Public expenditure and agricultural productivity in Nigeria

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Abstract

In a country like Nigeria, which operates on an agrarian economy, agricultural products serve as the essential foundation for sustainable development to thrive. In addition to serving as the main food source for a large segment of the population, the agricultural sector is vital in enhancing the GDP, thus remaining essential to the Nigerian economy. This study examined public expenditure on agricultural productivity in Nigeria from 1981 to 2023. An Augmented Dickey Fuller unit root test was employed to assess the correlation between agricultural output, total public expenditure, gross domestic product, agricultural value added, and the agricultural share of gross domestic production, which were found to be correlated in order one (1). In contrast, capital expenditures and recurrent expenditures were correlated in order zero (0). Furthermore, a co-integration bound test was conducted to explore long-term relationships, revealing that capital, recurrent expenditures, and agricultural production are interconnected in the long run. The short-run test results indicate that capital government expenditures and recurrent government expenditures do not significantly impact agricultural productivity. However, gross domestic product and agricultural value added are found to be statistically significant. Given the findings, it is advised that federal, state, and local governments increase their funding and capital investment in agricultural production. Establishing modern farming facilities would enhance large-scale production, consequently boosting GDP as well.

Key words: Public expenditure, Agricultural productivity, Economic growth, Nigeria

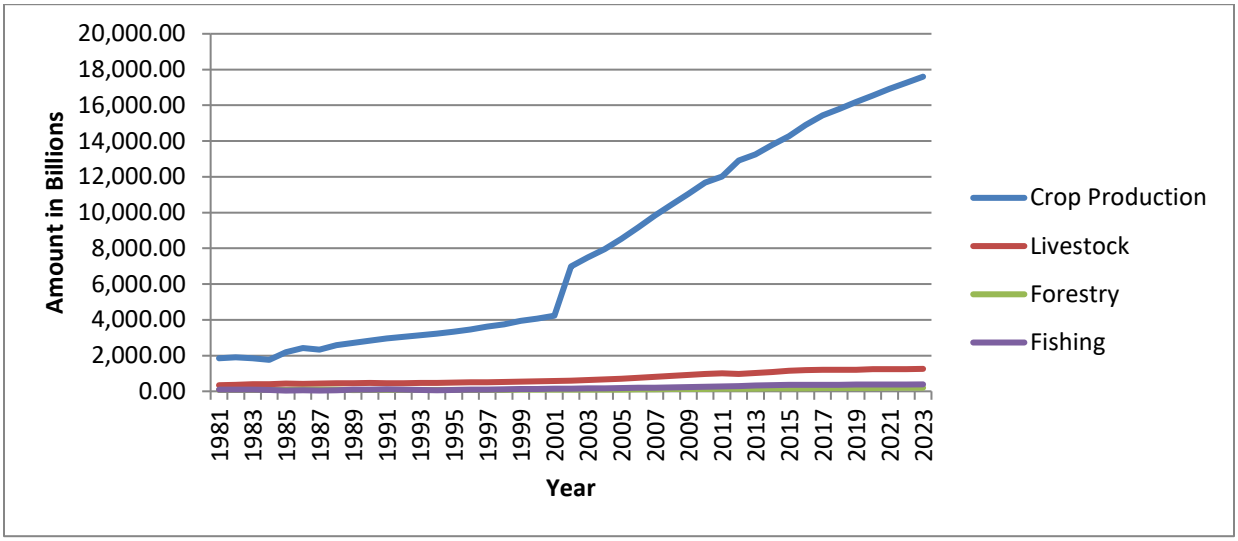
JEL Classification Codes: H10, H11, H50, Q17, Q20

1. Introduction

Agricultural productivity refers to the measure of the output of agricultural activities (such as crops or livestock) relative to the inputs use (such as land, labour, fertilizers, seeds and water). It reflects how efficiently resources are being used to produce food and other agricultural goods. In Nigeria, agriculture employs about 35% of the population as of 2020, despite the presence of oil. It remains the economic backbone, with 70% of people engaged at a survival level. Key subsectors include crop production, livestock, forestry, and fishing, with crop production accounting for 91.6% of agricultural output in Q3 2019 and showing 44.12% growth. The sector contributed approximately 22% of GDP in 2013, 24.18% in 2016, and 29.25% in Q3 2019 (Food and Agriculture Organization, 2020). Nigeria's varied climate supports a diverse range of crops, including staples like cassava, yams, and corn, as well as cash crops such as cocoa and cotton. Before oil dominance in the late 1970s, these crops were key exports. Post-civil war, food imports surged, disrupting self-sufficiency. Key southern crops are cassava and yam, while the north grows guinea corn and beans. In 2018, Nigeria produced 59.4 million tons of cassava, 47 million tons of yam, and various other crops while having livestock numbers of 53.5 million goats, 22.1 million sheep, and 13.9 million cattle. Main trade partners include Brazil, China, and the US, but the region faces ecological challenges due to low rainfall. (Lawal-Adebowale, 2021).

