Impact of Government Expenditure on Agricultural Output in Nigeria (1981-2019)

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Abstract

The agricultural sector's impact on GDP, food and nutritional supplies, job creation, income and wealth creation, and foreign exchange revenues cannot be overstated. Despite the agricultural sector's enormous contribution to Nigeria's economic growth, it has received less attention since the discovery of oil. As a result, this study investigates how government spending on agriculture has affected agricultural output in Nigeria from 1981 to 2019. The data used for this study was obtained from the Central Bank Statistical Bulletin. Using the Autoregressive Distributed Lag approach, the results revealed the presence of a long-run link between government agricultural expenditure and agricultural output in Nigeria. Government agricultural capital spending has a negative and statistically insignificant influence on agricultural output in Nigeria in both the short and long run. The findings demonstrate that government recurrent investment in agriculture had a favorable but statistically insignificant impact on agricultural output in Nigeria in the short and long run. Agricultural loan guarantee scheme funds had a negative and statistically negligible long-run influence on agricultural output while having a positive short-run impact. To that end, the government should strengthen monitoring institutions to guarantee that funds provided to the agricultural sector are utilized wisely and effectively in Nigeria. The government should promote the consumption of locally grown farm products to limit the number of resources spent on imported agricultural items, which erode consumers' purchasing power owing to imported inflation.

Keywords: *Agricultural sector, Government recurrent expenditure, ARDL, and Nigeria.*

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Background to the Study

Agriculture is the superstructure upon which the world's other productive economies are built. The rate of growth and development of the industrial sector is determined by the rate of growth of the agricultural sector. Agriculture is critical to the global economy and, more crucially, to developing economies, where it is the primary source of employment. Agricultural output improves the standard of living in any economy throughout the world by providing industrial raw materials for the manufacture of consumer goods. The development of the agricultural sector is a stimulant to the full realization of any economy's development since it influences job creation, price stability, growth, foreign exchange, and people's living standards. In support, Lipton (2012) observed that agricultural development stimulates industrialization for economic stability.

Nigeria's economy relied mainly on agricultural products for domestic food supply and foreign cash profits before the commercial exploitation of fossil oil in commercial quantities. The economy's reliance on agriculture, on the other hand, shifted with the rise in oil production. However, as a result of this circumstance, the agricultural sector in Nigeria has been neglected, affecting primarily the rural poor. Furthermore, Pinto (1987) said that throughout the oil boom, economic policies gave little attention to agricultural sector reform, relegating the sector to the background and making it less relevant in comparison to the oil sector. As a result of the neglect of the agricultural sector, the country has become a net importer of agricultural products, despite the fact that food production was sufficient for domestic consumption and exports in the 1970s (Amaghionyeodiwe and Udeaja, 2015).

The nation's gross domestic product declined by 10% and 8% on average from 1970 to 1973 and 1974 to 1980, respectively, with the sector's contribution rising to 26.09 percent, 26.95 percent, and 29.94 percent in the fourth quarter of 2019, 2020, and 2021. (Abimiku, 2006; Statista, 2022). As a result of agricultural neglect and over-reliance on oil products, which are vulnerable to international market shocks and world economic depression Zittler (2017) noted that the country has had to contend with worsening trade imbalances, excessive importation, inflation, unemployment, and debt upsurge in the daring adverse economic environment since the 1970s.

Between 2001 and 2005, government spending averaged N824 billion per annum. Of this amount, the agriculture budget spending constituted a very small share averaging only N14.7 billion per year or slightly less than 1.8% of the total budget. Furthermore, in 2017 agriculture expenditure stood at N135.6 billion, N203 billion, and 137.9 billion in 2018 and 2019 respectively (IFPRI, 2008; BudgIT, 2020). Affirming this position, Ojo and Oluwaseun (2015), added that the agricultural sector accounted for only 42% of the nation's GDP while in real terms, contributed 35.8% and 2.2% in 2008 and 2009 to the growth of real GDP in the first quarter of 2010. More so, the sector contributed 22.23%, 19.99%, 20.85% 21.91% and 26.95% to GDP in 2011, 2014, 2017, 2019 and 2020 respectively (National Bureau of Statistics, 2020).The effect of this is directly noticed on smallholder farmers. Smallholder farmers are majorly subsistence farmers and they produce the majority of the food in Nigeria. They produce 85% of total agricultural production and reside mainly in rural areas

(Ndubuaku, Okoro, Bello, and Alozie, 2019). Their productive capacity and growth are however hindered by inadequate and inaccessible credit facilities (Odoemenem and Obinne, 2010). Government expenditure on agriculture plays a very important role in agricultural productivity and development (Duong and Izumida, 2002). The provision of credit has been adjudged as a critical resource in the advancement of the agricultural sector. However, access to government agricultural loan facilities has been seriously incapacitated in Nigeria (Swinnen and Gow, 1999).

