Impact of Government Finance on the Growth of Agricultural Sector in Nigeria

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Abstract
This paper empirically analyzed the impact of government finance on the growth of agricultural sector in Nigeria. The relevant time series data for the study were obtained from secondary sources. The data ranged from 1981 to 2020 and Augmented Dickey fuller (ADF) test was deployed to test their stationarity. The study further uses the newly developed autoregressive distributed lag. (ARDL) bounds testing approach to cointegration for the estimation of the short run dynamics. The results show that government expenditure on agriculture in Nigeria affects agricultural output positively. As such, the government of Nigeria should make more budgetary allocation towards agricultural sector. This will help increase agricultural output and hence agricultural growth.

Keywords: *Expenditure on agriculture, bound test, autoregressive distributed lag. (ARDL), agricultural output*

1. Introduction

Nigerian economy is basically agrarian, over 70 percent of the labour force are employed in agriculture. The policies and strategies geared towards the development of the sector over the years have been informed by the belief that the development of agriculture is necessary for the overall growth and development of the economy. Moreover, the development of the sector is informed by the contribution of the sector to the growth of the economy. The sector provides livelihood directly and indirectly to a significant portion of the population especially in rural areas, raw materials for the growing industrial sector, increasing public revenue and foreign exchange for the financing of external demands of the economy and employment opportunities for an expanding labour force. This understanding contribution constituted the planning and design of programmes and projects to ensure growth in the sector.

Traditional agriculture dominates Nigerian agricultural practices. Production is carried out by primitive and rudimentary farming equipment like cutlasses, hoes and axes. The farmers practiced different systems of cultivation such as shifting cultivation, bush fallowing, permanent cultivation based on manuring and rudimentary crop rotation. Farm holding are small and scattered. Land is often communally owned and the claim of a traditional peasant farmer to any farmland derives from his mentorship of a land-holding group. The leadership of the land-holding allocates a small portion of the land to a peasant-cultivator member of the group. The farmers themselves are poor, illiterate and ignorant. They lack organization. Even the commercial agriculture which arose out of the need to improve the level of welfare of the peasant farmers and with the introduction of export crops which was facilitated by the modern exchange economy also suffers from poor performance. The production technique involves a widespread use of crude technology like hoes, cutlasses and other simple hand tools. The use of improved inputs such as chemical fertilizers, better crop varieties are extremely limited.

Consequently, productivity and output are very low. The farmers themselves are in the vicious circle of poverty. Low productivity leads to low income and this means a small capacity to save and this in turn results in little capital formation to meet the farmer‘s daily needs. This state of affairs aroused interest of some policy analysts and development experts. They

therefore, called for public sector or private sector investment to halt the decline and stimulate the development of the sector. For instance, Obadan (1993) argued that the state cannot act as a passive spectator that it must play a positive role, if the economy including agricultural sector is to move on a desired path. Also, Idachaba (1995), called for a balanced development of all the sectors of the economy with particular emphasis of ensuring food security for all Nigerians.

1.2 Statement of the Problem

Finance plays a major role in any business organization. In agriculture, finance enables farmers to advantageously use inputs and factors of production by granting farmers more access to resources through the removal of financial constraints. Finance is an important instrument that enables farmers to acquire commands over the use of working capital, fixed capital and consumptions goods (Sidedigi, 2004). Timely availability of agricultural finance enable farmers to purchase the required inputs and machinery for carrying out farm operations (Saboor, 2009). Utuk (2007), opines that the availability of finance guarantee adequate provision of farm inputs, adoption of improved agricultural practices and programme for the introduction of improved agricultural implement to enhance increased agricultural output by farmers.

In addition, Mbutor et al (2013) maintain that in agriculture, finance remains the bedrock for mechanization-the purchase of machinery, the training to use machinery, the transportation of equipment and produce, the marketing of produce, all is made possible by the availability of finance. Furthermore, Ammani (2012) opines that farmers instead of growing low yielding local crops, for example, access to capital may allow an increased use of improved seeds and fertilizers leading to higher crop output or unit of labour and land. This may in turn encourages the adoption of labour – saving technologies, such as animal traction in crop production (Zeller, 1999). Carter (1989) argued that finance could lead to efficient resource allocation, increase farmers technical efficiency and by implication, increase farmers profitability. Qureshi et al (1996) observed that an increase in finance to agriculture will lead to increase food production and farmers‘ income because as the demands for finance increases, farmers output also increase, resulting in improvement in their well being.