Between 2019 and 2023, Nigeria's agricultural productivity underwent a combination of progress and challenges, shaped by a variety of internal and external influences. In 2019, maize production reached a high of 12.7 million metric tons (mmt). However, by 2022, it experienced a slight decrease to 12.2 mmt, mainly due to diminished challenges such as droughts and floods. Milled rice production rose from 5.0 mmt in 2019 to 5.3 mmt in 2021, before stabilizing at 5.0 mmt in 2022. Despite these statistics, Nigeria continued to be a major rice importer, holding the fourth position globally. While soybean production saw a 12% increase over the last decade, it is projected to decline by 4.8% in 2023, a situation attributed to shortages of fertilizer and increasing input costs.

Figure 1. Agricultural Production in Billions



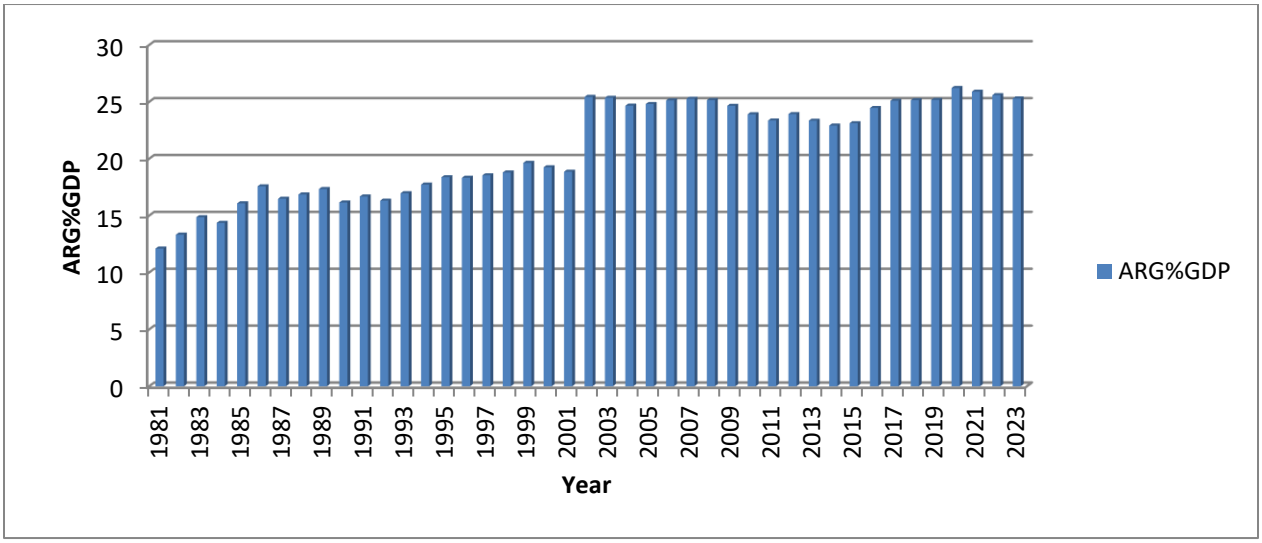
Source: Authors compilation from CBN 2024.

The figure above shows that crop production is the main component of agricultural output, with the government investing more in crops than in livestock, forestry, and fishing. In 2018, food crops contributed about 76% to the agricultural GDP, while livestock contributed 10%, with the rest from forestry and fisheries (CBN, 2018). Although agriculture is Nigeria's largest sector, employing two-thirds of the workforce, there is little discussion on its performance in addressing production challenges. Over the last 20 years, agricultural production has increased by less than one percent annually per capita. The Federal Ministry of Agriculture and Rural Development (FMARD, 2021) reported that Nigeria has been losing approximately $10 billion each year in export opportunities as a result of the decreasing production of cotton, cocoa, palm oil, and groundnuts. The Food and Agriculture Organization (2021) links the rise in food imports and decreased food self-sufficiency to increased food crop production and population growth.