Limited government credit facilities constrain farmers thus imposing a high cost on the society. This is in terms of rural unemployment, rural poverty, and distortion of production and liquidation of assets. Governments in both developed and developing countries attempt to overcome these problems by injecting more resources to subsidize credit, setting up a credit guarantee fund scheme, and stimulating institutional innovations in the financial system. Many banks perceived agricultural credit as risky and seek to channel credit to less risky sectors. More so, households' farmers are quite heterogeneous in terms of resource endowments, production, and consumption opportunities, hence, lenders are supposedly able to obtain and use information about the potential credit worthiness of the borrowers. In support, NBS (2020) noted that agricultural credit guarantee scheme funds declined by 31.62% from N11.90 million in 2017 to N8.14 million in 2019 thereby limiting the growth in agricultural production in Nigeria. Efforts have been made by successive governments over the years in Nigeria toward enhancing government agricultural expenditure aimed at addressing food production challenges but this has been hit by dwindling government revenues resulting from oil price fall. This has given rise to the allocation of meager resources to boost agricultural production which contravenes the Maputo declaration of 10% annual budgetary allocation for agriculture where Nigeria has consistently allocated less than 5% for agriculture in recent years. Notably, Nigeria spent 5.41%, and 5.38% of its annual budget on agriculture in 2008 and 2009 but, declined to 2% in 2018 and 156% in 2019 respectively (Oxfam Nigeria, 2021).

Despite these efforts, agricultural production has remained far behind population growth resulting in high food insecurity effects in Nigeria as the sector only contributed 23.1% and 25.2% to GDP in 2015 and 2019 with the only 40% of the arable land cultivated (NBS, 2020). Therefore, the country is yet to achieve food sufficiency and any meaningful economic growth and development as the situation has continue to worsen amid volatile government sources of revenue. Given that the welfare of many Nigerians, particularly rural dwellers are tied up to agriculture, a feasible future can only be guaranteed through effective government expenditure to improve food production. Since, studies revealed that an increase in agricultural government expenditure would enhance agricultural output levels, employment, food security, food prices, incomes, and overall socio-economic welfare.

Therefore, it is imperative to examine the impact of agricultural government expenditure on agricultural output in Nigeria. Specifically, the paper seeks to achieve the following objective.
  i. Investigate the impact of government capital expenditure on agriculture to crop Production in Nigeria.

ii. Examine the impact of government recurrent expenditure on agriculture has no significant effect on crop production.
iii. Evaluate the impact of the agricultural credit guarantee scheme fund has no significant effect on crop production in Nigeria.
iv. To determine the causal relationship between government agricultural expenditure and crop production in Nigeria.

In line with the objective the following hypotheses, are formulated in a null form. They are:

H_{01}: There is no significant contribution of government capital expenditure on agriculture to crop
Production in Nigeria

H_{02}: Government recurrent expenditure on agriculture has no significant effect on crop production in Nigeria.

H_{03}: Agricultural credit guarantee scheme fund has no significant effect on crop production in
Nigeria.

H_{04}: There is no causality between government agricultural expenditure and crop production in
Nigeria.

Literature Review
Concept of Government Expenditure
Government expenditure is referred to expenditure on infrastructure which include transportation and communication that brings about reduce the cost of production through increased private sectors investment and profitability of firms thus, fostering economic growth (Ebiringa and Charlse, 2012). Government expenditure as observed by Babalola, Aninkan, and Salako (2015), is the expenses that a government incurs for its maintenance, society, and the economy as well as for helping other countries. Government expenditure represents the total government spending to attain the predetermined macro-economic objectives. Governments have recorded a continuous increase over time in almost every country. Government expenditures include administration, defense, justice, law and order, and maintenance of the state which are considered unproductive (Bhatia, 2002). Expenditures on defense, education, agriculture, transportation and communication, and such are all the non-transfer expenditures.

According to Gukat and Ogboru (2017), government expenditure is the costs that are usually incurred by the government for the provision and maintenance of itself as an institution, the economy, and society. They further state that government expenditures usually tend to increase with time as the economy becomes large and more developed or as a result of an increase in its scope of activities. Gukat and Ogboru (2017) classified government expenditure into recurrent and capital expenditure as the major components of government budget in an economy. It is sometimes referred to as a revenue budget and it covers recurrent items or expenditures while the capital expenditure budget has to do with expenditures necessary for capital assets procurement. The study defines government based on the

emphasis on government expenditure components which include capital and recurrent spending in the agricultural sector. The expenditure is spread among the two constituents for the production of food crops in Nigeria and thus, the variables formed part of the study.

Concept of Agriculture

Various people have defined Agriculture in different ways but common among these definitions is the fact that it is the production of food, feed, fiber, and other goods by the systematic growing and harvesting of plants and animals (Adamu, 2018). Akinboyo (2008), defined agriculture as the science of making use of land to raise plants and animals. It is the simplification of natural food webs and the rechanneling of energy for human planting and animal consumption. According to Allen (2000), 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. Ikala (2010) has described agriculture as the profession of the majority of humans that involves farming, fishing, animal husbandry, and forestry. 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 (Allen, 2000).

According to Fashola (2013), agriculture is that kind of activity that joins labour, land or soil, live animals, plants, solar energy, and so on. Yusuf (2014), defined agriculture as a way of life that involves the production of animals, fishes, crops, and forest resources for the consumption of man and supplying the agro-allied product required by other sectors. It is seen as the inherited and dominant occupation employing about 70% of Nigerians. Though subsistence agriculture is practiced in this part of the world, it will not be an overstatement to say that it is the life wire of the economies of developing countries. This work adopts Ahmed's (2013) definition of agriculture as its working definition. It is encompassing as it involves not only the cultivation of crops for man's consumption but also, the conversion of these raw materials (farm produce) by agricultural manufacturing firms into finished goods and services that have better utility at satisfying human wants and desires. It also involves extensive research training of farmers on the use of improved seedlings and better technological equipment to boost crop yields for the economic development of Nigeria.

