricultural output. From the result, it was understood that the impact of capital expenditure on agricultural output begins to weaken after one year. This could suggest that physical assets used for agricultural activities may be depreciating faster, thus, the productivity of these assets declines after a short period. Therefore, there is need for increased attention to maintenance culture of assets and innovation of machines used in agriculture locally by farmers. However, recurrent expenditure has a negative and insignificant impact on agricultural output. This could suggest that funds meant for agriculture may have been diverted to other areas that are not productive.

The overall conclusion in this study is that capital expenditure has a positive and significant impact on agricultural sector output, while recurrent expenditure has negative and insignificant impact on agricultural output over the period under study. Since the impact of capital expenditure seems to weaken after a short period, the study recommends that governments at all levels should intensify and increase expenditure on capital items in Agriculture sector. Procurement of capital expenditure by government should be effectively monitored by relevant authorities to ensure efficiency and effectiveness. To do this, it should be ensured that the right and durable equipment are procured for farming purposes. With respect to recurrent expenditure which negates output in the agricultural output, there is need for reorganization of overhead expenditures in the sector. Close monitoring and cut of overhead spending in the agricultural should be instituted in all government agencies related to agriculture in Nigeria.

REFERENCES

[1] Aigheyisi, O. S. (2013). The relative impacts of federal capital and recurrent expenditures on Nigeria's Economy (1980-2011). *American Journal of Economics* 3(5), 210-221.

[2] Aina, G. O. & Omojola, J.T. (2017). Assessment of the Effect of Government Expenditure on

[3] Agricultural Output in Nigeria (1980-2013), *International Journal of Innovative Agriculture & Biology Research*, 5(4), 1-7

[4] Apata, T. G. (2019). Public spending mechanisms and gross domestic product (GDP) growth

[5] in the agricultural sector (1970–2016): Lessons for Nigeria from agricultural policy progressions in China, *Bulletin of Geography. Socio-economic Series*, 44(44), 57-72. DOI: http://doi.org/10.2478/bog-2019-0015.

[6] CBN Annual Reports various issues

[7] De, U. K. & Dkhar, D. S. (2018). Public Expenditure and Agricultural Production in

[8] Meghalaya, India: An Application of Bounds Testing Approach to Co-Integration and Error Correction Model, *International Journal of Environmental Sciences and Natural Resources*, 8(2), 71-78

[9] Iganiga, B. O. & Unemhilin, D. O. (2011). The Impact of Federal Government Agricultural

[10] Expenditure on Agricultural Output in Nigeria, *Kamla-Raj Journal of Economics*, 2(2), 81-88

[11] Ilyas, M., Hafiz, K. A., Afzal, M. & Tahir, M., (2010) Determinants of manufacturing value

[12] added in Pakistan: an application of bounds testing approach to cointegration, *Pakistan Economic and Social Review*, 48(2)209-223

[13] Ogen, O. (2003). Patterns of Economic Growth and Development in Nigeria since

[14] 1960 in S. O. Arifalo and Gboyega Ajayi (eds.), *Essays in Nigerian Contemporary History*. Lagos: First Academic Publishers

[15] Okorie, U. E., Osabuohien, E. S., & Oaikhenan, H. E. (2020). Electricity Consumption,

[16] Public Agricultural Expenditure and Output in Nigeria: A Time Series Dynamic Approach, *International Journal of Energy Economics and Policy*, 10(2), 113-123.

[17] Olorunfemi, S. (2008). Public Investment and Economic Growth in Nigeria: An Autoregressive model, *Journal of international Finance and Economics*, 8(2),

[18] Osabohien, R., Adeleye, N. & De Alwis, T. (2020). Agro-financing and food production in Nigeria, *Heliyon* 6, e04001. doi.org/10.1016/j.heliyon.2020.e04001

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

[20] Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70(1) 65-94.

[21] Swan T. (1956). Economic Growth and Capital Accumulation. *Economic Record* 32 (63), 334-361.

[22] Udoh, E. (2011) An examination of Public Expenditure, Private investment and Agricultural

[23] Sector Growth in Nigeria: Bounds Testing Approach, *International Journal of Business and Social Science*, 2(13), 285-292.