Agriculture has often been seen as a risky venture in which the returns are slow and the profit levels low. The injection of significant amount of capital into agriculture has been seen as the responsibility of government (Nwosu 1995). Thus public expenditure finance of agriculture has become a prime policy instrument for promoting development in the agricultural sector. In agriculture, government makes financial allocations to agricultural education, extension and research, subsidization of modern inputs (e.g. fertilizers, pesticides, irrigation, improved seeds) and the establishment of production and marketing infrastructure (e.g. rural feeder roads, water, electricity and storage facilities). The specific instruments of public finance employed by government include government investment, agricultural credit, subsides and capital transfers to enterprises, government stock changes and current production of goods and services (Nwosu, 1995). Hence, in this study attention will be focused on the public sector finances because of its numerous contribution and support to the agricultural sector. The main aim is to empirically examine the impact of government finance on the growth of agricultural sector in Nigeria.

2. Conceptual issues and theoretical framework

Finance has been the focus of many studies in agriculture. Ogwumike and Ozughalu (2014) posit that it is seen by many researchers as a major ingredient in agricultural production. The smallholder farmers who is trapped in the vicious cycle of poverty requires not only labour or land but also an injection of adequate financial capital to extricate him from the poverty cycle (Olowa and Olowa, 2011). Ogunmike and Ozughalu further opine that credit can affect farmers choice to crops. When farmers have no access to credit, they are more likely to grow crops that have lower climate risks or require less investment capital.

Moreover, it has been stressed by development experts that agricultural surplus is important for the structural transformation accompanying economic growth (Moody, 1981). This is based on the view that the agricultural sector should transfer to the non-agricultural sector the surpluses of investible resources generated in agriculture (Kuznets, 1961). On this basis it is suggested that developing countries must extract resources from agriculture for successful industrial development (Ohkawa and Rosovsky 1996, Johnstone and Kilby, 1975).

According to Mbutor, Ochu and Okafor (2013), finance to the agricultural sector remains costly and inequitably distributed and this limits the ability to small-scale farmers to grow their productivity. Nyoro (2002) also opines that lack of working capital and low liquidity, limit the farmers ability to purchase productivity enhancing input like seeds, fertilizers and pesticide. This was supported by Awudu and Wallace (2000) and Kimbaara (2005) who stated that the average production efficiency levels are higher among producers who have access to formal credit.

The appropriate indicator of the phase of development would be the share of agriculture in the national product. Kuznets (1966) states that during the early phase of modern economic growth the share of agriculture in the national product is around 50 percent. Landes (1965) reports that in the year of Britain‘s industrial revolution agriculture was taking as much capital as giving. Mody (1981) argues that this resources flow into agriculture became necessary because the changes in land tenure and improvement in techniques that made agricultural growth possible required substantial out lays of capital. Hence, capital was required for land clearing, drainage, cost of enclosure and consolidation, fencing, building, and equipment, roads etc (Obansa and Maduekwe, 2009).

To this end, agriculture financing not only removes financial constraints but also promote investment and adoption of technology necessary to spur desired economic growth. This is supported by Nkankwo (2013) who stated that improved financial markets accelerated agricultural and rural growth. Financial services assist, households in maintaining food security and smoothing consumption, thereby safeguarding or enhancing labour productivity, the most important production factor of the poor.

3. Literature Review

Modern agriculture is essential for economic development. Schultz (1964) and Zuberi (1989) opine that modern agriculture is possible when farmers are provided with capital for purchasing modern inputs. According to Mbutor et al (2013), agricultural finance enhances productivity and promotes standard of living by breaking the vicious cycle of poverty among farmers. They further stated that literature abounds on the relationship between agricultural finance and agricultural productivity. Zuberi (1989) asserted that agricultural output was low in developing countries. Using Pakistan as a reference, he attributed this to small holdings, traditional methods of farming, poor irrigation facilities or misuse of modern farm technology, among others. This resulted in small income and no saving or small saving. Access to finance, therefore, was expected to stimulate farm investment, boosting the use of modern inputs, and augmenting farm production. Since farmers especially in the rural areas were poor, they found it difficult to save and funds available through informal financial markets were usually costly while the commercial banks and other formal sources of funds view the sector as risky for lending.