Concept of Agricultural Output

The essence of engaging in any economic activity is to produce a particular product or output. It is also for this reason that people involved in agricultural activities. Therefore, agricultural output refers to the products of economic activities and this includes production, livestock, forestry, and fishing (CBN, 2012). Olabanji, Adebisi, Ese, and Emmanuel (2017), defined agricultural output as the value of agricultural products which, free of intra-branch consumption, are produced during the accounting period and before processing, are available for export and consumption. According to OECD (2020), the agricultural output comprises output sold (including trade between agricultural holdings); changes in stocks; output for own final consumption; output produced for further processing by agricultural producers; and intra-unit consumption of livestock feed products. Agricultural output is the quantity of

products or goods produced in the course of cultivation of crops and rearing of animals in a given period (Ekine, 2018). Agricultural output growth is therefore the positive change in the agricultural output of an economy. It is an increase in the capacity of the agricultural sector of an economy to produce goods, compared from one period of time to another (World Bank, 1999).

Agricultural output can be broadly seen as the output or end products people reap from the series of agricultural activities in which they involve (Adamu, 2018). Nigerian agriculture has produced a great output over the years which have been instrumental to both the country itself and the international community. According to Babalola (2001), Nigeria led the world in the production and export of agricultural output like cocoa, palm produce, groundnuts, rubber, and timber. CBN (2012) grouped agricultural output into four categories; crop production is the cultivation of plants both on land and in riverine areas. Broadly, these crops are grouped into cereals, roots and tuber, vegetable, pulses and nuts, fruits and sugars, vegetables and spices, and forest crops (Babalola 2002); Fishing refers to the water products gained by involving in fishing activities; Livestock entails the rearing of animals for both consumption and commercial purpose while forestry involves the raising of tree products which are commercially harvested for income generation. Agriculture is the science or practice of farming, including the cultivation of the soil for the growing of crops, the rearing of animals to provide food, and the preparation and marketing of agricultural and agro-allied products for welfare maximization and economic development of Nigeria. Agriculture encompasses a wide variety of specialties and techniques, including ways to expand the lands suitable for plant cultivation, by digging water channels and other forms of irrigation. Cultivation of crops on arable land and the pastoral herding of livestock on rangeland remain at the foundation of agriculture.

Theoretical Review
There have been various axioms, propositions, or facts that have been developed by different scholars in an attempt to provide a reasonable, logical, and rational explanation of casual-effect relationships among various groups of the observed phenomena which explain different views and situations in an economy. These theories are usually abstract models of perceived reality. In view of this, the study is predicated upon Wagner, Peacock, and Wiseman's Displacement and Agriculture Based Economic Development theories.

Wagner's Theory of Public Expenditure
This theory was propounded by Wagner (1883). The theory states that there is a tendency for a long-run relationship between state activities and national income growth. This implies a continuous relative expansion of public spending as a consequence of the development process. Therefore, as society advance in industrialization, the set of social, commercial, and legal relationships within it become more complex. In this case, the government plays a more prominent role in setting up and running institutions to control this complexity which causes an enlargement in the size of the public budget. Thus, in the initial stage of economy growth, the state finds out that it has to expand its activities quite fast in several fields like agriculture, education, health, civil amenities, transport, communications, security, and so on. Evidently,

government expenditure has since witnessed an increase needed to manage and finance natural monopolies and ensure smooth operation of the market forces (Etale and Ayunku, 2015). Serena, Andrea and Babatunde (2011) pointed out that such expenditure is expected to increase take off conditions that supports value addition to agricultural products in Nigeria. Therefore, the inter-linage of all these facilities provided by the government smoothen operations of economic activities which enhance the real income per capita of the country (Ogboru, Abdulmalik and Park, 2018). This theory is relevant to this study as it describes the reasons why government expenditure over time in Nigeria has been rising in a quest to increase food production for welfare maximization and income stability. Due to the progressive nature of economic development in Nigeria, government expenditure in the agricultural sector has been rising to meet up with the rising demand for food by the rising population.

Agriculture-Based Economic Development Theory
Agriculture Based Economic Development Theory was propounded by Wiggins in 2006. The theory postulated that an agricultural-based strategy for economic development requires a technical, institutional and financial- incentive change that will raise the productivity of small farmers. Wiggins explains that agricultural financial incentives can play a dual role in the process of agricultural development for economic transformation. Firstly, it will produce more food and also produce many great jobs needed. A higher level of investment (gross capital formation) should stimulate growth while agricultural productivity is expected to have a positive effect on aggregate economic growth. It has been observed by Zuberu, Iliya, Yusuf, and Salihu (2017) that countries at the early stages of development depend almost fully on agricultural growth for employment, foreign exchange, government revenue, and food supply to the population. In this sense, agricultural growth is the key impetus to the growth of underdeveloped and developing countries (Uremadu and Onyele, 2016). This theory supports not only the funding of agricultural output by government and private individuals but also the investment in agricultural infrastructures which could facilitate the production of agricultural output and its linkage to other sectors/industries through the creation of added value for optimum utility maximization by citizens in Nigeria.

Empirical Review
Various studies have attempted to establish the relationship between government agricultural expenditure and agricultural output. In an attempt to further expatiate on the link between government agricultural expenditure and agricultural output, relevant empirical works of literature were consulted. Omekwe, Bosco, and Obayori (2018), examined the determinants of agricultural output in Nigeria from 1985 to 2016. The ECM results showed that government funding in agriculture was positively and significantly related to agricultural output, and agriculture credit had a positive and significant impact on agricultural output. Ihugba, Chinedu, and Njoku (2013) empirically analyzed the relationship between Nigeria's government expenditure on the agricultural sector and its contribution to economic growth from the period 1980 to 2011. Based on the result of Granger causality, the paper concludes that a very weak causality exists between the two variables used in this study. Ayunku and Etale (2015) investigated the effect of agriculture spending on economic growth in Nigeria

for the period 1977 to 2010 with a particular focus on sectional expenditure analysis. The empirical results indicated that RGDP was particularly influenced by changes in agriculture expenditure (AGR), inflation (INF), interest rate (INT), and exchange rate (EXR), which contributes to or promotes economic growth in Nigeria.

