Public Agricultural Expenditure, Agricultural Output and Economic Growth in Nigeria: 1986-2022

[1] Abu, G. A., [2] Agama, S. A. and [1]Iorlamen, T. R.

[1,2,] Department of Agricultural Economics, Federal University of Agriculture, Makurdi. PMB 2373, Makurdi, Benue State, North Central Nigeria

**goddy_master@yahoo.co.uk (corresponding Author)*
[2] National Biotechnology Research and Development Agency, Abuja

Abstract

This study examined the nexus between public agricultural expenditure, agricultural output and economic growth in Nigeria with time series data spanning 1986-2022 using data from National Bureau of Statistics, World Development Indicators and Food and Agricultural Organization Statistical Database. The study employed the Autoregressive Distributed Lag Model to analyze the data. It was found that both agricultural credit and agricultural government expenditure have a significant positive impact on economic growth only in the short run. However, agriculture output was found to be positive and significant on economic growth both in the short run and long run. Based on the findings, the study recommended that government should increase its spending on agriculture especially during periods of economic slowdown or crisis in order to stimulate economic growth. In addition, Credit facilities should be provided for farmers, especially in the short term. This will have a significant positive impact on economic growth.

Keywords: Agricultural Credit, Autoregressive Distributed Lag Model, Public Agricultural Expenditure, Real Gross Domestic Product.

1.0 Introduction

The agricultural sector has been a significant contributor to economic growth in Nigeria, providing subsistence for low-income earners and accounting for 70% of the non-oil sector GDP and 19.17% of the total GDP (Ademola & Yisa, 2021). The sector is reputed as the mainstay of the economy in the early 1960‟s. It was the key driver for growth and development (Izuchukwu, 2011). Despite the predominance of the oil and gas sector in Nigeria, agricultural sector still remains source of economic resilience in the Nigerian economy with about 70% of the working population still engaged in it (Chidinma et al., 2012).

However, in recent years, Nigeria has experienced a significant decline in agricultural output compared to other regions where agricultural output has been doubling. This decline has been attributed to low agricultural investments, poor funding, and misguided government policies (Isitor, Asumugha, Ezeaku & Maduekwe, 2021). Despite the potential contribution of agriculture to economic growth, successive administrations have neglected the agricultural sector in favor of the oil industry. Stagnation in agricultural production has been accounted as the reason for

Nigeria's economic failure (Oyinlola, Aromolaran & Babatunde, 2021; Aromolaran & Ayodele, 2019; Adetunji, 2017).

The potential contribution of agriculture to economic growth in Nigeria has been marred by poor funding, coupled with misguided government policies. Agricultural sector in the 1960s contributed about 64 percent of the total gross domestic product (GDP) of Nigeria, but gradually declined to 48% in the 1970s (Obilor, 2013 cited in Egbulonu et al. 2016). During these years, there was little or insignificant improvement in agricultural production because successive governments only used the policies/programmes to embezzle public funds to the total neglect of food production by refusing to pay farmers the true value of their crops and at the same time selling fertilizer and seeds to them at high prices. However, a peep into the Federal Government capital expenditure on agriculture portraits a gloomy future for the sector's development in the country.

The relationship between government spending, agricultural output and economic growth has been a subject of debate among scholars. For instance, while some studies found government spending on agriculture to be positive and significant on economic growth (Idoko & Sunday, 2018; Olawumi & Adesanmi, 2018; Ayunku & Etale, 2015), the study by Eugene (2017) concluded that government expenditure on agriculture will cause a decline in economic growth. Similarly, while some studies found agricultural sector expenditure to be positive and significant on the sector's output (Bridget et al., 2021; Atayi et al., 2020; Keji & Efuntade, 2020; Eneji, Habila & Haruna, 2019; Uremadu, Anwa & Uremadu, 2018; Ewubare & Udo, 2017; Egwu, 2016; among others). Others found an insignificant relationship (Daniel, Okay & Steve 2018; Edeh, Ogbodo & Onyekwelu, 2018). In addition, another stream of studies concluded that agricultural output will impact growth positively and significantly (Abula & Ben, 2016; Ismail & Kabuga, 2016; Odetola & Etumnu, 2013; Tolulope & Chinonso, 2013). However, the study conducted by Etea and Obodoechi (2019) disagreed stressing that though agricultural output is positive on GDP, the impact is not statistically significant. This divergence of findings as to the relationship between agricultural government expenditure, agricultural output and economic growth motivated this study.

This research is different from previous studies because it aims to investigate into the relationship between government spending, agricultural output and economic growth in Nigeria as none of the previous studies have been able to examine the relationship between the three components in one study. For instance, while some studies focused on the impact of government agricultural spending on economic growth (Idoko & Sunday, 2018; Olawumi & Adesanmi, 2018; Peter & Lyndon, 2015; Eugene, 2017), other studies focused on Agriculture expenditure and agricultural output (Bridget et al., 2021; Atayi et al., 2020; Keji & Efuntade, 2020; Eneji et al., 2019; Uremadu et al., 2018; Ewubare & Udo, 2017; Egwu, 2016; Ihugba, Chinedu, & Njoku, 2013; among others). Another strand of literatures focused on the impact of agricultural sector output on economic growth (Abula & Ben, 2016; Ismail & Kabuga, 2016; Odetola & Etumnu, 2013; Tolulope & Chinonso, 2013; Etea & Obodoechi, 2019). The aim of this study is to analyse the relationship among the three

variables i.e. government spending on agriculture, agriculture output and economic growth in one single study. The study will also examine the causal relationship that exist among these variables.

