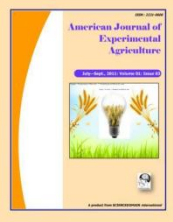

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Analysis of Agricultural Public Capital Expenditure and Agricultural Economic Growth in Nigeria 1961–2010

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This work was carried out in collaboration between all authors. Authors IEE and IEO designed the study and wrote the first draft of the manuscript. Author OWI performed the statistical analysis and discussed the result. Author INB managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study investigated the impact of agricultural public capital expenditure on agricultural economic growth in Nigeria over the period 1961 to 2010.
Methodology: Annual data was used for this study and was obtained from Central Bank of Nigeria 2010 statistical bulletin and annual report. The data was analyzed using Augmented Dickey-Fuller test, Johansen maximum likelihood test and Granger Causality test.
Results: The result of the Johansen cointegration test showed that there exist a long run relationship between all the explanatory variables and explained variable. The result of parsimonious error correction model showed that agricultural capital expenditure had a positive impact on agricultural economic growth. Also, granger causality test showed a unidirectional relationship between agricultural capital expenditure and agricultural economic growth. This means that agricultural economic growth does not cause expansion of agricultural public capital expenditure rather; it indicates that agricultural public capital expenditure raises the nation's agricultural economic growth. The Error Correction Mechanism (ECM) indicated that if the economy is out of equilibrium, 5.2% of disequilibrium will be corrected for annually.
Conclusion: The study therefore recommends that the proportion of government capital expenditure that goes into agricultural expenditure financing should be increased.

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Keywords: Agricultural capital expenditure; agricultural economic growth; cointegration; long run; error correction mechanism.

1. INTRODUCTION

In an agrarian economy like the type that exists in Nigeria, agricultural production provides the needed fulcrum upon which a sustainable development would blossom [1]. Apart from being the main source of food for most of the population, the agricultural sector contributes substantially to GDP and thus has remained vital to the Nigerian economy [2]. It provides the means of livelihood for over 70 percent of the population, plus being a major source of raw materials for the agro-allied industries as well as a potent source of the much needed foreign exchange earnings [3,4]. According to the [5], the Federal Government of Nigeria on a yearly basis often allocates funds to the various sectors of the economy for the overall development of the nation. Thus part of the seriousness of government to sustain the agricultural sector can be evidenced on its various allocations to this sector of the economy.

Government spending is referred to as an outflow of resources from government to other sector of the economy [6]. Government spending or public spending is sub-divided into current and capital expenditure. Capital expenditure has been defined as payment for non-financial assets used in production while current expenditures are payments for non-repayable transactions within a year [5]. In Nigeria, government expenditure has continued to rise due to the huge receipts from production and sales of crude oil and the increase demand for public goods like roads, communication, power, education and health, among others [6]. Available statistics show that total government expenditure (capital and recurrent) and its components have continued to rise in the last three decades. Government capital expenditure rose from N5, 004.60 million in 1977 to N10, 163.40 million in 1980 and further to N24, 048.60 million in 1990. The value of capital expenditure stood at N239, 450.90 million and N759, 323.00 million in 2000 and 2001, respectively. Furthermore, the agricultural component of capital expenditure also shows a rising trend between 1977 and 2007 [6].

A catalogue of reasons has been advanced for the relative poor performance of Nigeria's agricultural sector. Key among these include interest and foreign exchange rate volatilities, poor infrastructure base, policy inconsistency and unnecessary intervention by the public sector which sends wrong signal to the private sector [7]. Other important constraints include inadequate public agricultural expenditure, over dependence on crude oil revenue, rural-urban migration, inadequate processing and storage capacity, smallness of farm holdings, ageing population, use of inefficient traditional technology and increasing population pressure, etc. In an attempt to solve these problems of agricultural sector, the federal and state governments of Nigeria intervene through some agricultural policies and programmes. Notable among these policies are the National Accelerated Food Production Programme (1973), Agricultural Development Programme (ADP) (1975), The River Basin and Rural Development Authorities (1976), Operation Feed the Nation (OFN) (1976), Land Use Decree (1978), Green Revolution (GR) (1980), Fertilizer Company of Nigeria (NAFCON), National Agriculture Land Development Authority (NALDA) (1991), Cassava Multiplication Progranmme (1985-1999) and the latest is the Transformation Agenda of the Federal Ministry of Agriculture (2011). Meanwhile, these policies have not helped much in improving significantly the agricultural sector as the costs involved are still more than the benefits realized.