Matthew and Mordecai (2016), investigated the impact of public agricultural expenditure on agricultural output in Nigeria for the period 1981 to 2014. The Johansen Co-integration test revealed that there exists a long-run relationship between agricultural output, public agricultural expenditure, commercial bank loans to the agricultural sector, and interest rates in Nigeria. The results of the parsimonious ECM model showed that public agricultural expenditure has a significant negative impact on agricultural output while commercial bank loans to the agricultural sector and interest rates have insignificant positive impacts on agricultural output in Nigeria. Olawumi and Oyewole (2018), empirically evaluated the nexus between public spending on agriculture and Nigerian output growth for the period 1981 to 2016. The findings showed that agricultural development in Nigeria has a positive impact on the economic growth in Nigeria and that all the variables in the model proved significant, which shows that agricultural sector output has a positively impact on the economic growth in Nigeria over the period under study. Sunday (2017) examined the impact of government expenditure on agriculture and agricultural output on Nigeria's economic growth for the period of 1980 – to 2014. The result further revealed that the variables have a long-run relationship because of evidence of two co-integrating equations while the speed of adjustment of the ECM result is 90.9% per annum. The research concluded that government expenditure on agriculture and agricultural output significantly impacts Nigeria's economic growth.

Jambo (2017), determined the composition of public expenditure that is more growth-enhancing for the agricultural sector in Zambia, Malawi, South Africa, and Tanzania between 2000 and 2014. The results from the empirical analysis revealed that agricultural growth responds differently to the agricultural spending types across the countries. Chiekezie, Nkamigbo, and Ozor (2020) examined the economic assessment of government expenditure on the agricultural sector in Nigeria, to establish if it has any direct link with economic growth for the period 1981 to 2017. The results revealed that there is a substantial positive correlation between economic growth and recurrent expenditure, a very high positive correlation between economic growth and capital expenditure, a very high positive correlation between economic growth and commercial banks' loans and advances, and a negligible positive correlation between economic growth and agricultural guaranteed scheme loans and that government expenditure on agriculture and agricultural sector output have a significant impact on economic growth.

Obi and Obayori (2016), examined the dynamic effect of government spending on agricultural output in Nigeria. The study discovered that the dynamic model depicted by the parsimonious ECM result showed that the coefficient of government capital and recurrent spending on agriculture was positively related to agricultural output. Also, the coefficient of the ECM showed that there exists a long-run equilibrium relationship among the variables.

Moreover, the Pairwise Granger Causality results showed that government capital and recurrent spending on agriculture granger cause agricultural output in Nigeria. Idoko and Jatto (2018), examined the relationship between government expenditure on agriculture and economic growth in Nigeria for the period 1985 to 2015. The study revealed the existence of a positive and significant relationship between government expenditure on agriculture and economic growth in Nigeria. Edeh, Ogbodo, and Onyekwelu (2020) evaluated the impact of government expenditure on agriculture on agricultural sector output in Nigeria for the period 1981 to 2018. The result of the ARDL model technique of analysis revealed that capital expenditure is positively related to agricultural output and it is also statistically significant at 5 % in the current year. However, recurrent expenditure has a negative and insignificant impact on agricultural output. Ademola, Olaleye, Olusuyi, and Edun (2013) explored the average contribution of the agricultural sector to the national earnings of Nigeria for the period 1981 to 2010. It was found that a significant relationship exists between government expenditure in the agricultural sector and the economic growth of Nigeria.

Ebenezer, Ngarava, Etim, and Popoola (2019), analyzed the impact of government expenditure on agricultural productivity in South Africa for the period 1983 to 2016. It was revealed that there exists a long-run relationship between government expenditure on agriculture and agricultural productivity, and a positive significant effect only to be expected in the long run. Uger (2013) examined the impact of the Federal Government's expenditure on the agricultural sector. The study revealed a weak relationship between the variables which is as a result of inadequate funding. Udeorah and Vincent (2018) investigated the relative effectiveness of government and deposit money bank financing on Nigeria's agricultural sector performance for the period 1981 to 2015. The results showed that while government financing through the agricultural credit guarantee scheme fund (ACGSF) had a significant positive effect on aggregate agricultural output, crop output, and livestock output; government recurrent expenditure on the agricultural sector had a significant negative effect on the aggregate agricultural output and crop production output. On the other hand, bank financing proved insignificant in predicting output from the aggregate agricultural sector, and other examined agricultural sub-sectors.

Ewubare and Ologhadien (2019), examined the impact of agricultural financing on cassava production in Nigeria for the period 1985 to 2015. The parsimonious ECM revealed that cassava output in previous periods is positively related to output in the current period. Similarly, public capital spending in agriculture has a positive and significant impact on cassava production. On the contrary, recurrent spending on agriculture significantly reduced cassava production. The result also showed that the agricultural credit guarantee scheme fund at lag 3 exerts a significant positive impact on cassava production, but the impact of its second lag cassava output is negative. Adamu (2018) investigated the impact of the agricultural loans on dry season farming in the Mubi metropolis of Adamawa state, Nigeria. The study further revealed that 97% of the farmers' farm sizes were below 0.76 and 57% of which are inherited by the farmers while only 10% of the farmers enjoy government loans as 90% finance their farming by personal savings and other sources. Moreover, 40% of the farmers get assistance from politicians in form of farming tools. Osabohien, Adeleye, and De Alwis, (2020),

examined how agro-financing impacts food production in Nigeria supporting Goal 2 of the 2030 Sustainable Development Goals (SDGs) for the period 1981–2018. Findings revealed that agro-financing was statistically significant in explaining the level of food production in Nigeria.