The remaining part of this study is structrued as follows. Section 2 deals with review of related literatures. Section three explains the nature and source of the data used as well as the methodology. Section 4 analyses and discusses the result with their policy implications and lastly, section 5 concludes the study and offers policy recommendations.

2.0 Literature Review

2.1 Empirical Literature Review

A lot of related studies have been done on the relationship among government agricultural spending, agricultural output and economic growth in Nigeria. However, while some studies focused on the impact of government agricultural expenditure on economic growth, others focused on its impact on agricultural output. Another stream of studies focused on the impact of agricultural output on economic growth. These would be disussed in the next sections.

2.1.1 Impact of Government Agricultural Expenditure on Economic Growth in Nigeria

Previous studies found a significant positive impact of government agricultural spending on economic growth. For instance, Idoko and Sunday (2018) explored the relationship between government expenditure on agriculture and economic growth in Nigeria from 1985 to 2015. Using the multiple regression analysis and Johansen co-integration test. The findings revealed a positive and significant relationship between government expenditure on agriculture and economic growth in Nigeria. In the same vein, Olawumi and Adesanmi (2018) employed correlation LM test, heteroscedasticity test and ordinary least square (OLS) to examine the nexus between public spending on agriculture and Nigerian output growth from 1981 to 2016. The findings revealed that public agricultural expenditure has a positive and significant impact on economic growth in Nigeria. Similar study by Peter and Lyndon (2015) from from 1977 to 2010 using the ex-post facto research design and Error Correction Model (ECM) found agricultural government expenditure to be positive and significant on economic growth in Nigeria.

On the contrary, the above result is in disagreement with that of Eugene (2017) who used the Johansen cointegration and Granger causality approach to examine the impact of government expenditure on agriculture and economic growth in Nigeria from 1981 to 2014 revealing a negative and significant impact of government agricultural expenditure on economic growth.

2.1.2 Impact of Government Agricultural Expenditure on Agricultural Output in Nigeria

Some stream of literatures found government agricultural expenditure to be positive and significant on economic growth in Nigeria. E.g. Bridget et al. (2021) employed the VECM technique to examine the relationship between government agricultural spending and agricultural output in Nigeria with annual time series data spanning through 1981 to 2019. Their findings revealed a positive and significant long-run impact of government agricultural spending on agricultural output in Nigeria. In another study conducted to examine the effect of government

spending on agricultural output in Nigeria from 1981 to 2018, Atayi et al. (2020) found both capital and recurrent expenditure on agriculture to be positive and significant on agricultural output in Nigeria using the descriptive statistics and the Ordinary Least square method. A dynamic study conducted by Keji and Efuntade (2020) on the relationship between agricultural output growth and government spending in Nigeria from 1981 to 2018 employing the ARDL model found government spending on agriculture to be positive and significant on the growth of agricultural output in Nigeria. Similar study by Eneji, Habila and Haruna (2019) using the ordinary least square (OLS) and the error correction mechanism (ECM) to examine the impact of government expenditure on agricultural productivity in Nigeria from 1981 to 2018. The findings revealed that government expenditure on agriculture has positive and significant impact on agricultural productivity.

Additionally, Uremadu et al. (2018) employed the Johansen co-integration tests and Vector error correction model to examine the effect of government agricultural expenditure on agricultural output in Nigeria using time series data from 1981 to 2014. The findings revealed that a long-run relationship exists between agricultural output and government agricultural expenditure. The findings further revealed a positive and significant impact of government agriculture expenditure and agricultural sector output. Ewubare and Udo (2017) also employed the Johansen co-integration and error correction model to study the impact of public sector financing on agricultural output in Nigeria from 1980 to 2014. The findings revealed that public sector financing on agriculture has a positive and significant impact on the sector's output in Nigeria. Another similar study by Egwu, (2016) using the cointegration technique found agricultural financing to be positive and significant on agricultural output and hence alleviate poverty among the populace in the long run.

Furthermore, using the Engle-Granger modelling (EGM) of co-integration, Error Correction Mechanism and Pair wise Granger Causality tests, Ihugba et al. (2013) examined the nexus between Nigerian expenditure on the agricultural sector and agricultural output between 1980 and 2011. The findings revealed that a long-run relationship exist between agricultural contribution and government expenditure. The study further revealed that any reduction in agricultural financing would reduce economic growth in Nigeria. Itodo *et al.* (2012) employed the linearized Cobb-Douglas production function and the multiple regression method to analyse Nigeria government spending on agriculture from 1975-2010. The findings revealed a positive and significant relationship between Agricultural output and government spending in Nigeria. Similar study by Iganiga and Udemhilin (2011) also employed the Cobb Douglas Growth Model, Descriptive Statistics, Co-integration and Error Correction mechanism to examine the effect of Federal government agricultural expenditure on the value of agricultural output in Nigeria. The findings revealed that Federal government capital expenditure was positive and significant on agricultural output.

However, related study by Daniel et al. (2018) found a positive impact but the impact was insignificant in a study conducted in Nigeria covering the period 1980 to 2016 using time series secondary data and employing the Auto Regressive Distributed Lag (ARDL) technique. Similar

study by Edeh et al. (2018) in Nigeria fron 1981 to 2018 found a mixed result. Specifically, capital expenditure was positive and statistically significant on agricultural output while recurrent agricultural expenditure was negative and insignificant on agricultural output.