1.1 Statement of Problem

The agricultural sector has been affected with numerous problems which has been the result of the poor performance of the sector itself. This has attracted various strategies including expansion of public expenditure on agricultural activities by different government in the country. Overtime this expenditure has perhaps been on the increase without expressly translating to corresponding expansion or increase in agricultural economic growth. There is still the massive importation of rice, fish, wheat and other agricultural products into the country. There is still great variability in the income of farmers and food is still expensive for consumers. Nigeria cannot be said to be food secure. The current transformation agenda of the current government sets out to make a difference. Several studies have been carried out on government expenditure and economic output. They include [8] who analyzed the impact of government expenditure on economic growth in Nigeria; [9], examined the level of government spending on the education sector and its contribution to GDP; [10] used a disaggregated approach to determine the components (that include capital, recurrent, administrative, economic service, social and community service and transfer) of government expenditure that enhances growth and those that do not. Most of these studies have focused on using simple regression not minding the spurious correlation associated with non-stationary series and some used data covering short period of time. However, [10] used co-integration but his views limited to the components of government expenditure that enhances growth and those that do not. There is seemingly paucity of information on the impact of agricultural public or government capital expenditure on agricultural economic growth over the period 1961 to 2010. Hence this research will fill this gap and provides the required empirical information. The main objective of this research is to investigate the impact of agricultural capital expenditure on agricultural economic growth in Nigeria between 1961 and 2010.

1.2 Literature Review

Several studies have been undertaken in Nigeria and elsewhere to assess the relationship between capital expenditure and economic growth. According to [11] the relationship between government (capital expenditure) and economic growth has continued to generate series of controversies among scholars in economic literature. The empirical literature includes: [10,12-17]. Akpan N [10] used disaggregated approach in order to determine other components of government expenditure that enhances growth. He concluded that there was no significant relationship between most components of government expenditure and economic growth in Nigeria. Komain J [13] investigated the relationship between government expenditure and economic growth in Thailand for the period 1993 to 2006. They made use of the Granger causality tests and Ordinary Least Square (OLS) method. Their finding revealed that government expenditure and economic growth are not co-integrated but indicated a unidirectional relationship. This is because causality runs from government expenditure to growth and also detected a significant positive effect of government spending on economic growth. Eboh EC [12] made use of the heterogeneous panel data to study the impact of government expenditure on economic growth. The result was that countries with large government expenditure tend to experience higher growth.

Government spending and economic growth are directly related. It has been established in literature by some authors that there is a link between economic growth and government spending for example [18]. They believe that there is a nexus between government spending and economic growth. [14,15,16,19] confirmed a negative correlation between economic

growth and spending on health and education. Also, [14] confirmed a short run negative correlation between education and economic growth. They went further to analyze the long run positive relationship between educational spending and economic growth. The relationship between spending on defense and health on economic growth is inconclusive. Engle and Granger [14] reported a non-significant and no impact of government spending on defense on economic growth.

The issue of whether government spending on the sector matters or not is further evidenced by the study carried out by [20] to investigate the growth effect of government expenditure in Lebanon over several years (1962 to 2007). They applied Johansen co-integration technique to examine the nature of government expenditure and its impact on economic growth. The study focused on different sectors and the results from the education sectors shows that government spending on education has a positive effect on growth in the long run and negative impact in the short run, while expenditure on defense and health are negatively correlated in the long run and insignificant in the short run.

Komain and Brahmasrene [21] used an econometric model that takes government expenditure and quality of governance into consideration, in a cross-sectional study that includes 71 countries. The results revealed that both the expenditure and quality of the government are associated with economic growth. Lawal and Abdulkadir [22] Employed multivariate co-integration and variance decomposition approach to examine the causal relationship between government expenditure and economic growth for Egypt, Israel and Syria. In the bivariate framework, the authors observed a bi-directional (feedback) and long run negative relationships between government spending and economic growth. Moreover, the causality test within the trivariate framework (that include share of government civilian expenditure in GDP, military burden and economic growth) illustrated that military burden has a negative impact on economic growth in all the countries. Furthermore, civilian government expenditures have positive effect on economic growth for both Israel and Egypt.