Afangideh (2009) studied the various channels through which financial development influences, agricultural investment and output in Nigeria. The study employed annual times series data, from 1970 to 2005 and developed a small macro-econometric model that captured the relationship among gross national saving, bank lending to agriculture, investment in agriculture and agricultural output. The study found that total bank lending to agriculture had statistically significant negative impact on agricultural output over the period of the study. The study concluded that the perennial influx of young school leavers to the cities inflicted much

damage to the resources available for investment in agriculture in rural areas and resulted in a decline in overall agricultural output.

Richard (1990), khandker and Farugee (2003) and Khan et al, (2008) provided empirical evidence that institutional agricultural credit played a key role in enhancing farm production. They argued that without doubt, agriculture could be the main medium for improving the socio-economic conditions of the rural people. Wagar et al. (2008) using time series analysis and applying the error correction model for Pakistan, found that agricultural credit had a positive impact on the gross domestic product and its effect was more pronounced on the agricultural component. The impact of agricultural credit in reducing poverty was significant both in the short and long-run.

Ayoola and Oboh (2006) examined the effect of agricultural production on the growth of Nigeria economy. They found out that every segment of agricultural production requires the availability of adequate capital since capital determines access to all other resources on which farmers depend. It has been shown that farm level credit if well applied, encourages capital formation and diversified agriculture, increase resources productivity, size of farm operations, innovations in farming, marketing efficiency, value added and net farm incomes (Nwagbo, 2005).

Siddigi et al (2004) reported that flow of credit to farmer had increased demand for inputs to increase crop production. The elasticity of amount of credit, number of tractors, irrigation, use of chemical fertilizer and pesticides etc., with respect to dependent variable agricultural income on per cultivated as well as per cropped acre basis indicated that credit (production Credit) and tube wells impacted positively and significantly at 95 percent confidence level. Number of tractors and use of fertilizers also contributed positively but insignificantly. It was because of inappropriate use of fertilizer tractors. Oboh (2008) used error correction model to investigate farmer‘s allocative behaviour in credit utilization in Benue State. The study reveals that the usefulness of any agricultural credit programming does not only depend on its availability, accessibility and affordability, but also on its proper and efficient allocation and utilization for intended uses by beneficiaries. In spite of the importance of credit in agricultural production, its acquisition, management and repayment are depleting with a number of problems.

Jan et al; (2012) pointed out that other associated reasons for low productivity in agriculture included land fragmentation, lack of managerial skills in farmers, which limited their ability to adopt improved farming practices, and insufficient use of modern technology and input. The later was a function of the inadequate finance available to the farmers, particularly the smallholders. The matter of enhancing agricultural productivity, therefore, largely depend on inter alia, the availability of finance to farmers.

Eyo (2003) investigated the impact of Nigerian macro-economic policies on agricultural output between 1981 and 2005, using data from the Central Bank of Nigeria and the National Planning Commission. The estimated model postulated that the index of agricultural production was a function of variables associated with the macro-economic environment, namely, foreign exchange rate, nominal interest rate, credit to the agricultural sector, world prices, government expenditure on agriculture, rate of inflation, foreign private investment in agriculture, and time. The results of the model estimated using OLS techniques indicated that credit to the agricultural sector had positive impact on the index of agricultural production. But the positive impact of this variable was statistically insignificant.

A few studies have been carried out on the impact of agricultural expenditure on agricultural output in Nigeria but the results have been inconclusive. However, this paper will thus contribute to the literature by introducing new variables of interest and current data and as well as applying the newly developed autoregressive distributed lag (ARDL) cointegration technique to empirically ascertain this relationship.

4. Methodology

4.1 Empirical Model

A linear model representing the relationship of interest is as follows:

AGD = *f* (GEX, PAP, RWR, AVR) .....(1)

Where AGD = agricultural output in tones

GEX = government expenditure on agriculture in billion naira

PAP = price of agricultural product (1990=100)

RWR = rural wage rate refers to the labour wage rate for agricultural production activities in the rural areas.

AVR = average rainfall describes the annual average rainfall (precipitation)in the country measured in millimeters.