2.1.3 Impact of Agricultural Output and Economic Growth

Another group of scholars focused on agricultural output and economic growth and they found a mixed result. For instance, Abula and Ben (2016) using the VECM model to examine the effects of agricultural output on economic growth confirmed that the shocks to agriculture had the most impact on shocks to economic development. They came to the conclusion that agriculture is advantageous and important to the growth of the Nigerian economy. Ismail and Kabuga (2016) also examined the effect of agricultural output on Nigeria's economic expansion using the ARDL technique on annual time series data spanning though 1986 to 2015. The findings revealed that agricultural output has a positive and significant impact on economic growth both in the short-term and long-term. Using the growth accounting framework and time series data from 1960 to 2011, Tolulope and Chinonso (2013) also employed the granger causality test to examine the contribution of the agricultural sector to economic growth in Nigeria. The findings revealed that the agricultural industry has contributed favourably and steadily to Nigeria's economic expansion, reiterating the sector's significance to the economy. However, no inverse link was discovered.

However, the studies by Etea and Obodoechi (2019) employing the Vector Error Correction Model (VECM) and variance decomposition test to examine the contribution of agricultural sector output to the growth of domestic economy in Nigeria from 1990 to 2017 found a positive but an insignificant contribution of agricultural output to economic growth.

2.3 Theoretical framework

Keynesian Theory of Public Expenditure

Propounded by John Maynard Keynes in the 1936, the theory regards public spending as a factor which can be utilized as a policy instruments to promote economic growth (Keynes, 1936). The theory posits that public spending can contribute positively to economic growth, hence, an increase in the government spending is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demand. As a result, government spending augments the aggregate demand, which leads to an increased output depending on expenditure multipliers. Keynes (1936) opined that government expenditure is a tool adopted by the government to reverse economic downturns by stimulating the whole economy through its various spending programs, hence, growth is an outcome of public expenditure. The theory can be explained with a model known as the expenditure-output approach.

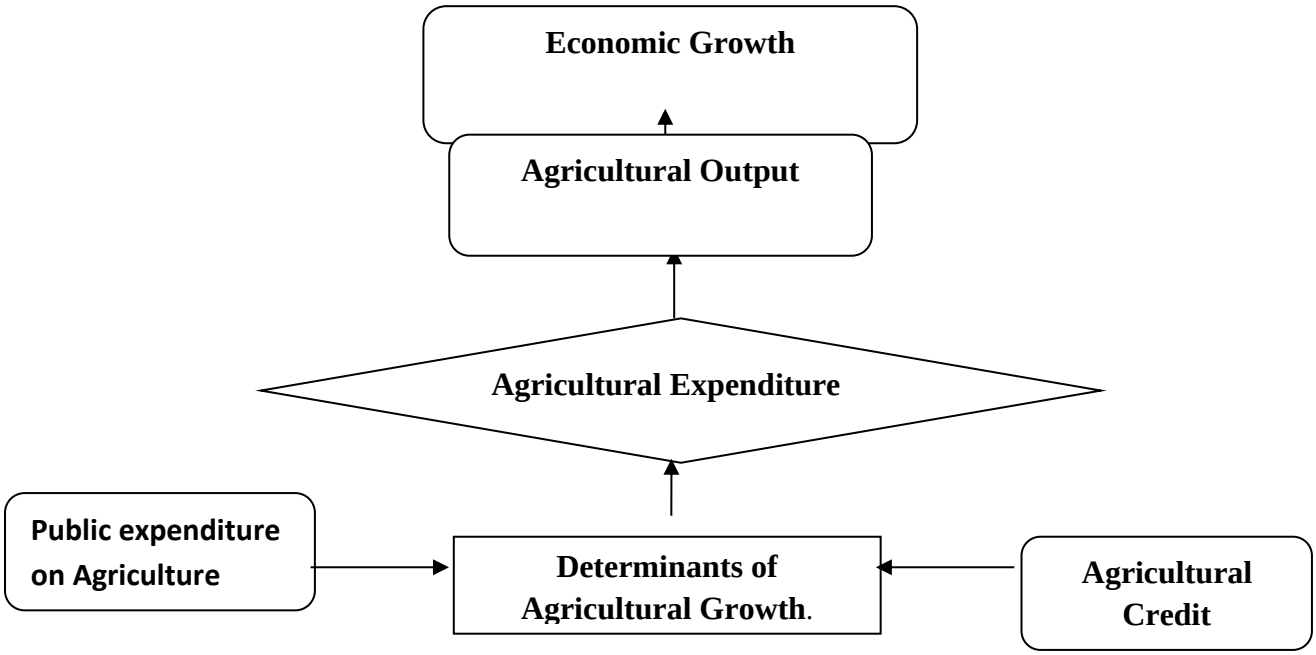

Figure 1: Schema showing the relationship between agricultural public expenditure, agricultural output and economic growth.

In the context of this study, an increase in government spending on agriculture will lead to the sector's output growth and hence promote economic growth. This is linked through the framework in Figure 1. The diagram depicts the relationship between the selected variables for the course of the research and economic growth in Nigeria. The diagram explains how Agricultural Credit and Government Expenditure on Agriculture are elements that affect the rate of economic growth in Nigeria. When government spends more on agriculture and channels agricultural credits appropriately, they both determines agricultural growth which in turn leads to an increase in agricultural output. Increased Agricultural output will in turn promote economic growth.

3.0 Methodology

3.1 Data

This study utilized time series secondary data spanning through 1986-2022. The data on Real Gross Domestic Products, Government Agricultural Expenditure, Agricultural Output and Labor Force were sourced from the National Bureau of Statistics (NBS), while data on Gross Fixed Capital Formation were sourced from the World Development Index and Annual Database. In addition, the data on Agricultural Credit were sourced from Food and Agriculture Organization Statistical Database (FAO) publications.