Liozides and Vamvoukas [23] examined the causal relationship between GDP and public expenditure for the US data during the period 1947–2002. The causality results revealed that total government expenditure causes growth of GDP. On the other hand, growth of GDP does not cause expansion of government expenditure. Moreover, the estimation results indicated that public expenditure raises the US economic growth. The authors concluded that, judging from the causality test Keynesian Hypothesis exerts more influence than the Wagner's law in US. Liu Chih-H et al. [24] employed the trivariate causality test to examine the relationship between government expenditure and economic growth using data set on Greece, United Kingdom and Ireland. The authors found that government expenditure granger causes economic growth in all the countries they studied. The finding was true for Ireland and the United Kingdom both in the long run and short run. The results also indicated that economic growth granger causes public expenditure for Greece and United Kingdom, when inflation is included.

Loto MA [25] also examined the effects of government expenditure on economic growth for a panel of 30 developing countries over the decades of 1970s and 1980s with a particular focus on sectoral expenditures and employed regression technique. Their results revealed that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth with the exception of current expenditure which was insignificant. Furthermore, [26] analyzed the relationship between public expenditure and economic growth in Sri Lanka over the period 1952 to 2002 and applied Johansen co-integration technique and Granger causality test. The finding suggests that the growth of

public expenditure in Sri Lanka is not directly dependent and determined by economic growth.

Magazzino C [27] investigated the relationship between government expenditure and economic growth in Nigeria. He employed the Bounds Test approach to co-integration based on unrestricted Error Correction Model and Pair wise Granger Causality tests. The results from the Bounds Test indicate that there exists no long-run relationship between government expenditure and economic growth in Nigeria only when real GDP is taken as dependent variable. In addition, the causality results reveal that government capital expenditure granger causes economic growth. While no causal relationship was observed between government recurrent expenditure and economic growth.

Magazzino and Wagner [28] in his work - "the nexus between disaggregated public spending and GDP in the Euro Area" investigated the relationship between real per capita GDP and ten different items of real public spending (according to the COFOG functional classification), using annual data for the period 1990 -2010. The author empirically tested the Wagner's Law employing panel data methods for Euro Area Countries. The result of the Granger causality test showed that Wagner's Law (Y→G) holds in five countries (Austria, Germany, Netherlands, Portugal and Spain) while the data for five other countries (Cyprus, France, Greece, Ireland and Slovenia) did not support the Keynesian proposition of government expenditure as a policy instrument to encourage and lead growth in the economy.

Nasiru I [29] examined the empirical evidence of Wagner's Law and Augmented Wagner's Law in EU-27 countries over time period 1970 - 2009. Several time series econometric techniques were applied in order to check correlation among variables, data stationarity, co-integration and causality. Dividing EU-27 into two different groups, namely "Rich" for older member and “poor" roughly correspond to new comers, empirical evidence is in favour of Wagnerian hypothesis, according to which the law is appropriate for developing countries, since public expenditure should be determined by aggregate income in an initial step of the development process. With regard to Keynesian hypothesis, the author found no clear evidence of government expenditure causing national income.

Niloy B [30] Examined Wagner’s Law in Italy (at a disaggregated level) Using recent econometrics techniques. The author studied the relationship between real GDP and five different items of real government spending for Italy, using annual data for the period 1960-2008. The Granger causality tests results show evidence in favor of Wagner's Law (Y→G) only in the case of passive interests spending in the long-run, and of spending for dependent labor income in the short-run. On the contrary, causality flow is in line with Keynesian hypothesis (G→Y) in the case of spending for passive interests for grants on production and for public investments in the long run and for grants production in the short-run. The empirical evidence concluded that Wagner's law finds a weak support in Italy and that the relationship between government spending and national income is more Keynesian than Wagnerian.

2. MATERIALS AND METHODS

2.1 The Data

Secondary data were collected for this study. The data are annual and were obtained from CBN (2010) Statistical Bulletin and Annual report.