Ndubuaku, Okoro, Bello, and Alozie (2019) investigated the impact of agricultural financing on the agricultural sector's contribution to GDP in Nigeria for the period 1981 to 2016. The study found that government funding to agriculture and the Agricultural Credit Guarantee Scheme Fund (ACGSF) had a non-significant impact on Agricultural Contribution to GDP (AGDP). On the other hand, the study found that Commercial Banks' Credit, Loans, and Advances to the Agricultural Sector (CBCA) had a positively significant impact on GDP. Abbas *et al.* (2016) examined Pakistan's government expenditure and the degree of its impact on the agricultural sector and economic growth for the period 1983 to 2011. The Johansen Co-integration test results showed the existence of a long-run relationship between government expenditure on agriculture, agricultural outputs, and economic growth in Pakistan. On the other hand, the regression analysis revealed that agricultural outputs and government expenditure had a positively significant impact on GDP in Pakistan. Egwu (2016) investigated the impact of agricultural financing on agricultural output, economic growth, and poverty alleviation in Nigeria by employing the use of the ordinary least square regression technique. The result revealed that Credit Guarantee Scheme Fund Loan and commercial banks' credit to Nigeria's Agricultural sector has significantly impacted agricultural output positively thereby reducing the poverty rate and stimulating the economic growth within the study period. Iganiga and Unemhilin (2011) examined the effect of federal government agricultural expenditure on agricultural output in Nigeria. The results showed that a positive relationship exists between government capital expenditure and agricultural output. Therefore, this study attempts to fill the gap in the related empirical literature reviewed by limiting its examination to the impact of government expenditure on agriculture and its effect on crop production, which other studies did not capture but instead considered agricultural output as a whole.

Methodology and Model Specification
To test the null hypotheses, this paper used secondary data and employed annual time series data for the period 1981 to 2019 collated from the Central Bank of Nigeria (CBN) Statistical Bulletin. The Augmented Dickey-Fuller (ADF) Unit Root Test was employed to test the stationarity of the data while the bound co-integration technique was used to check for the existence of a long-run relationship among the variables. Therefore, to investigate the impact of agricultural government expenditure on agricultural output in Nigeria, the Autoregressive Distributed Lags (ARDL) bounds testing approach developed by Pesaran, Shin, and Smith (2001) was adopted. The choice of this method is justified by the advantages following: first, the ARDL is more flexible and presents the advantage of being applicable when all variables are I (0), I (1), or are mutually integrated (Pesaran et al., 2001). Secondly, the ARDL is robust when the sample size is small (Odhiambo, 2009; Solarin and Shahbaz, 2013). Thirdly, in applying the ARDL method biased estimators cannot be obtained in the long-run model (Harris and Sollis, 2003). In this case, the functional form of the model followed closely that

of Eguw (2016); Obi and Obayori (2016); Udeorah and Vincent (2018); Ndubuaku, Okoro, Bello, and Alozie (2019); and Edeh, Ogbodo and Onyekwelu (2020). The functional model is expressed as:

$$CP = f(GCEA, GREA, ACGSF) \quad\text{-}\quad\text{-}\quad\text{-}\quad\text{-}\quad\text{-}\quad\text{-} \quad (1)$$

Equation (1) is further expressed as:

$$\log CP = \beta_0 + \beta_1 \log GCEA + \beta_2 \log GREA + \beta_3 \log ACGS + \varepsilon t \quad\text{-}\quad\text{-}\quad\text{-} \quad (2)$$

Equation 2 is transformed into log form to reduce the data into a sizeable measurement which has a common based for adequate interpretation of elasticities. The log form of the variable is to reduce the magnitude of the values to a manageable size and for a more robust result. The elasticities of the variables are obtained to reduce the high values of the variables into a manageable size.

Where:
logCP = log of Crop Output
logGCEA = log of Government Capital Expenditure on Agriculture
logGREA = log of Government Recurrent Expenditure on Agriculture
ACGSF = log of Agricultural Credit Guarantee Scheme Funds
εt = Error Term at time t
Log = Natural Logarithm
β_0 = Constant
$\beta_1 - \beta_3$ = Coefficient

Apriori Expectation
Hypothetically, β_1, β_2, and $\beta_3 > 0$ are expected to be greater than zero. This means that Government Capital Expenditure on Agriculture, Government Recurrent Expenditure on Agriculture, and Agricultural Credit Guarantee Scheme Funds are positively related to crop production. This implies that when there is an increase in Government Capital Expenditure on Agriculture, Government Recurrent Expenditure on Agriculture, and Agricultural Credit Guarantee Scheme Funds, crop production would increase in Nigeria. Based on equation (2), the long-run ARDL model is presented as;

$$\log CP_t = \alpha_0 + \beta_1 \log GCEA_{t-i} + \beta_2 \log GREA_{t-i} + \beta_3 \log ACGS_{t-i} + \varepsilon t\text{-} \quad\text{-}\quad\text{-} \quad\text{-} (3)$$

Therefore, the short-run ARDL model is presented as thus;

$$\Delta \log CP_t = \alpha_0 + \beta_1 \Delta \log GCEA_{t-i} + \beta_2 \Delta \log GREA_{t-i} + \beta_3 \Delta \log ACGS_{t-i} + \phi ECT + \varepsilon t\text{-} \quad\text{-} (4)$$

Where,
α_0 = drift component
$\beta_1 - \beta_3$ = long-run dynamics of the model
εt = error term
t−I = lagged period
Δ = difference operator
ϕ = Coefficient of the error correction term

Analysis and Discussion of Findings

The descriptive statistics of all the variables considered in the model was carried and the result is presented in table 1.