Economic Growth: was proxied by the Real Gross Domestic Products (Billion Naira). while the explanatory variables were Government Agricultural Expenditure (GEA)- capital and recurrent expenditure on agriculture by the government (% of total government expenditure); Agricultural Output (AO)- total agricultural sector contribution to RGDP (Billion Naira); Gross Fixed Capital

Formation (*GFC*)- the acquisition of produced assets (% of GDP); Labour Force Participation (*LF)* - *a* country's working-age population that engages actively in the labour market (% of total labour force). Agricultural Credit (AC) - total amount of loans to the agricultural sector (Billion Naira).

3.2 Model Specification

To examine the relationship between agricultural government spending, agricultural output and economic growth in Nigeria, this study adapted the model of Idoko and Sunday (2018), Keji and Efuntade (2020), and Ismail and Kabuga (2016).

The model in its econometric form is stated in Equation 1

$$RGDP_t = \beta_0 + \beta_1 GEA_t + \beta_2 AGO_t + \beta_3 GFC_t + \beta_4 LF_t + \beta_5 AC_t + \varepsilon_t \quad [1]$$

3.3 Estimation Technique

The study adopted the autoregressive distributed lag (ARDL) technique developed by Pesaran et al. (2001). Autoregressive distributed lag (ARDL) model uses a combination of endogenous and exogenous variables and it contains the lagged values of the dependent variable, the current and lagged values of the regressors as explanatory variables. When the variables are stationary at level 1(0) or integrated of order 1(1), the ARDL model is considered to be the best econometric technique. The short-run and the long-run impact of government agricultural expenditure as well as Agricultural Output on economic growth was determined using the short-run and long-run coefficients of the ARDL model. The ARDL model is stated is Equation 2.

$$\Delta RGDP_t = \lambda_0 + \alpha_1 RGDP_{t-1} + \alpha_2 GEA_{t-1} + \alpha_3 AGO_{t-1} + \alpha_4 GFC_{t-1}$$

$$+\alpha_5 LF_{t-1} + \alpha_6 AC_{t-1} + \sum_{i=1}^{n} \beta_i \Delta RGDP_{t-i} + \sum_{i=0}^{n} \delta_i \Delta GEA_{t-i} + \sum_{i=0}^{p} \theta_i \Delta AGO_{t-i}$$

$$+\sum_{i=0}^{n} \rho_i \Delta GFC_{t-i} + \sum_{i=0}^{n} \pi_i \Delta LF_{t-i} + \sum_{i=0}^{n} \omega_i \Delta AC_{t-i} + \varepsilon_t \text{ ----------2}$$

Where all the variables are as explained in section 3.1. In addition, λ_0 = intercept, α_1--- α_6 = long run coefficients, β_i, δ_i, θ_j, ρ_i, π_i, ω_i= short run coefficients, ε_t is the stochastic or white noise component, Δ=Difference operator.

4.0. Results and Discussions

4.1. Presentation and Analysis of Result

4.1.1. Descriptive Statistics

This was used to determine the nature of the data for the study such as their average values as well as their normality conditions.

Table 4.1.1. Descriptive Statistics Result

Variables	Mean	Median	Max.	Min.	Jarque-B.
Real GDP	37882.89	26658.62	75098.76	16048.31	5.0909*
Government Spending on Agriculture	20.7751	7.54	76.76	0.01	6.2726
Agricultural Output	8444.699	5024.54	17960.58	2303.51	4.6848*
Gross fixed capital Formation	35.6895	30.0379	89.3861	14.1687	9.0847
Labour Force Participation rate	59.8081	60.05	66.66	53.91	0.4058*
Agricultural Credit	3.1873	0.73	12.46	0.02	6.073

*** denotes normal distribution at 5%**

Source: Author's Compilation, 2023

The descriptive statistic shows that on the average, 20.78% of the total government spending was spent on agriculture for the period of study. The lowest for period was 0.01% while the highest was 76.76%. Also, the table shows that the average Real GDP for the study period is N37,883 billion with the lowest being N16,048 billion and the highest is N75,099 billion. In addition, the average value of agricultural output is N8,445 billion for the study period. Also the lowest output produced was equivalent to N2,303.51 billion while the highest was N17,961 billion. Furthermore, Average amount of loans channelled to the Agricultural sector over the years of study was N3.2 billion with N12.5 million as the highest and N20 million as the lowest. Taking a look at the Jarque-Berra statistic, only Real Gross domestic product, Agricultural output and Labour force participation rate are normally distributed at 5%. On the other hand, Government agricultural expenditure, Gross fixed capital formation and Agricultural credit are not normally distributed at the same level of significance

4.1.2. Correlation Matrix

This was used to check for the relationship among the variables in the model and also to check for the presence of multi-colinearity.

Table 4.1.2. Correlation matrix

	RGDP	GEA	AGO	GFC	LF	AC
RGDP	1					
GEA	0.8615	1				
AGO	0.9942	0.6625	1			
GFC	-0.7476	-0.6109	-0.5798	1		
LF	-0.8772	-0.5372	-0.5719	0.6186	1	
AC	0.8170	0.6050	0.6109	-0.6275	-0.6696	1

Source: Author's Compilation, 2023

Table 4.1.2 shows that there is a strong relationship between the RGDP and each of the explanatory variables with correlation coefficients close to 1 (0.8615 for GEA, 0.9942 for AGO, 0.7476 for GFC, 0.8772 for LF and 0.82 for AC). However, all but GFC show a positive relationship with Real GDP. In addition, although the correlation coefficients among the explanatory variables are greater than 0.5, they are far from 1 which means the relationship among the explanatory variables is not very strong which is an indication that our model is free from multi-collinearity (A violation of the assumption of the least squares).

4.2. Pre-Estimation Test

This section includes testing for the econometric properties of the variables used in the study so as to guide against having a spurious result. It includes the unit root test and the bound cointegration test.