Taking logarithm of both sides of equation (1), the stochastic model is expressed as follows:

$InAGD_t = \beta_0 + \beta_1 InGEX_t + \beta_2 InPAP_t + \beta_3 InRWR_t + \beta_4 InAVR_t + \mu_t$ .....(2)

Where β0= Constant., β1, β2, β3, β4: are the relative slope coefficients and partial elasticity of the parameters

μ_t =stochastic error term

A priori expectations:

β1> 0, β2 > 0, β3> 0, β4 > 0

4.2 Data

The data used in this study is yearly data for the period 1981–2020. The sample time span was selected based on the availability of statistical data. Data for agricultural output (AGD), government expenditure on agriculture (GEX), price of agricultural product (PAP), and average rainfall (AVR) were obtained from CBN statistical bulletin. While rural wage rate (RWR) data was collected from rural agriculture daily wage paid workers. Table 1 presents the descriptive statistics of the raw data for the variables used in the analysis.

Table 1: Descriptive Statistics of Raw Data

	AGD	GEX	PAP	RWR	AVR
Mean	139.0853	2138.213	3208.989	1387.500	2674.973
Median	132.6500	2138.465	3129.100	1350.000	875.5000
Maximum	294.2000	2307.200	8009.100	2500.000	6998.300
Minimum	56.06000	2037.840	50.20000	500.0000	192.0000
Std. Dev.	60.36995	68.13359	2556.836	715.1071	2578.368
Skewness	0.736682	0.521996	0.080488	0.312655	0.317574
Kurtosis	3.137494	2.939449	1.611188	1.910828	1.309930
Jarque-Bera	3.649510	1.822642	3.257854	2.628846	5.432917
Probability	0.161257	0.401993	0.196140	0.268629	0.066108
Sum	5563.410	85528.53	128359.6	55500.00	106998.9
Sum Sq. Dev.	142136.7	181045.2	2.55E+08	19943750	2.59E+08
Observations	40	40	40	40	40

Source: Author's computation using Eviews 10 software

4.3 Estimation Technique

4.3.1 Unit Root test for Stationarity

The first step in this analysis involves carrying out a unit root test. A unit root test examine whether a time series variable is non-stationary and possesses a unit root. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is either stationarity, trend stationarity or explosive root depending on the test used. This paper employs Augmented Dickey Fuller test (ADF Test) which is one of the most commonly used statistical test when it comes to analyzing the stationary of a series. The ADF equation is stated below:

$\Delta yt = \delta yt\text{-}1 + \alpha iPi = 1\ \Delta yt\text{-}i + \mu t$ ....(3)

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.

4.3.1 Cointegraton Test

Having determined the nature and stationarity of the time series data, this paper further employed cointegration, a statistical method used to test the correlation between two or more non-stationary time series in the long-run or for a specified time period. The method helps in identifying long-run parameters or equilibrium for two or more sets of variables. It helps in determining the scenarios wherein two or more stationary time series are cointegrated in such a way that they cannot depart much from the equilibrium in the long-run. This paper applied the autoregressive distributed lag (ARDL) cointegration technique. The ARDL model is considered as the best econometric method compared to others in a case when the variables are stationary at I(0) or integrated of order I(1). The long run relationship of the underlying variables is detected through the F-statistic (Wald test). In this approach, long run relationship of the series is said to be established when the F-statistics exceeds the critical value band.

The autoregressive distributed lag model contains the lagged value(s) of the dependent variable, the current and lagged values of regressors as explanatory variables. The major advantage of ARDL lies in its identification of the cointegrating vectors where there are multiple cointegrating vectors. The Error Correction Model (ECM) can be derived from ARDL model through a simple linear transformation, which integrates short run adjustments with long run equilibrium without losing long run information. The associated ECM model takes a sufficient number of lags to capture the data generating process in general to specific modeling frameworks. Based on this paper's objectives, it is a better model than others to catch the short-run and long-run impact of government finance on the growth of agricultural sector in Nigeria. However, this technique will crash in the presence of integrated stochastic trend of I(2). To forestall effort in futility, it is wise to test for unit roots first.