Nigeria has been increasing public spending for years. Akpan (2005) notes that many nations, including Nigeria, allocate public expenditures without considering their economic development stage, as highlighted by Aruwa (2009). This trend is evident in Nigeria's significant resource allocation to agriculture, health, education, industries, and social services, which support economic growth. Recent fluctuations in agricultural spending are documented in the Nigerian Agricultural Public Expenditure Review (NAGPER), showing low expenditure levels in the 1970s and 1980s. A rise in agricultural GDP began in the 1990s, with an average growth rate of 5.6% in 2000,

exceeding the African average and nearing the government's 6% target. However, the sustainability of this growth is uncertain, as crop yields have declined over the past two decades due to stagnant productivity, prompting calls for a review of agricultural public expenditures. The table below shows agriculture's contribution to GDP, peaking at 25.43% in 2002, followed by 25.34% in 2003, 25.26% in 2007, 25.15% in 2019, 25.14% in 2008, and 25.11% in 2006. In 1981, agriculture's GDP contribution was 12.09%, the lowest since 1958.

Figure 2. Agriculture as a percentage to GDP



Source: Authors compilation from CBN 2024 statistical bulletin.

In recent years, government spending has fallen short of public expectations as a means of financing agricultural production. In comparison to other developing nations like Kenya, which allocates 6%, and Brazil, which allocates 18% (Uremadu, et al., 2018), Nigeria's government expenditure on agricultural output is less than 2% of the total annual budget, as reported by a World Bank study (2008). Economic theories indicate that agricultural development involves the adoption of new production methods by farmers and the acquisition of new input materials (Akintunde, et al., 2013). A major factor in agricultural development is public spending. Government spending on agriculture is one of the most important instruments for promoting economic growth, development, and poverty reduction in economies where a sizable section of the population depends on agricultural products for their livelihood. This is because agricultural expenditures are crucial for transforming the agricultural sector, which is essential for agricultural

economies. By increasing government investment in irrigation, agricultural production can be directly enhanced by shifting the production frontier upward (Binswanger, et al., 1993).

In Nigeria, public capital expenditures for agriculture typically made up 55% of overall agricultural expenditures, falling short of the 60% required for the agricultural sector to function at its best (Alabi & Abu, 2023). Additionally, their research shows that although total public agricultural expenditure and public agricultural capital expenditure are important determinants of agricultural productivity, there is not much of a correlation between Nigerian agricultural productivity and public recurrent expenditure. Public capital expenditure has a negative influence on agricultural productivity in Nigeria, according to Nuhu, Onuoha, & Dalyop (2022), however this effect is statistically insignificant over the long and short terms. However, a comparison of the federal government's capital expenditures for agriculture to the total amount spent on other sectors of the government suggests that the agricultural sector needs more support (Efanga, Ame, & Takon, 2024). Federal capital spending on agricultural output was below 10 percent from 1980 to 2011, with the exception of 1981, 1982, 1983, 1984, 1986, 2001, 2002, 2004, 2005, 2007, 2008, and 2009. Notably, a number of government agricultural development policies and initiatives were introduced in 2009, such as the Rural Agro-Industrial Development Scheme (1987), the Structural Adjustment Programme (1987), and the Green Revolution (1980).

Agriculture in Nigeria began facing challenges in the mid-1970s, leading to a decline in agricultural product exports and subsequent food shortages. Experts indicate that agricultural production is hindered by insufficient funding. Although government spending on agriculture in Nigeria has steadily increased over the last few decades, empirical data suggests that the agricultural sector has not performed well (CBN, 2009; Ekerete, 2000), and there is widespread dissatisfaction among Nigerians regarding agricultural output. The agricultural sector in Nigeria has suffered from a lack of interest from both the government and the populace. Since the discovery of oil, Nigerian agriculture has not received the necessary attention. It is often overlooked that agriculture was once the backbone of the nation, as both the government and the public concentrate on crude oil. Due to the government's disregard for the agricultural system, a large number of people from rural areas have moved to cities in pursuit of white-collar jobs.

The nation is confronted with a financial issue in the agricultural sector. Typically, there are delays in the disbursement of government loans to farmers in Nigeria, particularly those in rural areas.

There have been instances when the government failed to approve the appropriate loan amount following the planting season. Even when the loan is distributed earlier, it often does not reach the farmers in need (the impoverished and rural farmers) but is instead redirected to other activities that do not contribute to agricultural output. Due to significant political costs, these affluent farmers seldom repay the loans and face no penalties (Uremadu, et al., 2018). By investing in agricultural production, the government seeks to enhance productivity and alleviate poverty and hunger in the nation, as agriculture is the backbone of the economy.