2.2 Model Specification

2.2.1 Unit root tests

According to [31] a non-stationary time series has important asymptotic consequences; regression estimates do not converge in probability with increased sample size, R-square values have non-degenerated distributions and divergence in t-value distributions often exist such that asymptotically correct critical values do not exist. Regressions involving non-stationary variables in levels often display first order serial correlation and lead to spurious results. To carry out the unit root test for stationarity, the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests are used to examine each of the variables for the presence of a unit root (an indication of non-stationarity). The DF test assumes that the data generating process is AR(1) process, and so if this is not so the autocorrelation in the error term will bias the test since it includes the first difference in lags in such a way that the error term is distributed as white noise. The test for the stationary or order of the integration of the data series and testing for co-integration were carried out using Augmented Dickey-Fuller (ADF) tests. ADF test was used because it captures additional dynamic left out by the DF and ensures that the error term is white noise through the inclusion of additional lag length. The test procedure is given by:

$$\Delta AGDP_t = \beta_1 + \beta_2 + \delta AGDP_{t-1} + \theta_i \sum_{i=1}^{m} \Delta AGDP_{t-1} + \varepsilon_t \quad \ldots \quad (1)$$

$$\Delta ACEX_t = \beta_1 + \beta_2 + \delta ACEX_{t-1} + \theta_i \sum_{i=1}^{m} \Delta ACEX_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta AFPI_t = \beta_1 + \beta_2 + \delta AFPI_{t-1} + \theta_i \sum_{i=1}^{m} \Delta AFPI_{t-1} + \varepsilon_t \quad (3)$$

$$\Delta ALF_t = \beta_1 + \beta_2 + \delta ALF_{t-1} + \theta_i \sum_{i=1}^{m} \Delta ALF_{t-1} + \varepsilon_t \quad (4)$$

Where:

$AGDP_t$ = Agricultural Contribution to Gross Domestic Product (Million Naira)
$ACEX_t$ = Agricultural Capital Expenditure (Million Naira)
$AFPI_t$ = Agricultural Foreign Private Investment (Million Naira)
ALF_t = Agricultural Loanable Fund (Million Naira)
ε_t = Error term

N/B: The model is a deterministic trend with drift.

The decision rule is that the t-statistics on the coefficient of the variable β_1 which is expected to be negative, must be significantly different from the critical value for a given sample size. The null hypothesis is that the variable of interest is non-stationary (i.e. it is integral of order one 1(1).

2.2.2 Cointegration analysis

C-ointegration is the idea that the linear combinations of non-stationary series can be stationary, implying a long-run relationship, thus they can be modeled. In testing for Co-integration, the Johansen Efficient Maximum Likelihood test was used to examine the existence of a long-term relationship among the variables.

Consider a VAR of order *P.*

$$y_t = A_t y_{t-1} + \ldots + A_p y_{t-p} + \beta x_t + \varepsilon_t \quad (5)$$

Where y_t is a k- vector of non-stationary I (1) variables, x_t is a d-vector of deterministic variables, and $\mathcal{E}_t$ is a vector of innovations. We can rewrite this VAR as:

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma \Delta y_{t-1} + \beta \chi_t 9 + \varepsilon_t \quad (6)$$

Where,

$$\prod = \sum_{i=1}^{p} A_i - I, \qquad \boldsymbol{\Gamma} = -\sum_{j=i+1}^{p} A_I \quad (7)$$

Granger's representation theorem asserts that if the coefficient matrix $\prod$ has reduced rank, $r < k$, then there exist $k \times r$ matrices α and β each with rank r such that $\prod = \alpha \beta^1$ and $\beta^1 y_t$ is I (0), r is the number of co-integrating relations (the rank) and each column of β is the cointegrating vector. The element of α are known as the adjustment parameters in the error correction model. Johansen's method is to estimate the matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of $\prod$.

2.2.3 Error correction model

This specification includes a short run dynamic process, consistent with data and converging to the long run equilibrium. The Error Correction Model (ECM) attempts to integrate economic theory useful in characterizing long run equilibrium with observed disequilibrium by building a model that explicitly incorporates behavior that would restore equilibrium. Error Correction Mechanism has the co-integrated relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics. The Error Correction Term (ECM) is the one-period lagged value of the residual from a static model.