Table 4.2.1. Augmented Dickey-Fuller Unit Root Result

Variables	**Level**			**First Difference**			
	ADF Statistic	Critical Value @ 5%	Decision	ADF Statistic	Critical Values @ 5%	Decision	Order of Integration
RGDP	-1.981	-2.939	NS	-3.071	-2.939	S	I(1)
GEA	-0.448	2.939	NS	-6.983	-2.939	S	I(1)
AGO	-2.023	-2.939	NS	-4.837	-2.939	S	I(1)
GFC	-3.692	-2.939	S	-	-	-	I(0)
LF	-1.787	-2.939	NS	-5.500	-2.939	S	I(1)
AC	-1.539	-2.939	NS	-7.223	-2.939	S	I(1)

S- Stationary, NS – Non-Stationary.

The Augmented Dickey-Fuller unit root test result in Table 4.2.1 shows that all the variables except GFC are not stationary at levels since their ADF statistics are less than the critical values at 5% level of significance. However, they later became stationary at 1st difference. This implies that

GFC is of order I(0) while RGDP, GEA, AGO, LF, and AC are of order I(1). Since we have a mixed order of integration of variables and none of the variables are of order I(2), this is a condition for the adoption of the ARDL model. We may therefore proceed to test for the existence of a long run relationship using the ARDL bound cointegration test as postulated by Pesaran *et al.(*2001).

Table 4.2.2. ARDL Bound Test

	Level of Significance	**I(0) Bound**	**I(1) Bound**
Computed F-value =5.87			
N= 40	1%	3.41	4.68
	5%	2.62	3.79
	10%	2.26	3.35
Null Hypothesis: There is No Levels Relationship			

Source: Author's Compilation, 2023

From the bound test result above, since the computed F-value of 5.87 is greater than the critical values of the I(1) bound at all levels of significance, the decision is to reject the null hypothesis and accept the alternative one and therefore conclude that there is a long-run relationship among agricultural public expenditure, agricultural output and economic growth in Nigeria and economic growth in Nigeria.

4.3. Model Estimation

In order to estimate the model for the study, it is appropriate to determine the optimal lag length for the model of the study. The result of the lag selection is presented as follows:

4.3.1. Lag Length Selection

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-1132.933	NA	4.35E+18	59.94382	60.20238	60.03581
1	-943.7692	308.635	1.41e+15*	51.88259	53.69255*	52.52656*
2	-916.3256	36.10993	2.56E+15	52.33293	55.69429	53.52887
3	-863.8332	52.49242*	1.63E+15	51.46491*	56.37766	53.21283

* 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

Source: Author's Compilation, 2023.

Three of the information criteria above (FPE, SC and HQ) suggest a lag length of 1. Hence, ARDL (1, 1, 1, 1, 1, 1) model will be estimated for the study so as to achieve objective one and two.

4.3.2. ARDL Estimates

In order to determine the short run and long run impact of the explanatory variables on Real GDP, the ARDL model was employed and the result are presented in Table 4.3.2.

Table 4.3.2. Short Run, Long Run and Error Correction Estimates of the ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5725.333	805.1386	7.1110	0.0000
Δ(GEA)	2.6849	0.7932	3.3849	0.0030
Δ(AGO)	1.0718	0.3156	3.3954	0.0021
Δ(LF)	-302.9451	171.0068	-1.7715	0.0874
Δ(GFC)	-31.3289	29.8179	-1.0507	0.3024
Δ(AC)	199.6147	77.7563	2.5672	0.0159
ECT*	-0.2870	0.0445	-6.4446	0.0000
GEA	34.0059	64.1657	0.5300	0.6003
AGO	3.4227	0.4608	7.4274	0.0000
GFC	-86.4887	128.7985	-0.6715	0.5074
LF	-115.5288	633.4182	-0.1824	0.8566
AC	358.2929	342.0422	1.0475	0.3038

Source: Author's Compilation, 2023.

From Table 4.3.2, the coefficient of D(GEA) and GEA are 2.685 and 34.0059 respectively. This means that Agricultural government expenditure has a positive impact on economic growth both in the short run and long run and a unit increase in agricultural government expenditure will increase economic growth by 2.6849 and 34.0059 units in the short-run and long-run respectively. The P-value of 0.003 shows that the relationship is statistically significant at 5% in the short run. However in the long run, a p-value of 0.6003 implies that the impact is not statistically significant at 5%. Similarly, the coefficients of D(AC) and AC are 199.6147 and 358.2929 respectively meaning that Agricultural credit has a positive impact on economic growth both in the short run and long run and a unit increase in agricultural credit will increase economic growth by 199.6147 and 358.2929 units in the short-run and long-run respectively. However, while the P-value of 0.0159 shows that the relationship is statistically significant at 5% in the short run. The p-value of 0.3038 implies that the impact is not statistically significant at 5% in the long run.

Conversely, the coefficients of D(AGO) and AGO are 1.0718 and 3.4227 respectively meaning that Agricultural output has a positive impact on economic growth both in the short run and long

run and a unit increase in agricultural output will increase economic growth by 1.0718 and 3.4227 units in the short-run and long-run respectively. The P-value of 0.0021 and 0.0000 inidicate that agricultural output is statistically significant on economic growth in both the short run and long run.