Limited access to government credit facilities hinders farmers and imposes societal costs, leading to rural unemployment, poverty, and asset liquidation. The Nigerian government is attempting to address these issues by increasing resources for credit subsidies, creating a credit guarantee fund, and fostering financial system innovations. Despite efforts to boost agricultural spending to improve food production, declining oil revenues have restricted resources, contradicting the Maputo declaration's call for a 10% annual budget allocation for agriculture. Nigeria has allocated less than 5% of its budget to agriculture in recent years, with allocations dropping from 5.41% in 2008 to just 1.56% in 2019. Consequently, agricultural production has not kept pace with population growth, resulting in significant food insecurity, as the sector contributed only 23.1% and 25.2% to GDP in 2015 and 2019, and 25.6% and 25.27% in 2022 and 2023, while only 40% of arable land is cultivated (NBS, 2023).

In addition to evaluating the short- and long-term conditions of agricultural production in Nigeria, this study also looks at the long-term effects of government spending on agricultural output and evaluates the agricultural sector in Nigeria. According to a review of the literature on public spending and agriculture, very few researchers have attempted to distinguish between capital and recurrent public spending in order to evaluate the short-term effects of each on agricultural output (Oaya & Obumneke, 2017). The long-term effects of capital and recurrent expenses in agriculture have not been explored. This study intends to analyze public capital and ongoing costs related to agricultural production in Nigeria, using recent data and an Autoregressive Distributed Lag (ARDL) model for the years 1981 to 2023.

1.1 Composition of public agricultural expenditure

Recurrent and capital expenditures are some of the methods by which the government regulates the agricultural industry and production. While recurrent expenditures are utilized in the payment of wages and salaries, procurement of goods and services, and utilization of fixed assets, capital expenditures involve the building of silos, tractors, feeder roads, and other machinery for farmers, thus expanding agricultural production and improving the standard of living of people in such areas. Furthermore, government spending on loan programs, input subsidies, and other types of financial support to farmers, especially rural farmers, would render farming more lucrative. It would raise agricultural production and stimulate entrepreneurship in agro-business, with multiplier impacts on other sectors of the economy, including industry (Edeh et al., 2020).

The government spending on agriculture has varied over the years. From 1981 to 1990, the federal government spent an average of 0.93 billion Naira on agriculture. This rose to 6.103 billion Naira from 1991 to 2000. It further increased to ₦71.14 billion as the average capital spending from 2001 to 2010, and from 2011 to 2018, it rose slightly to ₦72.06 billion. Besides, the average recurrent expenditure by the federal government has also shown a mixed trend; from 1981 to 1990, it was ₦0.26 billion. It increased to ₦6.34 billion from 1991 to 2000. After rising to ₦28.22 billion from 2001 to 2010, the average recurrent expenditure kept increasing to ₦70.27 billion from 2011 to 2019 (Central Bank of Nigeria Bulletin, 2019). The recurrent expenditure of the public on agriculture in 2020 was ₦76.61 billion, which fell to ₦72.27 billion in 2021. In 2022 and 2023, however, it rose again to ₦81.87 billion and ₦87.69 billion, respectively.

The statistics point to the fact that the government spent more on capital spending and less on recurrent spending, including employees' salaries and wages, during the previous period. Since 2020, however, that trend has changed, with the government spending more on recurrent expenditure and less on capital expenditure. The heavy capital expenditure in agriculture, along with a substantial decline in current expenditure, can be attributed to the federal government's engagement in agriculture being capital-intensive and less labor-intensive than in other sectors of the economy. Sub-Saharan African nations, including Nigeria, are recognized for their labor-intensive agricultural practices. As of the third quarter of 2017, the audited financial statements of the federal government of Nigeria reveal that the agricultural sector employs the majority of the

labor force, totaling 77.5 million individuals. In the comparison of capital and recurrent expenditures between government expenditures for agriculture (GEA) and total government expenditures (TGE), it is evident that GEA accounts for a larger proportion of capital expenditures. Conversely, GEA holds a smaller share of recurrent expenditures compared to TGE, indicating that GEA has lower recurrent expenditures.