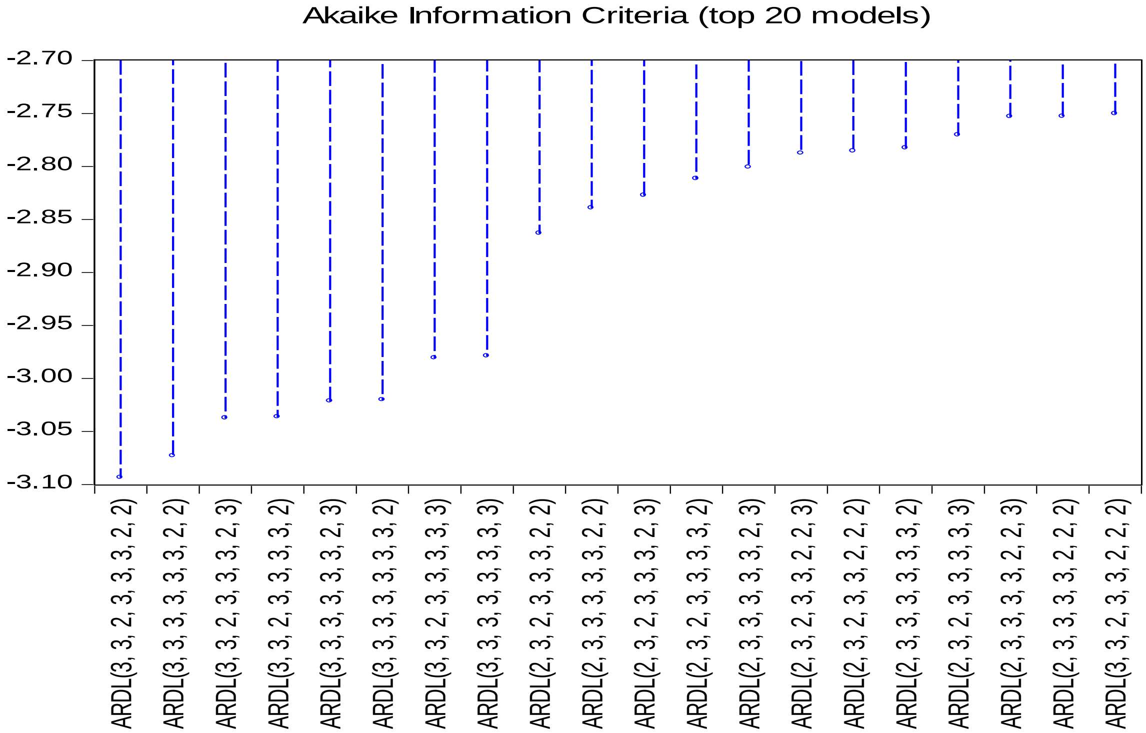
[24] Zirra, C. T. O. & Ezie, O. (2017). Government Fiscal Policy and Agricultural Sector Outputs

[25] in Nigeria: Evidence from Fully Modified Ordinary Least Square (FMOLS), *Journal of Research in Business, Economics and Management*, 8(2), 1434-1440

[26] Wang X. and Wen,Y. (2013). Is Government Spending a Free Lunch?—

[27] Evidence from China‖, Research Division, *Federal Reserve Bank of St Louis*, Working Paper Series, 2013-013A, 2013 [Online]. Available: http:// research. stlouisfed. org/ wp / 2013/2013-013.pdf

APPENDIX



ARDL Cointegrating And Long Run Form				
Dependent Variable: LAGVA				
Selected Model: ARDL(3, 3, 2, 3, 3, 3, 2, 2)				
Date: 08/16/20 Time: 12:59				
Sample: 1981 2018				
Included observations: 35				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAGVA(-1))	0.389473	0.116778	3.335169	0.0157
D(LAGVA(-2))	0.197609	0.139808	1.413434	0.2072
D(LLAB)	-2.157273	0.956458	-2.255482	0.0650
D(LLAB(-1))	-4.194002	1.252738	-3.347869	0.0155
D(LLAB(-2))	3.415828	1.468026	2.326818	0.0589
D(LCEXA)	0.139355	0.035791	3.893560	0.0080
D(LCEXA(-1))	0.094633	0.045267	2.090545	0.0815
D(LREXA)	-0.014733	0.032438	-0.454173	0.6657
D(LREXA(-1))	-0.014477	0.041966	-0.344972	0.7419