In this study therefore having established the cointegration relationships among variables, an over-parameterised error correction model was estimated which initially consisted of 2 lag length of each variable. The over-parameterised error correction model estimated is given in equation 8.

$$\Delta LogAGDP_t = \varphi_0 + \varphi_1 \Delta LogACEX_t + \varphi_2 \Delta LogACEX_{t-1} + \varphi_3 \Delta LogACEX_{t-2} + \varphi_4 \Delta LogAFPI_t - \varphi_5 \Delta LogAFPI_{t-1} - \varphi_6 \Delta LogAFPI_{t-2} + \varphi_7 \Delta LogALF_t + \varphi_8 \Delta LogALF_{t-1} - \varphi_9 \Delta LogALF_{t-2} + \varphi_{10} \Delta LogAGDP_{t-1} - \varphi_{11} \Delta LogAGDP_{t-2} - ECM_{t-1} \quad \ldots \quad (8)$$

Where ECM = Error Correction term, other variables have been define in section 2.2.1

$$ECM_{t-1} = LogAGDP_t - \beta_0 - \beta_1 LogACEX_t - \beta_2 LogAFPI_t - \beta_3 LogALF_t \ldots \quad (9)$$

Following the 'general to specific' modeling methodology, the over-parameterised model was continually simplified and re-parameterised by removing variables with low explanation until a parsimonious and encompassing representation of the data generation process was obtained with the choice of optimum lag length guided by the Akaike and Schwarz Information Criteria. The parsimonious error correction model is given in equation 10.

ΔLogAGDP$_t$ = $\varphi_0 + \varphi_1\Delta$LogACEX$_t$ + $\varphi_2\Delta$LogACEX$_{t-1}$ + $\varphi_3\Delta$LogAGDP$_{t-1}$ - $\varphi_4\Delta$LogAGDP$_{t-2}$ – ECM$_{t-1}$ …………………………………………… (10)

2.3.4 Granger causality test

The test was conducted to know the causality that is whether Agricultural Gross Domestic Product Granger causes Agricultural Capital expenditure and vice versa. The procedure is given by:

$$AGDP_t = \sum_{i=1}^{n} \alpha_1 ACEX_{t-1} + \sum_{j=1}^{n} \delta_j AGDP_{t-j} + U_i \quad \text{(11)}$$

$$ACEX_t = \sum_{i=1}^{n} \alpha_1 AGDP_{t-1} + \sum_{j=1}^{n} \delta_j ACEX_{t-j} + U_i \quad \text{(12)}$$

3. RESULTS AND DISCUSSION

This section presents the results of unit root (stationarity) tests, cointegration tests and error correction model and granger causality test.

3.1 Stationarity Test

The time series behavior of each of the series is presented in Table 1 below using ADF test at both level and first difference of the series. The null hypothesis of the presence of the unit root (non-stationary) was tested against the alternative hypothesis of the absence of a unit root (stationary). The variable; Agriculture Foreign Private Investment (AFPI) was stationary at level thus there was no need to difference it. However, the variables; Agricultural Gross Domestic Product (AGDP), Agricultural Capital Expenditure (ACEX) and Agricultural Loanable Fund (ALF) were not Stationary at their levels thus they needed to be difference in order to them to make stationary. On application of the Augmented Dickey-Fuller (ADF) test on their first differences, the non stationary variables became stationary as indicated by the t – values of the Augmented Dickey-Fuller (ADF) which are all negative and larger (in absolute terms) than the standard critical values, thus leading to rejection of the null hypothesis. From the results, the variables Agricultural Gross Domestic Product (AGDP), Agricultural Capital Expenditure (ACEX), Agricultural Loanable Fund (ALF) are integrated of order 1 that is are I(1). However, the variable; Agricultural Foreign Private Investment (AFPI) is integrated of order (0), that is I (0). We then proceed to discuss the results of co-integration between the explained and each of the explanatory variables.

Table 1. Result of the unit root test

Logged Variables	Level	First Difference	Order of Integration
Agricultural Gross Domestic Product (AGDP)	-2.77	-4.80***	I(1)
Agricultural Capital Expenditure (ACEX)	-2.03	-10.39***	I(1)
Agricultural Foreign Private Investment (AFPI)	-3.59**	-	I(0)
Agricultural Loanable Fund (ALF)	-2.69	-6.55***	I(1)

*Critical value at 1% = -4.16; 5% = -3.50; ** - P<0.05; *** - P<0.01; tests were performed by including intercept and trend*

3.2 Johansen Cointegration Test

The result of Johansen co-integration tests are extracted into the Table 2. The test statistics indicate that the hypothesis of no co-integration, H_O, among the variables can be rejected. The result revealed that three co-integrating vectors exist among the variables of interest, since the variables are co-integrated, there is therefore, a long run relationship among the variables. It also means that the study can proceed to estimating the Error Correction Model.