Enhancing and advancing agricultural production within the nation is the primary objective of public spending on agricultural initiatives aimed at alleviating poverty and hunger. In order to achieve these roles and goals, governments have traditionally devoted the majority of financial and other capital resources to supporting agriculture. To this end, and in the fight against poverty, the government has implemented a number of policies and programs, such as the Green Revolution (GR), the Land Use Degree Fertilizer Company of Nigeria (NAFCON), the Agriculture Development Project (ADP), and Operation Feed the Nation (OFN). However, these policies have not been successful in increasing agricultural production because the costs continue to exceed the benefits, and Nigeria has become a major importer of agricultural products (Abula & Ben, 2016).

2. Literature Review

2.1 Theoretical literature

The Wagner hypothesis of public expenditure was developed by German economist Adolph Wagner. According to this hypothesis, public spending will steadily climb in tandem with income, which will propel industrial development as the proportion of public spending in the GDP rises. Three main factors contribute to the ongoing increase in public spending: the expansion of the scope of public goods (which includes building and maintaining public parks, providing irrigation and flood control, providing healthcare and educational facilities, and creating overhead capital), the coverage of new functions (such as health, education, affordable housing, food provision, agriculture, pensions, and sick benefits, etc.), and traditional functions (such as defense, administration of justice, maintenance of law and order, and provision of social overhead).

The agricultural location theory was formulated in the 19th century by a Prussian landowner named Johann Heinrich von Thünen (The Isolated State). This theory posits that market accessibility or proximity to the market can influence the utilization of agricultural land. Thünen's

model illustrates a solitary market surrounded by farmland, all situated on a flat, uniform terrain. At a fundamental level, transportation costs are solely influenced by the distance traveled and the volume shipped. According to the theory, farmers who are near or adjacent to the market will cultivate crops with high market values (i.e., the highest rent), thereby maximizing their profits. When transportation costs decrease, location rents will be elevated; conversely, if they increase, location rents will diminish. If transport costs escalate, location rents will be reduced. Utilizing this estimation, we derive a rent slope that indicates the decline of location rent as the distance from the market increases.

2.2 Empirical literature

Efanga, Ame, & Takon (2024) carried out research on government expenditure and agricultural sector output in Nigeria with a view to considering the effect of corruption perception index as a moderating factor. The study, using the ARDL approach, was conducted between 2003 and 2022. Government spending on agriculture impacts Nigerian agricultural output significantly, findings revealed, and the financial alternatives to agriculture correlate with agricultural output in Nigeria conditioned by the perception of corruption. In a different study, Alabi & Abu (2023) also examined the relationship between agricultural public spending and farm productivity in Nigeria. This study used time series data from 1981 to 2014 and employed an instrumental variable two-stage least squares (IV-2SLS) model and an autoregressive distributed lag (ARDL) model. According to the results, Nigeria was unable to realize 20% of its agricultural public budgets. Additionally, Nuhu, Onuoha, and Dalyop (2022) examined the Nigerian government's spending on productivity and agriculture from 1981 to 2019. The results of this study, which also employed the ARDL model, showed a long-term correlation between government spending and agricultural output in Nigeria. Additionally, it was found that capital expenditure had a negative, statistically insignificant, and short- and long-term effect on agricultural output.

Ayoub & Mivumbi (2019), using the ARDL model, analyzed the effect of public spending on China's agriculture output between 1988 and 2018. The result shows that there is a positive relationship between government spending and agricultural output, which reflects that government expenditure needs to increase in order to enhance agricultural productivity. Mondal (2018) also used the ARDL model to test short- and long-run relationships between government spending and agricultural development in another study and concluded that there is no significant relation

between the two. Ahmad (2018) examined the effect of government spending on Indian agricultural industries using panel data. The findings categorically show that government spending raises agricultural value. Iganiga & Unemhilin (2011) examined the effect of federal government spending on Nigerian agriculture from 1970 to 2008. They used co-integration and error correction techniques to examine these variables' short-run and long-run dynamic impacts. The two variables were observed to have a positive relationship in the study.

Ele et al. (2014) created a long-term relationship between the explanatory factors and the explained variable through the use of the Granger Causality test and Johansen maximum likelihood test to explore the impact of public capital expenditure on agricultural economic growth in Nigeria during the period 1961-2010. The error correction model also validated that agricultural capital expenditure has a positive impact on agricultural economic growth, with there being a unidirectional relationship between agricultural capital expenditure and agricultural economic growth. Fiscal policy contributed immensely to agricultural output in the 1980s and 1990s, argue Oladipo et al. (2020). A vector error correction model was used in the current research. The results show that Nigerian agricultural output has both capital and recurrent expenditure positively affecting it. Equally, the study by Okoh et al. (2019) was looking at how fiscal policy affected Nigerian agricultural productivity from 1980 to 2017. Employing the OLS estimation method, it looked into how the two variables are related. The findings show that government spending positively affects agriculture. In addition, Kamil et al. (2017) parameterized a model designed to evaluate the role of agriculture in economic growth using the Vector Error Correction Model (VECM). The findings indicate that Nigerian economic growth is positively determined by agriculture.