However, equation (2) can be written in ARDL form as follows:

= + ∑ +∑ + ∑ P P +
∑ + ∑ + + +
P P + + + ………………..(4)

where represents drift component while Δ shows the first difference, shows the white noise. The study uses the Akaike information criterion (AIC) for choosing the lag length. After finding the long-run association existing between variables, the study uses the error

correction model (ECM) to find the short-run dynamics. The ECM general form of Equation (4) is formulated below in Equation (5):

$$= + \sum \quad + \sum \quad + \sum \quad P\ P \quad + \sum \quad + \sum \quad ++ \ldots\ldots\ldots\ldots\ldots\ldots..(5)$$

where Δ represents the first difference while Ж is the coefficients of *ECM* for short-run dynamics. *ECM* shows the speed of adjustment in long-run equilibrium after a shock in the short run.

After analyzing data through Equation (2), the existence of the long-run relation between the variables under investigation is tested by computing the Bound F-statistic (bound test for cointegration) in order to establish a long run relationship among the variables. This bound F-statistic is carried out on each of the variables as they stand as endogenous variable while others are assumed as exogenous variables.

The null hypothesis of no cointegration among variables in eq. (4) can be tested as:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$against the alternative hypothesis of

H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

5. Result and Discussion

Table 2 presents the results of ADF unit root test in the presence of intercept for variables in equation 2 using automatic selection of Schwarz Information Criterion and maximum lag length of 9. The result reveals that the time series variable are either stationary at levels or at first difference. Agricultural output (InAGD), average rainfall (InAVR), government expenditure on agriculture (InGEX), and rural wage rate (InRWR)were all stationary at first difference, i.e., I(1). However, price of agricultural product (InPAP) was stationary at level, I(0). For this reason, ARDL approach is used for the co-integration of the model.

Table 2: Result of ADF Unit Root Test of the Variables

VARIABLES	AT LEVEL		REMARKS	FIRST ORDER DIFFERENCE		REMARKS
	ADF Test Stat	Order of Integratior		ADF Test Stat	Order of Integration	
InAGD	-1.909256	-		-12.59591	I(1)	***
InAVR	-0.922796	-		-2.807688	I(1)	*
InGEX	-1.677759	-		-13.08177	I(1)	***
InPAP	-2.629148	I(0)	*	-8.770748	I(1)	***
InRWR	-0.912154	-		-6.690940	I(1)	***
Note:	Critical Value: 1% = -3.615588 5% = -2.941145 10% = -2.609066			Critical Value: 1% = -3.615588 5% = -2.941145 10% = -2.609066		

Source: Author's computation using Eviews 10 software
Note: * = 10% level of Significance; ** = 5 % level of significance; *** = 1 % level of significance

The result of the cointegration test based on the ARDL bound testing approach is presented in Table 3. In conducting the bound testing, model selection criteria was Akaike information criterion, the coefficient covariance matrix was ordinary, the maximum lag lengths for dependent and regressors were1. For the fixed regressors trend specification, the model chosen was constant. Also, unrestricted constant was examined.The bounds test results reveal that when agricultural output (AGD) is the dependent variable, the calculated *F*-statistics are 2.069079 and 1.858321under constant and unrestricted constant, respectively. Both values are lower than the lower bounds of critical values at 5% significance level, 2.86 and 2.56 respectively. These results suggest that the null hypothesis of no cointegration cannot be rejected when agricultural output (AGD) is the dependent variable.When government expenditure on agriculture (InGEX) is the the dependent variable, the calculated F-statistics are 1.353422 and 1.274166 under constant and unrestricted constant, respectively. Both values are lower than the lower bounds of critical values at 5% significance level, 2.86 and 2.56 respectively. These results suggest that the null hypothesis of no cointegration cannot be rejected when government expenditure on agriculture (InGEX) is the dependent variable.

On the contrary, as depicted in Table 3, when price of agricultural product (InPAP) is the dependent variable, the calculated F-statistics are 5.475484 and 5.530176 under constant and unrestricted constant. Both calculated F-statistic are higher than the upper bound critical value of 4.01 and 3.49, thus the null hypothesis of no cointegration can be rejected when price of agricultural product (InPAP) is the dependent variable. This suggests that there is a cointegration between price of agricultural product (InPAP) and other variables.