In addition, the coefficients of D(GFC) and GFC are -31.3289 and -86.4887 respectively. This means that, there is a negative relationship between RGDP and gross fixed capital formation both in the short run and long run respectively and a unit increase in gross fixed capital formation will bring about 31.3289 and 86.4887 unit decrease in RGDP. The P-value of 0.3024 and 0.5074 however showed that the relationships are not statistically significant at 5%. Similarly, the coefficients of D(LF) and LF are -302.9451 and -115.5288 respectively. This means that, there is a negative relationship between RGDP and labour force participation both in the short run and long run respectively with a unit increase causing real GDP to fall by 31.3289 and 86.4887 units. The P-value of 0.0874 and 0.5074 however showed that the relationships are not statistically significant at 5%.

Lastly the error correction coefficient of -0.2870 means about 28.7% of the short run deviations in RGDP will be corrected in the long run. The P-value of 0.0000 shows that the coefficient is statistically significant at 5% and the negative sign is in conformity to economic *apriori*

4.3.3. Granger Causality Test

In order to examine the causal relationship among agricultural public expenditure, agricultural output and economic growth in Nigeria, the granger causality test was conducted and the result are summarised in Table 4.3.3.

Table 4.3.3. Granger Causality Test Result

Null Hypothesis:	F-Statistic	Prob.
AGO does not Granger Cause RGDP	6.0044	0.0058
RGDP does not Granger Cause AGO	1.1906	0.3164
GEA does not Granger Cause RGDP	0.8439	0.4389
RGDP does not Granger Cause GEA	6.2222	0.005
AC does not Granger Cause RGDP	0.0369	0.9638
RGDP does not Granger Cause AC	6.2968	0.0047
GEA does not Granger Cause AGO	0.3549	0.7038
AGO does not Granger Cause GEA	8.0014	0.0014
AC does not Granger Cause AGO	0.9686	0.3898
AGO does not Granger Cause AC	0.6426	0.5322
AC does not Granger Cause GEA	1.8290	0.176
GEA does not Granger Cause AC	0.3597	0.7005

Source: Author's Compilation, 2023.

The granger causality test shows that AGO granger causes RGDP because of the p-value of 0.0058 which is less than 5%. On the other hand, RGDP does not granger cause AGO with p-value of 0.3164 greater than 0.05. Similarly, RGDP granger causes GEA with p-value of 0.005 but the causality does not hold in the other way i.e. GEA does not granger cause RGDP with a p-value of 0.4389. In addition, RGDP granger causes AC with p-value of 0.047 but the causality does not in the other way i.e. AC does not granger cause RGDP with a p-value of 0.9638.

Furthermore, AGO granger causes GEA with p-value of 0.0014 but GEA does not granger cause AGO with a p-value of 0.7038. Lastly, no causality exist between AGO and AC with p-value of 0.3898 and 0.5322 as when as between AC and GEA with p-value of 0.176 and 0.7005.

4.4. Post Estimation Test

To check whether our model is reliable and robust for prediction, there is need to check for the various econometric properties of the model estimated. This includes the test of goodness of fit, auto-correlation, serial correlation, heteroscedasticity, linearity, normality and stability test. The summarised result of the various tests are presented in Table 4.4.

Table 4.4. Post Estimation Test Results

Test	P-values
R^2	0.9431
Adjusted R^2	0.8964
D.W Statistic	1.959
Prob. (Jaque-Bera)	0.1453
Breusch-Godfrey (LM serial correlation)	0.4881
Breusch-Pagan Godfrey (Heteroscedasticity)	0.5343
Ramsey Reset Test (Linearity)	0.7594

Source: Author's Compilation, 2023.

From the post estimation test result in table 4.4, R^2 of 0.9431 shows that about 94% of the variation in RGDP is caused by the explanatory variables. This is an indication of a high explanatory power of the model. The D.W statistic of 1.959 which is approximately 2 is an indication of the absence of autocorrelation. The p-value of Jarque-Berra statistic of 0.1413 shows that the model is normally distributed. The Breusch-Godfrey LM serial correlation test confirmed the absence of serial correlation in the model with a probability value of 0.4881. The Breusch-Pagan-Godfrey heteroscedasticy test shows the absence of heteroscedasticity in the model with a p-value of 0.5343. The Ramsey-Rest Linearity test shows that the model is linear with a p-value of 0.7594 and it is an indication that the model is correctly specified at 5% level of significance.

4.4.1. Stability Test

To check for the stability of the model of the study, it is necessary to perform the stability test using CUSUM and CUSUM of Squares.