Aina & Omojola (2017) investigated whether government spending affected Nigerian agricultural output between 1980 and 2013 using Ordinary Least Squares (OLS) and Error Correction Models (ECM). The long-term results indicate that the coefficient of government spending on agricultural products is correctly signed, despite the short-term results showing a significant positive relationship. Zirra & Ezie (2017) investigated the effects of fiscal policy on Nigeria's agriculture sector. The estimation was done using a Fully Modified OLS method. Their results demonstrate that Value Added Tax (VAT) has a positive impact on the expansion of agricultural production, even though government spending on agriculture is still incredibly low. Similarly, Lawal et al.

(2018) examined how fiscal policy affected agricultural output in Nigeria. The findings show that there is no statistically significant relationship between government spending and agricultural productivity. Second, Abula & Ben (2016) examined Nigerian farm productivity and government agricultural spending using an Error Correction Model (ECM). Their research indicates that government spending on agriculture has a negative effect on agricultural productivity, potentially due to differences between actual and budgeted spending.

3. Research Methodology

Wagner's theory of expanded state activities forms the basis of this theoretical framework. The theoretical framework suggests that with economic growth, the government spending will rise with new activities coming into the economy. The theory has been shown to suggest that more new activities would augment output. Pesaren et al (2001) suggested the autoregressive distributed lag (ARDL) model to check whether the variables are co-integrated or not and is also referred to as the bound testing procedure. ARDL studies rely on the identification of long-run and short-run relationships among variables using a co-integration test. Irrespective of whether the variables are pure I(0) or I(1) variables, ARDL is used regardless of the order of integration among them. The general structure of an ARDL (Bound test) regression model looks like this:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \ldots + \beta_p y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \ldots + \alpha_q x_{t-q} + \varepsilon_t. \quad 3.1$$

Where ε_t is a random disturbance term

3.1 Model Specification

Model One: To investigate the impact of re-current expenditure on agricultural production in Nigeria.

$$AP = f(REXP, AVA, AGR\%GDP, TPE, GDP) \quad 3.2$$

Where;

AP = Agricultural Production, REXP = Recurrent expenditure on Agriculture. AVA = Agricultural value added, AGR%GDP = Agriculture share of GDP, TPE = Total public expenditure, GDP = Gross domestic product.

The data generating process for equation one in econometric from as

$$\Delta AP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta AP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta REXP_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta AVA_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta AGR\%GDP_{t-i} + \\ + \sum_{i=0}^{p} \alpha_{5i} \Delta TPE_{t-i} + \sum_{i=0}^{P} \alpha_{6i} \Delta GDP_{t-1} + \beta_1 AP_{t-1} + \beta_2 REXP_{t-1} + \beta_3 AVA_{t-1} + \beta_4 AGR\%GDP_{t-1} \\ + \beta_5 TPE_{t-1} + \beta_6 GDP_{T-1} + \varepsilon_t. \qquad 3.3$$

Model Two: To investigate the impact of re-current expenditure on agricultural production in Nigeria.

$$AP = f(CEXP, AVA, AGR\%GDP, TPE, GDP) \qquad 3.4$$

Where;

AP = Agricultural Production, CEXP = Capital expenditure on Agriculture, AVA = Agricultural value added, AGR%GDP = Agriculture share of GDP, TPE = Total public expenditure, GDP = Gross domestic product.

The data generating process for equation one in econometric from as

$$\Delta AP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta AP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta CEXP_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta AVA_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta AGR\%GDP_{t-i} + \\ + \sum_{i=0}^{p} \alpha_{5i} \Delta TPE_{t-i} + \sum_{i=0}^{P} \alpha_{6i} \Delta GDP_{t-1} + \beta_1 AP_{t-1} + \beta_2 CEXP_{t-1} + \beta_3 AVA_{t-1} + \beta_4 AGR\%GDP_{t-1} \\ + \beta_5 TPE_{t-1} + \beta_6 GDP_{T-1} + \varepsilon_t. \qquad 3.5$$

4. Results and Discussion

4.1 Unit Root Test

The Augmented Dickey Fuller unit root test, which is carried out by 5%, is displayed in the table below.