The calculated F-statistics are 1.759701 and 2.201290 under constant and unrestricted constant, respectively when rural wage rate (InRWR) is made the dependent variable. Both values are lower than the lower bounds of critical values at 5% significance level, 2.86 and 2.56 respectively. These results suggest that the null hypothesis of no cointegration cannot be rejected when rural wage rate (InRWR) is the dependent variable. Similarly, when average rainfall (InAVR) is the dependent variable, the calculated F-statistics are 0.957188 and 1.216739 under constant and unrestricted constant, respectively. Both values are lower than the lower bounds of critical values at 5% significance level, 2.86 and 2.56 respectively. These results suggest that the null hypothesis of no cointegration cannot be rejected when average rainfall (InAVR) is the dependent variable. In sum, the results suggest that all other equations except agricultural product (InPAP) do not have any cointegration, it could be concluded that there is only one cointegrating relationship among the above variables.

However, given the objective of this paper which is to examine the impact of government finance on the growth of agricultural sector in Nigeria, the relationship of interest isFInAGD (InAGD /InGEX, InPAP, InRWR, InAVR) but bound testing results suggest that the null hypothesis of no cointegration cannot be rejected when agricultural output (AGD) is the dependent variable. This implies that the error correction model should not be estimated (long run) but only the short run ARDL model should be estimated.

Table 3: Bounds Tests for Cointegration

F-statistics	Constant	Unrestricted constant
FInAGD (InAGD /InGEX, InPAP, InRWR, InAVR)	2.069079	1.858321
FInGEX (InGEX /InPAP, InRWR ,InAVR,InAGD)	1.353422	1.274166
FInPAP (InPAP/InRWR, InAVR, InAGD, InGEX)	5.475484	5.530176
FInRWR (InRWR/ InAVR, InAGD, InGEX, InPAP)	1.759701	2.201290
FInAVR (InAVR/InAGD, InGEX, InPAP, InRWR)	0.957188	1.216739

F-critical at 5% level*		
Constant	2.86	4.01
Unrestricted constant	2.56	3.49

Source: Author's computation using Eviews 10 software
Note: * critical values are based on Pesaran et al. (2001) for k= 4 and n= 39 at 5% significance level.

Before estimating the short run ARDL, there was need to find the appropriate lag length for the ARDL model which is very important because of having Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroskedasticity, etc.). As such, it was necessary to determine the optimum lag length(k) by using proper selection criteria such as; the Akaike Information Criterion(AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion(HQC). Nevertheless, the information from most of the information criteria in Table 4 suggest lag length of zero (0) (FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz Bayesian Criterion; HQ: Hannan-Quinn information criterion). However, one year lagged value of the dependent variables was introduced in the estimated short run ARDL.

Table 4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	53.85981	NA*	0.004181*	-2.641071*	-2.423379*	-2.564324*
1	54.12116	0.437951	0.004356	-2.601144	-2.339914	-2.509048
2	54.77631	1.062399	0.004446	-2.582503	-2.277735	-2.475058
3	55.40328	0.982824	0.004547	-2.562340	-2.214033	-2.439545

Source: Author's computation using Eviews 10 software
Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The result of the short run ARDL coefficients is presented in Table 5. The ARDL short-run dynamic results show that in the short-run, government expenditure on agriculture D(InGEX) is statistically significant at 1% level while other variables are insignificant. Specifically, the lagged value of agriculture output D(InAGD(-1)) showed an inverse relationship with agricultural output in the current year. Nonetheless, this result was statistically insignificant.However, it should be noted that despite the contribution to the economy, Nigeria's agricultural sector faces many challenges which impact on its productivity. These include; poor land tenure system, low level of irrigation farming, climate change and land degradation. Others are low technology, high production cost and poor distribution of inputs, limited financing, high post-harvest losses and poor access to markets. These challenges continue to stifled agricultural productivity in the country (FAO, 2021).

The relationship between government expenditure on agriculture D(InGEX) and agricultural output is positive and statistically significant in the current year at 1% significant level. The result shows that one unit increase in government expenditure on agriculture leads to 0.14 per cent increase in agricultural output. This result aligns with Falana (2021) whose finding shows that public agricultural expenditure in Nigeria affects agricultural output positively. Presently, the Nigerian government is proposing just 1.8 per cent of the 2022 budget for agriculture, significantly short of the Maputo Declaration benchmark set during the second

ordinary assembly of the African Union in July 2003 in Maputo, Mozambique, when African heads of state and government met (Izuaka, 2021).