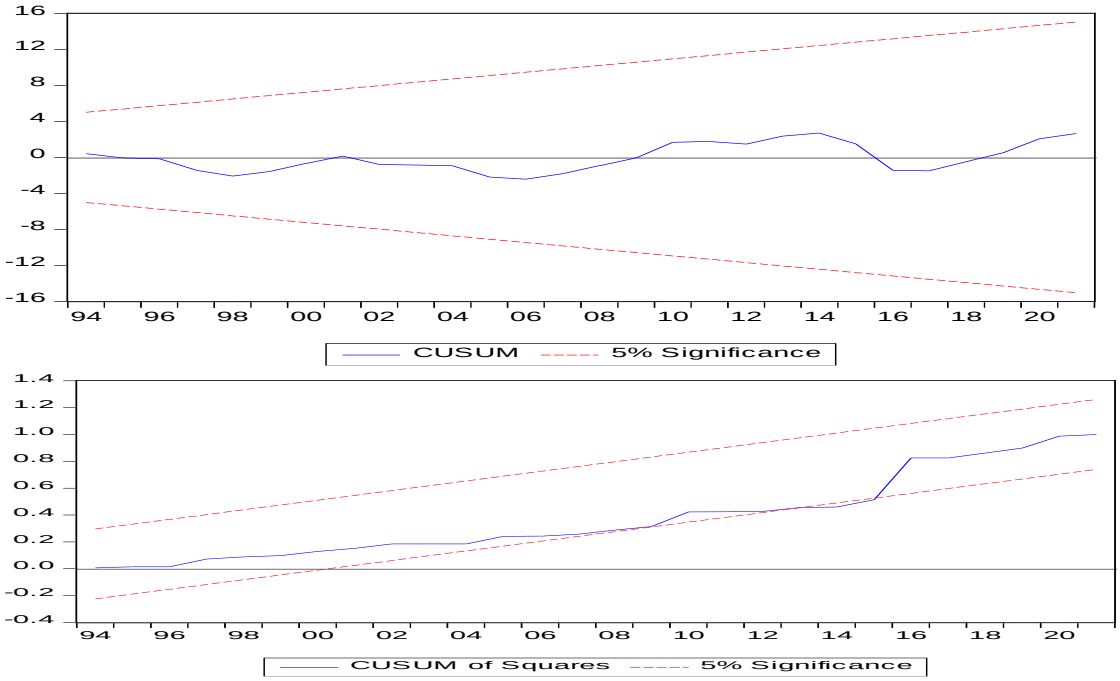

Figure 4.4.1 CUSUM and CUSUM of Squares

Source: Author's Compilation, 2023.

Figure 4.4.1 above shows that the plot of the CUSUM and CUSUM of Squares of the ARDL model under consideration are within the five percent critical bound. All the lines lie in between the upper and lower bound. It implies that the parameter estimates do not suffer any structural breaks or instability over the period of study.

4.5. Discussion of Findings and Policy Implications.

This study examined the relationship among government agricultural expenditure, agricultural output and economic growth in Nigeria using the ARDL model and the findings are discussed as follows:

Firstly, in the short run, agricultural government expenditure has a positive and significant impact on economic growth suggesting the need for government to increase its allocation to the agricultural sector so as to boost economic growth. However, in the long run, while the coefficient of GEA suggests a positive effect, it is not statistically significant, implying that the influence of government expenditure on economic growth might not persist over an extended period. The

positive and significant impact of government agricultural expenditure on economic growth is similar to the findings of Idoko and Sunday (2018), Olawumi and Adesanmi (2018), among others.

Secondly, in the short and long run, there is a positive and significant relationship between agricultural output and economic growth suggesting the need for policymakers to prioritize agricultural development. Investments in agricultural research, technology, infrastructure, and market access can boost agricultural productivity and contribute to overall economic growth. These findings highlight the crucial role of agricultural output in driving economic growth over different time horizons. These findings agreed with the result of Abula and Ben (2016), Ismail and Kabuga (2016), Odetola and Etumnu (2013), Tolulope and Chinonso (2013),

The effect of the controlled variables like agricultural credit, labour force participation and gross fixed capital formation were also examined on economic growth in Nigeria. For instance, regarding agricultural credit, the short-run analysis revealed a substantial positive and significant relationship with economic growth suggesting the need to make credit available for farmers. Policymakers should promote financial inclusion and create an enabling environment for financial institutions to provide affordable credit to the agricultural sector. However, the long-run perspective suggests a positive but statistically insignificant relationship, indicating that the impact of agricultural credit on economic growth may be less persistent over time. This result is in line with the findings of Egwu (2016).

Also, both the labour force participation rate and gross fixed capital formation demonstrate a negative and insignificant relationship with economic growth in both the short run and long run. This is however not in line with economic apriori because an increase in capital formation and labour force participation rate are expected to bring about an increase in economic growth.

The coefficient of the error correction term of -0.2870 shows that, 28.7% of the short run deviations in RGDP caused by shocks in the explanatory variables will be corrected in the long run. This is also in conformity with economic apriori as the sign is negative. The various post estimation test carried out showed that the model has a good fit and hence good for prediction.

In order to determine the causal relationship among RGDP, Agricultural output and economic growth in Nigeria, the granger causality test was carried out and the findings revealed that a unidirectional causality exist between GEA and RGDP, Specifically, RGDP granger causes GEA. This implies that variations in economic growth precede changes in agricultural government expenditure. However, there is no evidence of reverse causality, as GEA does not granger cause RGDP. In the case of AGO and RGDP, the Granger causality test indicates unidirectional causality as well. AGO granger causes RGDP, implying that fluctuations in agricultural output precede changes in economic growth. However, the reverse causality, where RGDP granger causes AGO, is not observed.

5.0 Conclusion and Policy Recommendations

This study examined the relationship among government agricultural expenditure, agricultural output, and economic growth in Nigeria. The study adopted a dynamic ARDL model to examine both the short run and long run impact of government agricultural expenditure and agricultural output on the economic growth in Nigeria. It was found that government spending in agriculture can positively influence economic growth only in the short run. In the long run, the impact diminishes, suggesting the need for more sustainable growth drivers. On the contrary, Agricultural output emerged as a robust driver of economic growth, both in the short run and long run, underlining the pivotal role of the agricultural sector in Nigeria's economic growth. Nevertheless, controlled variables like agricultural credit, labour force participation, and capital formation exhibited mixed results, with their effects being more pronounced in the short term. Based on the finding, the study recommends that government should increase its spending on agriculture especially during periods of economic slowdown or crisis in order to stimulate economic growth. Government should also prioritize long-term agricultural development initiatives aimed at increasing productivity and output. Credit facilities should be provided for farmers, especially in the short term. This will have a significant positive impact on economic growth.

References

Abula, M., & Mordecai, D.B. (2016). Impact of Agricultural Output on Economic Development in Nigeria (1986-2014). *Archives of Current Research International.* 4(1), 1-10.