Table 4.1. Unit Root Test

Variables	5% Critical Values	Level Diff	First Diff	Prob	Order of Integration
AP	-3.533083	-1.670876	-5.659622	0.0002	I(1)
CEXP	-3.540328	-3.579185		0.0460	I(0)
REXP	-3.533083	-5.051841		0.011	I(0)
TPE	-3.533083	-1.901381	-5.613980	0.0002	I(1)
GDP	-3.536601	-2.421949	-3.815766	0.0268	I(1)
AVA	-3.533083	-1.670877	-5.659622	0.0002	I(1)
AGR%GDP	-3.533083	-2.618905	-4.702504	0.0038	I(1)

Source: Author's computation using E-views 10

The aforementioned unit root test indicates that the order of integration satisfies the Auto-regressive Distributed Lag Model (ARDL) requirementsA first-order integration of agricultural production (AP), total public expenditure (TPE), GDP, agricultural value added (AVA), and agricultural percentage to GDP (AGR%GDP) indicates that these variables are stationary at first difference. Both capital expenditure (CEXP) and recurrent expenditure (REXP) are stationary at level difference when they are integrated of order zero, I(0). Because of this, we do the ARDL Bound test before the co-integration test.

4.2 Short –Run Estimation

Table 4.2. Investigating the impact of re-current expenditure on agricultural production in Nigeria

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AP(-1)	0.893558	0.140799	6.346329	0.0000
REXP	-4.269488	3.670449	-1.163206	0.2657
REXP(-1)	-3.574098	2.997021	-1.192550	0.2544
AVA	0.017996	0.004619	3.895808	0.0018
AVA(-1)	-0.012336	0.005349	-2.306052	0.0382
AVA(-2)	0.004118	0.004695	0.877059	0.3964
AVA(-3)	0.008924	0.003626	2.461353	0.0286
AVA(-4)	-0.013461	0.004149	-3.244496	0.0064
AGR_GDP	-271.0127	146.7986	-1.846153	0.0878
AGR_GDP(-1)	138.0012	147.3300	0.936681	0.3660
AGR_GDP(-2)	-62.86202	134.6795	-0.466753	0.6484
AGR_GDP(-3)	-166.1743	106.7643	-1.556459	0.1436
AGR_GDP(-4)	370.7656	111.4679	3.326209	0.0055
TPE	0.181604	0.125687	1.444895	0.1722
TPE(-1)	0.283953	0.171008	1.660468	0.1207
TPE(-2)	0.277362	0.144117	1.924562	0.0765
GDP	-0.342148	0.076616	-4.465728	0.0006
GDP(-1)	0.121178	0.082103	1.475918	0.1638
GDP(-2)	-0.108332	0.093962	-1.152937	0.2697
GDP(-3)	-0.184161	0.091810	-2.005888	0.0661
GDP(-4)	0.387688	0.114456	3.387226	0.0049
C	592.5533	2458.029	0.241068	0.8133

R-squared	0.999878	Mean dependent var	7729.235
Adjusted R-squared	0.999682	S.D. dependent var	9081.409
S.E. of regression	162.0661	Akaike info criterion	13.28063
Sum squared resid	341450.3	Schwarz criterion	14.25828
Log likelihood	-210.4110	Hannan-Quinn criter.	13.61811
F-statistic	5083.105	Durbin-Watson stat	2.084144
Prob(F-statistic)	0.000000		

Source: Author's computation using E-views 10

From the regression above, the Akaike info criterion (AIC) is used to select the lags and the heteroskedasticity was corrected using the White co-efficient matrix. Also, the regression is free from the serial- correlation. The result shows that recurrent government expenditure, agriculture percentage of GDP and total government expenditures are not significant to agricultural production (AP) in Nigeria in the short-run. Also, agricultural value added and gross domestic production shows a significant relationship to agricultural production. That is to say that one percent change in agricultural value added will bring about 0.17% increase in agricultural production and also one percent change in gross domestic production will bring about 34% decrease in agricultural

production in the short-run. The regression has 99% goodness of fit and overall regression is significant having the probability of 0.00000.

4.3 Co-integration test (Bounds Testing Approach) for long-run relationship

Table 4.3. Co-integration Test Results

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	18.23051	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
			Finite Sample:	
Actual Sample Size	35		n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

Source: Author's computation using E-views 10

The top level in the Bound Test above is represented by I(1), while the lower level is represented by I(0). The significance threshold that we employ is 5% (0.05). We infer that there is a long-term association between agricultural production and recurring government spending since the F-statistic is 18.23051, which is higher than the upper bound test.