The relationship between average annual rainfall (D(InAVR)) and agricultural output is positive as expected, but it was statistically insignificant in the current year. It should be noted that Nigeria like many African countries, which have their economies largely based on weather-sensitive agricultural productions systems, are particularly vulnerable to climate change (Dinar et al, 2006). This vulnerability has been demonstrated by the devastating effects of recent flooding in the Niger Delta region of the country and the various prolonged droughts that are currently witnessed in some parts of Northern region. Table 5 shows that a one unit increase in price of agricultural product (D(InPAP)) in the current year leads to 0.011066 per cent increase in agricultural output in the current year. However, this relationship is statistically insignificant at any of the conventional significant levels.

Finally, one unit increase in rural wage rate (D(InRWR)) leads to 0.027695 per cent increase in agricultural output. However, the relationship between rural wage rate (D(InRWR)) and agricultural output is positive and statistically insignificant in the current year.

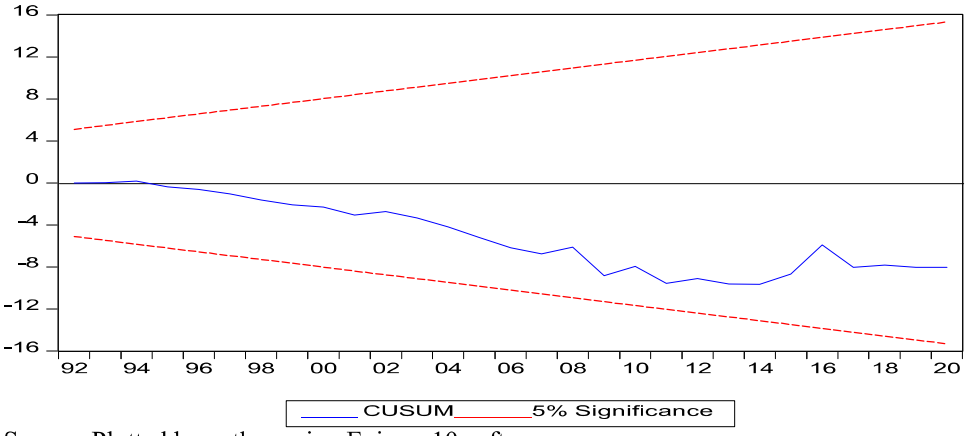
Table 5: ARDL Short-Run Dynamic Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003659	0.007943	0.460638	0.6482
D(InAGD(-1))	-0.000437	0.034394	-0.012712	0.9899
D(InGEX)	11.78541	0.419831	28.07181	0.0000
D(InPAP)	0.011066	0.015249	0.725706	0.4733
D(InRWR)	0.027695	0.058576	0.472806	0.6396
D(InAVR)	0.000720	0.021759	0.033105	0.9738
R-squared	0.977637	Mean dependent var		0.021584
Adjusted R-squared	0.974142	S.D. dependent var		0.268179
S.E. of regression	0.043124	Akaike info criterion		-3.305534
Sum squared resid	0.059510	Schwarz criterion		-3.046968
Log likelihood	68.80514	Hannan-Quinn criter.		-3.213538
F-statistic	279.7826	Durbin-Watson stat		2.070205
Prob(F-statistic)	0.000000			

Source: Author's computation using Eviews 10 software

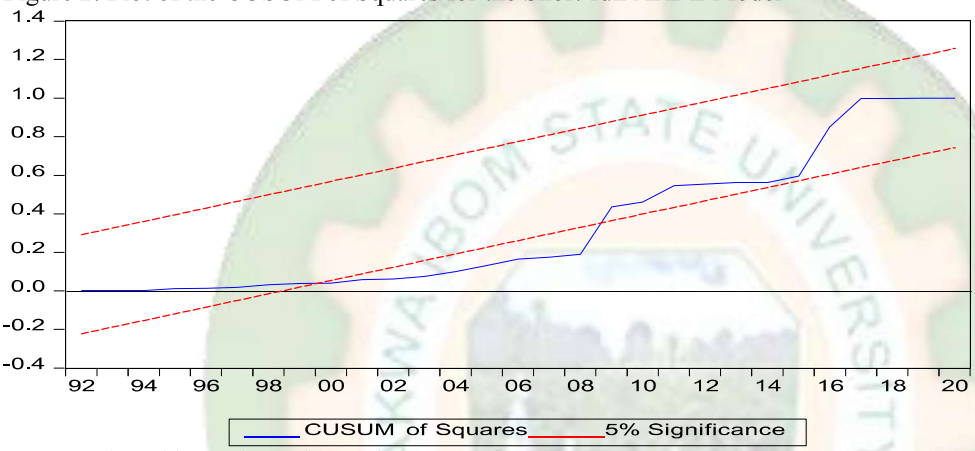
To assess the stability of the short-run coefficients of the ARDL model in Table 5, CUSUM and CUSUMSQ tests proposed by Brown et al. (1975) was used. The tests are based on the cumulative sum of the recursive residuals (CUSUM)and the cumulative sum of squared recursive residuals (CUSUMSQ) and are ofa graphical nature whereby the residuals are updated recursively and are plotted against the break points for the 5% significance line. The short-run coefficients are stable if the plot of CUSUMSQ and CUSUM stay within the 5% significance level. Figure 1(CUSUM) shows that the ARDL model appears to be within the 95% critical bounds, implying that all coefficients in the ARDLmodel are stable over the sample period. However, theCUSUM of squares in Figure 2 shows that there is slight deviation from the 95% critical bounds over a period, then the model is stable afterwards. The implication is that this short run ARDL model may be suffering from a bit of structural break.