D(LREXA(-2))	-0.174965	0.039213	-4.461923	0.0043
D(LAGLNS)	-0.088409	0.043895	-2.014098	0.0906
D(LAGLNS(-1))	0.097929	0.047925	2.043391	0.0870
D(LAGLNS(-2))	-0.208310	0.046557	-4.474316	0.0042
D(AAR)	0.005199	0.002555	2.034922	0.0881
D(AAR(-1))	0.003491	0.002259	1.545409	0.1732
D(AAR(-2))	-0.005690	0.003311	-1.718371	0.1365
D(MPR)	0.004203	0.010760	0.390647	0.7096
D(MPR(-1))	-0.017888	0.005603	-3.192626	0.0188
D(DO1)	0.554584	0.121180	4.576547	0.0038
D(DO1(-1))	0.376182	0.159199	2.362971	0.0561
CointEq(-1)	-0.238904	0.092818	-2.573911	0.0421
Cointeq = LAGVA - (-5.5930*LLAB + 0.1313*LCEXA + 0.9016*LREXA +				
0.5061*LAGLNS + 0.0140*AAR + 0.0750*MPR -0.1999*DO1 + 95.2079)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLAB	-5.592953	7.288302	-0.767388	0.4720
LCEXA	0.131347	0.424654	0.309305	0.7675
LREXA	0.901562	0.665958	1.353782	0.2246
LAGLNS	0.506104	0.426250	1.187342	0.2800
AAR	0.014037	0.034555	0.406214	0.6987
MPR	0.075000	0.063212	1.186480	0.2803
DO1	-0.199862	1.038502	-0.192452	0.8537
C	95.207860	120.825661	0.787977	0.4607

BOUNDS TEST

ARDL Bounds Test				
Date: 08/16/20 Time: 12:58				
Sample: 1984 2018				
Included observations: 35				
Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	k		
F-statistic	8.251666	7		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	2.03	3.13		
5%	2.32	3.5		
2.5%	2.6	3.84		
1%	2.96	4.26		
Test Equation:				
Dependent Variable: D(LAGVA)				
Method: Least Squares				
Date: 08/16/20 Time: 12:58				
Sample: 1984 2018				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAGVA(-1))	0.389473	0.116778	3.335169	0.0157
D(LAGVA(-2))	0.197609	0.139808	1.413435	0.2072
D(LLAB)	-2.157273	0.956458	-2.255482	0.0650
D(LLAB(-1))	-0.778174	1.374285	-0.566239	0.5918
D(LLAB(-2))	3.415828	1.468026	2.326818	0.0589
D(LCEXA)	0.139355	0.035791	3.893560	0.0080
D(LCEXA(-1))	0.094633	0.045267	2.090545	0.0815

D(LREXA)	-0.014733	0.032438	-0.454173	0.6657
D(LREXA(-1))	-0.189442	0.072035	-2.629862	0.0391
D(LREXA(-2))	-0.174965	0.039213	-4.461923	0.0043
D(LAGLNS)	-0.088409	0.043895	-2.014098	0.0906
D(LAGLNS(-1))	-0.110381	0.048522	-2.274850	0.0632
D(LAGLNS(-2))	-0.208310	0.046557	-4.474316	0.0042
D(AAR)	0.005199	0.002555	2.034922	0.0881
D(AAR(-1))	-0.002199	0.004606	-0.477442	0.6499
D(AAR(-2))	-0.005690	0.003311	-1.718371	0.1365
D(MPR)	0.004203	0.010760	0.390647	0.7096
D(MPR(-1))	-0.017888	0.005603	-3.192626	0.0188
D(DO1)	0.554584	0.121180	4.576547	0.0038
D(DO1(-1))	0.376182	0.159199	2.362971	0.0561
C	22.74557	21.35157	1.065288	0.3277
LLAB(-1)	-1.336181	1.300005	-1.027827	0.3437
LCEXA(-1)	0.031379	0.105977	0.296096	0.7771
LREXA(-1)	0.215387	0.111486	1.931964	0.1016
LAGLNS(-1)	0.120910	0.073956	1.634902	0.1532
AAR(-1)	0.003353	0.007936	0.422544	0.6874
MPR(-1)	0.017918	0.013150	1.362571	0.2219
DO1(-1)	-0.047748	0.245122	-0.194792	0.8520
LAGVA(-1)	-0.238904	0.092818	-2.573911	0.0421
R-squared	0.980477	Mean dependent var		0.201362
Adjusted R-squared	0.889372	S.D. dependent var		0.163388
S.E. of regression	0.054344	Akaike info criterion		-3.093399
Sum squared resid	0.017720	Schwarz criterion		-1.804682
Log likelihood	83.13448	Hannan-Quinn criter.		-2.648534
F-statistic	10.76199	Durbin-Watson stat		2.589957
Prob(F-statistic)	0.003444			