4.4 Short-Run Estimation of Model II

Table 4.4. Investigating the impact of capital expenditure on agricultural production in Nigeria

Dependent Variable: AP

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AP(-1)	0.944732	0.130117	7.260610	0.0000
CEXP	0.627322	0.721887	0.869003	0.3995
AVA	0.020478	0.004747	4.313931	0.0007
AVA(-1)	-0.015138	0.005419	-2.793704	0.0144
AVA(-2)	0.004997	0.004440	1.125433	0.2793
AVA(-3)	0.006870	0.003615	1.900363	0.0782
AVA(-4)	-0.012591	0.004010	-3.139707	0.0072
AGR_GDP	-333.4892	151.7094	-2.198211	0.0453
AGR_GDP(-1)	193.7798	142.3672	1.361127	0.1950
AGR_GDP(-2)	-84.26472	126.7329	-0.664900	0.5169
AGR_GDP(-3)	-116.4210	104.9460	-1.109343	0.2860
AGR_GDP(-4)	345.8996	110.0373	3.143477	0.0072
TPE	0.084100	0.175512	0.479171	0.6392
TPE(-1)	0.141670	0.178964	0.791613	0.4418
TPE(-2)	0.329275	0.154102	2.136730	0.0508
GDP	-0.390744	0.081215	-4.811231	0.0003
GDP(-1)	0.190115	0.109238	1.740376	0.1037
GDP(-2)	-0.133927	0.093710	-1.429171	0.1749
GDP(-3)	-0.140372	0.093613	-1.499493	0.1560
GDP(-4)	0.350584	0.106447	3.293491	0.0053
C	811.4009	2404.541	0.337445	0.7408

R-squared	0.999861	Mean dependent var	7729.235
Adjusted R-squared	0.999662	S.D. dependent var	9081.409
S.E. of regression	166.9142	Akaike info criterion	13.35655
Sum squared resid	390045.0	Schwarz criterion	14.28976
Log likelihood	-212.7396	Hannan-Quinn criter.	13.67869
F-statistic	5031.625	Durbin-Watson stat	2.112638
Prob(F-statistic)	0.000000		

Source: Author's computation using E-views 10

From the regression above, the Akaike info criterion (AIC) is used to select the lags and the heteroskedasticity was corrected using the White co-efficient matrix. Also, the regression is free from the serial- correlation. The result shows that capital government expenditure, and total

government expenditures are not significant to agricultural production (AP) in Nigeria in the short-run. Also, agriculture percentage of GDP, Agricultural value added, and gross domestic production shows a significant relationship to agricultural production. That is to say that one percent change in agricultural percentage to GDP will bring about 333% decrease in agricultural production, one percent change in agricultural value added will bring about 0.20% increase in agricultural production and also one percent change in gross domestic production will bring about 39% decrease in agricultural production in the short-run. The regression has 99% goodness of fit and overall regression is significant having the prob of 0.00000.

The highest level is indicated by I(1) in the Bound Test above, and the lower level is indicated by I(0). The significance threshold that we employ is 5% (0.05). We infer that there is a long-term association between agricultural production and recurring government spending since the F-statistic is 18.40576, which is higher than the upper bound test.

5. Conclusions and Policy Recommendations

After employing the auto-regressive distributed lag model (ARDL) to examine the impact of public spending on agricultural production in the Nigerian economy in both the short and long-term using the long-run co-integration bounds test, this study came to some intriguing conclusions.

Based on the findings, it was determined that Nigerian agricultural production is statistically unaffected by capital public expenditure, recurring public expenditure, total expenditure, and agricultural as a percentage of GDP. However, gross production and agricultural value added have a short-term impact on Nigerian agricultural output. Ultimately, it demonstrates unequivocally that there is a long-term correlation between capital public spending, ongoing public spending, and agricultural output in the Nigerian economy.

Based on the results, the research suggests that,

1) More funding should be allocated to agricultural output by the federal, state, and local governments, including both capital and ongoing expenditures.

2) Prior to Nigeria's crude oil discovery, the country's economy relied heavily on agricultural production, which the federal government ought to focus more on.

3) The government, through the ministry of agriculture, should ensure that agricultural funding reach farmers, particularly those in rural areas, for appropriate use.

4) Modern agricultural infrastructure should be made available by the federal government to enable the nation's vast production, which will contribute to GDP growth.

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