Table 1: Descriptive Statistics of the Variables

	LOG(CP)	LOG(GCEA)	LOG(GREA)	LOG(ACGSF)
Mean	7.985429	3.572639	0.918183	12.38191
Median	8.310882	3.482174	1.955089	12.63982
Maximum	9.691654	8.990816	4.252410	15.91897
Minimum	2.550789	-0.776529	-4.360665	3.148453
Std. Dev.	2.093432	2.528228	2.951829	3.577800
Observations	39	30	39	39

Source: Author's computation from E-views 10 (2022)

Descriptive statistics of the variables, such as averages, maximums, and minimums as well as standard deviations are presented in table 2. With a standard deviation of 2.093, the average value of crop production was 7.985. During the research period, the data varied between the minimum and maximum values of 2.550 and 9.691. This means that crop production in Nigeria averaged 7.985% which is high above the projected 2% population growth rate in Nigeria. Thus, the agriculture production in Nigeria is sufficient to cater for the need of the growing population. This means that there is an average of 2.093% scarcity in the data pertaining to crop production. The government's agricultural capital expenditures have an average of 3.572 and a standard deviation of 2.528, ranging from -0.776 to 8.990 in value. By implication, government capital expenditure on agriculture is 3.572% on average which is below the amount expected to be spent on capital projects in the agriculture sector thereby allowing farmers the avenue to purchase or carter for their agricultural needs. According to data from 1981 to 2019, the government spent an average of 0.918% of its recurrent budget on agriculture, with a standard deviation of 2.951, between the lowest value of -4.360 and the highest at 4.252. The recurrent spending on agriculture in Nigeria has been largely meant for the purchase of goods and services in Nigeria which determine the living standard of these farmers who are predominantly rural dwellers in Nigeria. The mean value of agricultural credit guarantee funds 12.381 ranges between 3.148 and 15.918. The standard deviation of 3.577 indicated that the dispersion of Agricultural credit guarantee scheme funds data was higher than other variables. This implies that agricultural scheme funds had the highest mean denoting that funds have been channeled into the agricultural sector through the scheme. To avoid spurious estimations of time series results in economics, it is necessary to determine the time series data's stationarity. The Augmented Dickey-Fuller test was decided upon to ensure that a reliable and efficient estimation result is achieved.

Unit Root Test

This study applied a unit root test to determine if the data is stationary before any analysis can be conducted. It is recommended that the unit root test is conducted to validate the data for analysis. The unit root was tested using the Augmented Dickey-Fuller test at a 5% level of significance.

Table 2: Results of unit root test

Variable	Level	ADF critical value	1ˢᵗ difference	ADF critical value	Order	Remark
LogCP	-2.726375	-2.941145	-6.102114	-2.943427	$I(1)$	Stationary
LogGCEA	-0.633241	-2.967767	-5.721188	-2.976263	$I(1)$	Stationary
LogGREA	-2.011143	-2.945842	-8.570666	-2.943427	$I(1)$	Stationary
LogACGSF	-2.995971	-2.941145	-5.735245	-2.943427	$I(0)$	Stationary

Note: 5% critical value was used for the ADF test
Source: Author's computation from E-Views 10 (2022)

The ADF test indicates that three of the variables (CP, GCEA, and GREA) were found to be stationary at the first difference and a 5% level of significance because their P-values were below the 0.05 respectively. Hence, the unit-roots for the ADF test were rejected at the first difference for the three variables. However, ACGSF was found stationary at levels and a 5 percent level of significance. Since they were all found stationary at different orders, i.e 1(1) and 1(0) they satisfy the condition for using ARDL and Bounds cointegration test.

Lag Length Criteria
To get the most accurate model parameters, it is necessary to determine the lag length criteria. The best model for a study must have a lag length that fits the data the best. Lag length 4 was selected based on the lag length estimation criteria. According to the information criteria, the best lag length to be used in this case is four lag. Using the lag length, the results are shown in Table 3.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-106.6995	NA	0.058659	8.515344	8.708898	8.571081
1	-41.70620	104.9891	0.001380	4.746631	5.714397	5.025312
2	-23.36733	23.98160	0.001274	4.566718	6.308697	5.068345
3	-0.179708	23.18762	0.000965	4.013824	6.530017	4.738396
4	42.12981	29.29120*	0.000240*	1.990015*	5.280421*	2.937533*

Source: Author's computation from E-view 10 (2022)

The best lag period for model estimation is determined by the lag length criteria. As a result, the model's efficacy is evaluated based on the length with the greatest number of criteria. Using the asterisk (*), five criteria were met: sequential modified LR test statistic (LR), final prediction error FPE, Schwarz information criterion (SIC), Hannan-Quinn and Akaike information criteria. A bound co-integration test was performed to assess the estimation's accuracy, and the results are detailed in this report.