Ademola, O., & Yisa, F. (2021). Agricultural sector contribution to Nigerian economic growth: Empirical analysis of the non-oil sector. Heliyon, 7(4), e06783. https://doi.org/10.1016/j.heliyon.2021.e06783.

Aromolaran, A. B., & Ayodele, O. (2019). Investment in agriculture and economic growth in Nigeria. *Journal of Economics and Sustainable Development.* 10(1), 23-36

Atayi, A.I., Boniface, .J. Bobola, A. O., & Olorunrinu, A.S. (2020). Journal of Applied Management Science. 3(10).

Ayunku, P.E., & Etale, L.M. (2015). Effects of Agriculture Spending on Economic Growth in Nigeria: Empirical Evidence. Research Journal of Finance and accounting, 6 (2)

Bridget N. et al (2021). Empirical Analysis of Government Agricultural Spending and Agricultural Output in Nigeria.

Chidinma, E., & Osundina, K.C., (2012). Government Expenditure on Agriculture and Economic Growth in Nigeria. *International Journal of Science and Research. 3(9),* 188-194.
Daniel, C., Okay, O., & Steve, O. (2018). Public Spending and Agricultural Sector Output: A Path Way for growing Nigeria out of Recession. *Governance and Management Review.* 3 (1), 62-76. Edeh, C.E., Ogbodo, J.C., & Onyekwelu, U.C. 2018). Impact of Government Expenditure

on Agriculture on Agricultural Sector Output in Nigeria (1981-2018). *International Journal of Research and Innovation in Social Science. IV (X),* 15-26.

Edeh, C.E., Ogbodo, J.C., & Onyekwelu, U.C. 2018). Impact of Government Expenditure on Agriculture on Agricultural Sector Output in Nigeria (1981-2018). *International Journal of Research and Innovation in Social Science. IV (X),* 15-26.

Egbulonu, K.G., & Nwokoro, A. (2016) Agricultural and Industrial Sectors and Nigeria's Economic Development. International Journal of Innovative Social Sciences and Humanities Research. 4(3), 59-67.

Egwu, P.N., (2016). Impact of Agricultural Financing on Agricultural Output Growth and Poverty Alleviation in Nigeria. *Journal of Biology, Agriculture and Health Care.* 6(2), 36-42.

Eneji, M. A., Habila, H. & Haruna, F.D. (2019), Impact of Government Expenditure on Agricultural Productivity in Nigeria. *Sumerianz Journal of Economics and Finance*, 2019, 2(9), 106-114.

Etea, I., & Divine, N.O. (2019), Agricultural output and economic growth, *DBN journal of Economics and sustainable growth*. Retrieved from www.rewearchgate.com.

Eugene, I., (2017), Government Expenditure on Agriculture and Economic Growth: Cointegration and Causality Approach. *Journal of Finance, Banking and Investment*, 4(2), 1596-9061. Ewubara, D. B. (2017). Public sector financing and agricultural output in Nigeria. International *Journal of Economics, Business and Management Research. 1 (2),* 79-88.

Ewubare, D.B. and Eyitope, J.A. (2015) The Effects of Public Expenditure on Agricultural Production Output in Nigeria. *Journal of Research in Humanities and Social Science*, 3, 7-23.

Idoko, C. U., & Jatto, S. M (2018), Government expenditure on agriculture and economic growth in Nigeria. *International Journal of academic research and reflection*, 6(4), 24-39.

Iganiga, B., & Uenemhilin, D.O. (2011). The Impact of n Federal Government Agriculture Expenditure on Agricultural Output in Nigeria. *Journal of Economics,* 2(2), 78-88

Ismaila, A.A., & Kabuga, N.A. (2016) Impact of Agricultural Output on Economic Growth in Nigeria using ARDL Econometric Approach. *Nigerian Journal of Agriculture and Development Economics (NIJADE),* 6(1), 127-138.

Izuchukwu O., (2011). Analysis of the contribution of Agricultural Sector on the Nigerian Economic Development. *World Review of Business,* 1(1) 191-200.

Keji, S. & Efuntade, O. (2020). Agricultural output and government expenditure in Nigeria. *Journal Perspektif Pembiayaan dan Pembangunan Daerah. 8(2),* 101-110

Obilor, S.I. (2013). The impact of Commercial Bank Credit to Agriculture on Agricultural Development in Nigeria: An Econometric Analysis. *International Journal of Business, Humanaities and Technology.* 3(1), 85-94.

Odetola, T. & Etumnu, C. (2013). Contribution of Agriculture to Economic Growth in Nigeria. Paper presented at the 18th Annual Conference of the African Econometric Society (AES) Accra, Ghana at the session organized by the Association for the Advancement of African Women Economists (AAAWE), 22nd and 23rd July, 2013.

Isitor, S. U., Asumugha, G. N., Ezeaku, P. I., & Maduekwe, I. A. (2021). Evaluating Nigeria's agricultural policy priorities for economic growth and development: A multicriteria analysis. Journal of Agricultural Education and Extension, 27(2), 129-148. https://doi.org/10.1080/1389224X.2021.1905736.

Oyinlola, A. O., Aromolaran, A. B., & Babatunde, O. A. (2021). Agricultural output and economic growth in Nigeria: An empirical investigation. Journal of Applied Economics and Business Research, 11(3), 1-15.

Olawumi, O.R., & Adesanmi, O. O. (2018). Public expenditure on agriculture and output growth in nigeria

International Journal of Arts and Commerce. 7(4), 60-78.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, *16*(3), 289-326.

Tolulope, O. & Chinonso, E. (2013). Contribution of Agriculture to Economic growth in Nigeria. Paper presented at the 18th Annual Conference of the African Econometric Society, Accra, Ghana. 1-28.