Figure 1: Plot of the CUSUM for the Short-run ARDL Model



Source: Plotted by author using Eviews 10 software

Figure 2: Plot of the CUSUM of Squares for the Short-run ARDL Model



Source: Plotted by author using Eviews 10 software

In a similar manner, residual diagnostics was also carried on the short run ARDL model in Table 5. Firstly, Breusch-Godfrey test (Godfrey 1978) for serial correlation was conducted to see if different lags of the residuals are correlated. From Table 6, it can be seen that the probability Chi-Square (*0.4040*) is greater than 0.05 at 5% significant level. It can be concluded that the residual in the short-run ADRL model is not serially correlated.

Secondly, to test that all residuals in the ADRL model have a constant variance (i.e., heteroscedasticity test), the Breusch-Pagan LM test was conducted. The result of Table 7 shows that the probability of the Obs*R-square (*0.7650*) is greater than 0.05. In that, we do not reject the null hypothesis of homoscedasticity or constant variance of the residual.

Table 6: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.751400	Prob. F(2,30)	0.4804
Obs*R-squared	1.812740	Prob. Chi-Square(2)	0.4040

Source: Author's computation using Eviews 10 software

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.193424	Prob. F(5,32)	0.9628
Obs*R-squared	1.114765	Prob. Chi-Square(5)	0.9528
Scaled explained SS	2.576042	Prob. Chi-Square(5)	0.7650

Source: Author's computation using Eviews 10 software

Conclusion and Recommendations

This paper empirically assessed the impact of government finance on the growth of agricultural sector in Nigeria using annual time series data from 1981 to 2020. Secondary data were collected from Central Bank of Nigeria Statistical Bulletin using Augmented Dickey fuller (ADF) test to test their stationarity. The result reveals that the time series variable are either stationary at levels or at first difference. For this reason, ARDL approach is used for the co-integration of the model. The result of the cointegration test based on the ARDL bound testing approach suggest that all other equations except agricultural product (InPAP) do not have any cointegration, it could be concluded that there is only one cointegrating relationship among variables.

However, given the objective of this paper which is to examine the impact of government finance on the growth of agricultural sector in Nigeria, the relationship of interest is FInAGD (InAGD /InGEX, InPAP, InRWR, InAVR) but bound testing results suggest that the null hypothesis of no cointegration cannot be rejected when agricultural output (AGD) is the dependent variable. This implies that the error correction model should not be estimated (long run) but only the short run ARDL model should be estimated.

The ARDL short-run dynamic results show that in the short-run, government expenditure on agriculture D(InGEX) is statistically significant at 1% level while other variables are insignificant. In sum, the finding of this paper shows that government expenditure on agriculture in Nigeria affects agricultural output positively. As such, the government of Nigeria should make more budgetary allocation towards agricultural sector. This will help increase agricultural output and hence agricultural growth.The government should provide pragmatic incentives (not politically biased ones) for private investments in agricultural value chains from input supply through production, processing, to marketing and recycling. Government should take the strategic lead for financial inclusion and insurance for rural and agricultural communities. They should ensure that insurance is included in the national agricultural policy as a part of a broader strategy that creates capacities and incentives for agricultural risk management.

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