Co-integration Bound Test

Table 4: Summary of Co-integration Bound Test Result

Test Statistic	Value	K
F-statistics	12.79118	3
Critical Bounds Value		
Significance level	Lower bound $I(0)$	Upper bound $I(1)$
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: Author's computation from E-view 10 (2022)

Table 4 shows that at a 5% level of significance, the F-statistic value is greater than the ARDL upper bound value. This suggests that government spending on agriculture has a long-term effect on agricultural output. The coefficient of the F-statistic 12.79118 is above the upper bound of 3.67, which indicates that there is sufficient evidence of a long-term relationship between government expenditure on agriculture and agricultural output in the model. Therefore, there is no evidence to support the null hypothesis that there is no long-term connection between the two variables in question. There is a strong long-term relationship between the variables in the model, which was confirmed by the results.

Table 5: ARDL long run estimated Result: log (CP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(CP(-1))	0.849741	0.078305	10.85174	0.0000
LOG(GCEA)	-0.005180	0.012611	-0.410749	0.6867
LOG(GREA)	0.002700	0.017864	0.151114	0.8818
LOG(ACGSF)	-0.013026	0.025381	-0.513240	0.6148
C	1.473111	0.459635	3.204958	0.0055
R-squared	0.995010	F-statistic		319.0460
Adjusted R-squared	0.991891	Prob(F-statistic)		0.000000

Source: Authors computation, from E-view 10 (2022)

Table 5 shows an estimated log of crop production coefficient of 0.849, which is significant at a 5% level of significance (see significance chart) (0.0000). This means that, if crop production increased by 1% in the previous period, agricultural output would increase by 0.849 % in the current period. There is a positive correlation between crop production in Nigeria during the lag period and agricultural output, so the findings are in line with what was expected. This means that the previous period's crop production has a 5% significance level in determining Nigeria's agricultural output.

Nigeria's agricultural output is negatively impacted by the government's investment in agriculture. This is at odds with the presumption of a long-term happy relationship. Assuming a probability value greater than or equal to 0.6867, the government capital expenditure coefficient of -0.005 is not statistically significant. Increasing government capital spending by 1% would reduce agricultural output in Nigeria by 0.005% according to this calculation. This finding is consistent with the study of Matthew and Mordecai (2016) and Edeh, Ogbodo, and Onyekwelu (2020). This consistency of the findings is attributed to the trend of capital expenditure in the sector. A major reason that can be attributed to the non-significance of the coefficient of government capital expenditure on agriculture could be attributed to the increase in debt burden which when not redeemed within the stipulated time could lead to a decrease in investment as thus crowd out of private investment in the agricultural sector and thus, lowers agricultural production in Nigeria. Also, government capital expenditure on agriculture insignificance could be attributed to the high level of corrupt practices prevalent in Nigeria (diversion of public funds into private accounts, misappropriation of public funds and inflating contract price) that have become impediments to agriculture sector growth thereby slowing agricultural output in the country. It also indicates that the size of government capital expenditures on agriculture is insignificant to provide the Nigerian population with the needed products.

0.0027 is the positive coefficient for government recurrent expenditure on agriculture. Furthermore, this indicates that the government's recurrent agricultural expenditure was in accordance with expectations. This variable's probability of 0.8818 confirms its insignificance. This means that a 1% increase in government recurrent expenditure on agriculture would result in a 0.0027% increase in Nigeria's agricultural output. This finding is consistent with the findings of Tawose (2014) and Olawumi and Oyewole (2018). The conformity of the findings with other studies is linked to the length of time in which the study was carried out as well as the study area. Therefore, an increase in government recurrent expenditure on agriculture would lead to an increase in the output level resulting from the high level of consumption and production of agricultural output by citizens in Nigeria. The insignificant effect could be attributed to the high level of imported agricultural products which has depleted the personal savings of Nigerians toward reinvestment into agricultural activities in Nigeria. Higher savings could lead to higher income, and raise the total factor productivity, hence growth in agricultural output (Mankiw, Romer and Weil, 1992). Due to the high taste for foreign products in Nigeria, imported inflation has continued to erode the purchasing power of farmers thereby affecting the level of resources used for agricultural production on a large scale.

Additionally, Nigeria's agricultural output is negatively impacted by the agricultural credit guarantee fund. This is demonstrated by the -0.013 coefficient, which indicates a deviation from a priori expectations. The negative coefficient means that a 1% increase in the fund for the agricultural credit guarantee scheme would result in a 0.013% reduction in Nigerian agricultural output. The product of this study is in disagreement with the findings of Udeorah and Vincent (2018) but consistent with Ndubuaku, Okoro, Bello, and Alozie (2019). The alignment of the study findings could be attributed to the peculiarity witnessed in the

agricultural sector over time which has thwarted the sector's output growth in Nigeria. This discrepancy in the findings could be attributed to the study period employed by both studies. In this case, the insignificant agricultural credit guarantee scheme funds can be attributed to factors such as the interest rates charged on these funds by the government. Most of the farmers in Nigeria are low-income earners who barely can afford three square meals per day. The agricultural credit guarantee scheme funds which are targeted at enhancing agricultural productivity in the country end up not reaching the target audience in the rural areas as most of these resources end up in the hands of those in the urban areas where agricultural activities have been taken over by commercial and industrial activities.

The coefficient of the constant or intercept is 1.473, which shows that agricultural output in Nigeria would be positive at 1.473 units if the explanatory variables were held constant. As indicated by the F-probability value of 0.0000 and the 319.0460 value, all of the explanatory variables together explained agricultural output. A further 99.50% of Nigeria's agricultural output variation can be attributed to the government's investment in agriculture.