Table 2. Johansen cointegration result

Trace test k=2				Maximum eigenvalues test k=2			
H_O	H_A	Trace statistic	Critical Values (5%)	H_O	H_A	Max-Eigen statistic	Critical values (5%)
r ≤ 0	r > 0	216.7877	47.85613*	r ≤ 0	r > 0	100.0533	27.58434*
r ≤ 1	r > 1	116.7344	29.79707*	r ≤ 1	r > 1	80.09372	21.13162*
r ≤ 2	r > 2	36.64066	15.49471*	r ≤ 2	r > 2	35.84853	14.26460*
r ≤ 3	r > 3	0.792129	3.841466	r ≤ 3	r > 3	0.792129	3.841466

*Note: r represents number of cointegrating vectors and k represents the number of lags in the unrestricted cointegration test. * denotes rejection of the null hypothesis at 5% level*

3.3 Error Correction Model

The error correction modeling involves three steps. The first is to estimate a long-run model; the second is to include the error term (ECM) from the long run model in a dynamic over-parameterised model and the third is to work on this model until one obtains the parsimonious model which is then interpreted.

Therefore an over-parametrised model was estimated. The result is shown in Table 3. Every variable was set at 2 lag. The parsimonious interaction involves dropping insignificant variables. Therefore, the size of the model was reduced by imposing zero coefficients on those lags where t – statistics is low. Through simplification, a more parsimonious and interpretable model was produced as shown in equation 10 and Table 4.

Table 3. Overparameterised model

Dependent Variable: DLOG(AGDP)
Method: Least Squares
Date: 07/08/13 Time: 18:07
Sample (adjusted): 1964 2010
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.100664	0.055806	1.803816	0.0801
DLOG(ACEX)	0.037868	0.040820	0.927687	0.3601
DLOG(ACEX(-1))	0.026753	0.039498	0.677328	0.5028
DLOG(ACEX(-2))	0.027906	0.042133	0.662325	0.5122
DLOG(AFPI)	0.102148	0.140823	0.725366	0.4732
DLOG(AFPI(-1))	-0.009374	0.131023	-0.071543	0.9434
DLOG(AFPI(-2))	-0.040168	0.072151	-0.556714	0.5814

Table 3 Continued….

DLOG(ALF)	0.047421	0.081369	0.582784	0.5639
DLOG(ALF(-1))	0.025606	0.079623	0.321593	0.7497
DLOG(ALF(-2))	-0.038385	0.078998	-0.485897	0.6302
DLOG(AGDP(-1))	0.458947	0.164165	2.795637	0.0085
DLOG(AGDP(-2))	-0.204087	0.176699	-1.154997	0.2561
ECM(-1)	-0.059766	0.052241	-1.144049	0.2606
R-squared	0.632577	Mean dependent var		0.185580
Adjusted R-squared	0.599369	S.D. dependent var		0.168250
S.E. of regression	0.165761	Akaike info criterion		-0.527130
Sum squared resid	0.934213	Schwarz criterion		-0.015387
Log likelihood	25.38755	Hannan-Quinn criter.		-0.334558
F-statistic	1.115987	Durbin-Watson stat		1.965044
Prob(F-statistic)	0.379616			

Table 4. Parsimonious model result

Variable	Coefficient	Std. Error	t-statistic	Prob.
Constant	0.1150	0.03976	2.8944	0.0061
DLOG(ACEX)	0.0313***	0.02548	3.2307	0.0054
DLOG(ACEX(-1))	0.02724	0.02474	1.1012	0.2772
DLOG(AGDP(-1))	0.4747***	0.15013	3.1622	0.0029
DLOG(AGDP(-2))	-0.1781	0.15424	1.1549	0.2548
ECM (-1)	-0.0528***	0.04683	3.1284	0.0057
R^2 = 0.63		Schwarz criterion = - 0.5235		
Adj R^2 = 0.59		Durbin – Watson = 1.985		
F-stat = 2.50**				