Table 6: ARDL Short-run Estimated Result: log (CP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(GCEA)	-0.005180	0.009498	-0.545342	0.5930
DLOG(GREA)	0.002700	0.012501	0.215949	0.8318
DLOG(ACGSF)	0.034544	0.048400	0.713722	0.4836
CointEq(-1)*	-0.150259	0.016805	-8.941190	0.0000

Source: Author's computation from E-views 10 (2022)

Table 6 summarizes the parameters of the explanatory variables and the speed of adjustment in the short run. Therefore, was noted that a significant error correction term exists. This lends credence to the hypothesis that the variables have a long-term, stable relationship. Because of this, it's worth noting that the system returns to short-run disequilibrium at 15.02% after a shock. This means that a 15.02% deviation from long-run disequilibrium is corrected in the short run. The ECT (-1) sign confirms the long-run existence of a co-integrating relationship between government agricultural expenditure and agricultural output by showing how slowly disequilibrium is adjusted back to equilibrium in the short run. As a result, agricultural output in Nigeria is only slowly responding to government agricultural expenditures. Diagnostic tests were performed on the model to verify the accuracy and reliability of the data. Table 7 shows the results of the diagnostics.

Post-estimation Test Results
To avoid drawing incorrect conclusions about economic phenomena, it is necessary to examine the model's assumptions about explanatory variables and residuals. According to the model's assumptions, the explanatory variables must be uncorrelated to examine the influence of each on the dependent variable. In addition, the model assumes that residuals are not correlated with each other. The model should not contain any multicollinearity or serial correlation. Furthermore, the issue of model misspecification must be avoided. These

assumptions lead to the null hypothesis being accepted when the test probability values exceed the specified significance threshold. A model is said to be "fit" if it shows no serial correlation or heteroskedasticity.

Table 7: Diagnostic Test Results

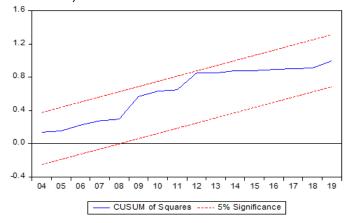| Diagnostic Tests		
Test	F-statistics	Probability
Jarque-Bera	0.833850	0.6591
Breusch-Godfrey Serial Correlation LM Test	0.223993	0.9198
Heteroskedasticity Test: Breusch -Pagan- Godfrey	1.721241	0.1605
Ramsey RESET Test	1.504329	0.2389

Source: Authors computation from E-views 10 (2022)

The results of Jarque-Bera, serial correlation, heteroskedasticity, and Ramsey test of model fit were conducted to evaluate the model. The probability values of the Breusch-Godfrey serial correlation and Breusch-Pagan-Godfrey heteroscedasticity test were 0.6591 and 0.9198 which is greater than 0.05, denoting the acceptance of the null hypothesis of no serial correlation, no heteroskedasticity and normality distribution. Furthermore, the probability value of the Ramsey RESET Test is 0.2389 which entails the acceptance of the null hypothesis stating that the model is correctly specified. This indicates that the functional form of the model is correct, depicting that the model does not suffer from omitted variables.

Stability Test
The short-run dynamic model's stability properties were examined using plots of the Cusum Sum of Residual (CUSUM). Changes in the regression coefficients can be detected more accurately using the CUSUM squares. Figure 2 depicts the CUSUM squares test result.

Figure 2: CUSUM Stability Test Result

Source: Authors computation from E-views 10 (2022)

Figure 2 shows that no cumulative sum strayed outside the critical region. Since the model residuals stayed within these two lines from 1981 to 2019, the study period depicted by the graph has been judged to be stable. Consequently, it is stable and efficient in estimating the relationship between government agricultural expenditure and agricultural output in Nigeria.

Conclusion and Recommendations

The study sought to examine the impact of government agricultural expenditure on agricultural output in Nigeria for the period 1981 to 2019. The study revealed that government agricultural expenditure has an insignificant impact on agricultural output in Nigeria. The outcome of the study concerning government capital expenditure on agriculture negates the a priori expectation implying that government capital expenditure on agriculture in Nigeria has led to a decline in agricultural output. Although the government has continued to fund agricultural activities through its budgetary allocation in Nigeria, its production has remained largely low thereby leading to the fear of food insecurity in Nigeria which affects the prices of agricultural output in the country. Agricultural production has continued to contribute immensely to the Nation's gross domestic product but this has been marred by insecurity and climate change. This affects grossly the living standard of every Nigeria as most of the people are engaged in agricultural activities in the rural areas thereby affecting the income used for the upliftment of livelihood. Most of the resources allocated for agricultural activities end up not reaching the targeted audience which is mostly farmers in the rural areas and thus its impact on the output remains low or insignificant.

Following the outcome of the study, the following recommendations are put forward:
1. Government should ensure that the capital budget allocated for the agricultural sector is followed with all seriousness to ensure the execution of projects that would enhance the sector's output growth in Nigeria.
2. The government monitoring agencies should ensure that capital expenditure allocated for agricultural development is judiciously spent to minimize the level of corruption in the sector in Nigeria
3. The government should reduce the number of resources spent on agricultural recurrent expenditure to enhance the production of locally produced goods in the country.
4. The government should empower the farmers with equipment and technology, and formulate and implement policies aimed at improving agricultural sector spending in Nigeria. This can be achieved through the judicious utilization of capital expenditure in the sector.
5. At all levels, the government should intensify and expedites efforts on the procurement of capital equipment through effective monitoring and evaluation for the enhancement of agricultural sector output.

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