*** - P<0.05; *** - P<0.01*

The parsimonious result is shown in Table 4. According to the result R^2 value of 0.63 shows that all the variables can explain about 63% of variation in Agricultural Gross Domestic Product. The F- statistics was significant at 5%, showing the joint significant of the variables included in the model and the Durbin Watson value of 1.985 implies that the model does not suffer from autocorrelation problem. In terms of the significant of the individual explanatory variables, it was observed that Agricultural Capital Expenditure (ACEX) and the past value of Agricultural Gross Domestic Product (AGDP (-1)) are the two significant determinants of agricultural economic growth in Nigeria for the period of analysis. Agricultural capital expenditure was statistically significant at 1% and had a positive effect on agricultural economic growth. This agrees with the apriori expectation, meaning that in the short-run, agricultural capital expenditure has a positive impact on agricultural economic growth in Nigeria. Statistically, the result shows that holding other variables constant a unit increase in agricultural capital expenditure will lead to a unit increase in agricultural economic growth. This result agrees with [13] who found out that there exists a significant positive effect of government spending that include capital expenditure on economic growth in Thailand during the period of study. The findings of this study also disagrees with [11], who showed that government spending on agriculture has a significant but negative impact on economic growth in Nigeria. The lagged variable of the dependent variable (DLOGAGDP (-1)) was significant at 1% and had a positive effect. This it means that the previous agricultural gross

domestic product affect the current agricultural gross domestic product. This implies that there exists a positive influence or significant relationship between the agricultural gross domestic product and agricultural economic growth of the previous year on the agricultural economic growth of the current year in Nigeria. The ECM also has the correct sign and it is statistically significant at 1%; with the speed of convergence to equilibrium at 5.2% of the past years deviation from equilibrium. This adjustment is essential for maintaining long-run equilibrium in order to reduce the existence of disequilibrium over time.

3.4 Granger Causality Test

Table 5 shows the result of Pairwise Granger Causality test. Granger causality talks about the nature of relationship between variables. It answers the question – what is the type of relationship that exists between the variables? Granger causality test was conducted to see whether Agricultural Gross Domestic Product granger causes Agricultural Capital expenditure and vice-versa. The results suggest that the null hypothesis that Agricultural capital expenditure does not granger because agricultural economic growth was rejected which indicated that causality runs from agricultural capital expenditure to agricultural economic growth because of the high F-statistic and low probability value. This also shows a unidirectional relationship between the two variables (Agricultural capital expenditure and agricultural economic growth). Consequently, from the results, it therefore means that Agricultural economic growth does not cause expansion of agricultural public capital expenditure rather; it indicates that agricultural public capital expenditure raises the nation's agricultural economic growth. This result is in line with the study conducted by [13]. They studied the economy of Thailand using Granger causality tests. Their finding was that government expenditure and economic growth are not co-integrated but indicated unidirectional relationship because causality runs from government expenditure to growth. Also, [23] examined the causal relationship between GDP and Public expenditure for US data during the period 1947 to 2002. The causality results revealed that total government expenditure causes growth of GDP.

Table 5. Pairwise granger causality test

Null hypothesis	Observation	F- statistic	Probability
AGDP does not Granger Cause ACEX	48	22.820	2.E-07***
ACEX does not Granger Cause AGDP	48	1.670	0.2002

*** denotes P < 0.01*

4. CONCLUSION

The study investigated the impact of agricultural capital expenditure on agricultural economic growth in Nigeria from 1961 to 2010. Using the assumptions of Partial equilibrium analysis, other sectors of the economy were assumed to be constant while analyzing the agricultural sector. The empirical findings showed that the explanatory variables, agricultural capital expenditure and the past values of agricultural gross domestic product were the two significant determinant of agricultural economic growth in Nigeria. The result of parsimonious error correction model showed that agricultural capital expenditure had a positive impact on agricultural economic growth. The result of granger causality test further validated this finding. It showed a unidirectional relationship between agricultural capital expenditure and agricultural economic growth. This means that agricultural economic growth does not cause expansion of agricultural public capital expenditure rather; it indicates that agricultural public

capital expenditure raises the nation's agricultural economic growth. To conclude, this research shows that agriculture, if properly funded could bring about sustainable economic growth and a reduction in agricultural capital expenditure by government would have negative repercussions on agricultural economic growth in Nigeria. The study therefore recommends that the proportion of government capital expenditure that goes into agricultural expenditure financing should be increased since this component exerts significant positive effect on agricultural economic growth. To achieve this increment, Maputo declaration of the commitment to the allocation of at least 10 percent of National budgetary resources to agriculture and rural development policy implementation within five years should be taking into cognizance. Though this fall short of 25 percent recommendation of Food and Agricultural Organization.

COMPETING INTERESTS

All the contributing authors have declared that there is no competing interest among us.

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