Total Government Spending On Agriculture and Its Output Growth in Nigeria

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Abstract
This study examined the relationship between government spending on agriculture and its output over the period 1970-2015 using Engle-Granger (1987) two step modeling (EGM) procedure involving: cointegration analysis and error correction of parameter estimates. Additionally, Granger causality test was carried out to determine the direction of causation between government spending on agriculture and agriculture sectors output. Based on the data analysis, it was discovered that Total government spending on agriculture (TGSA) has significant effect on agriculture output (AGDP) in the long and short-run.; this relationship is statistically significant in the long run and in the short run. Spending on agriculture sector has the capacity to increase its output by 10.7% if the allocation increases by 1% in the long run while in the short run, one percent increase in government expenditure on agriculture will bring about 10% increase in agriculture output. The study concludes that public expenditure is very crucial instruments for economic growth at the disposal of policy makers in Nigeria and government expenditure on agriculture is basically related to agricultural development and recommends that efforts should be made to increase government funding on agricultural sector and also compliment it with stable macroeconomic policies in order to curtail the level of food shortage and overdependence on foreign food and as well increase funding on anti-graft or anti-corruption agencies like the Economic and Financial Crime Commission (EFCC), and the Independent Corrupt Practices Commission (ICPC) in order to arrest and penalize those who divert and embezzle public funds.

1.1 Introduction

Agricultural sector acts as the catalyst that accelerates the pace of structural transformation and diversification of the economy, enabling the country to fully utilize its factor endowment, depending less on foreign supply of agricultural product or raw materials for its economic growth, development and sustainability. Economic history reveals that agricultural revolution is a fundamental precondition for economic growth, especially in developing countries (Eicler and Witt, 1964; Woolf and Jones, 1969).

Government spending no doubt is an important instrument for a government to control the economy of a nation. Economists have been well aware of the effects in promoting economic growth. Agriculture allocation is captured in the national yearly budget which plays a prominent role in modern economic management (Akande, et al, 2009). Basically, Agricultural allocation has a way of bringing desired effect in other sectors such as industry through inter-sectoral linkage. The underdeveloped state of many markets in developing countries like Nigeria makes government involvement in agricultural investment necessary.

Government spending on agricultural sector in the country has consistently fallen short of the public expectation. For instance, a collaborative study carried out by the International Food Policy and Research Institute (IFPRI) in 2008, revealed that Nigeria's spending on agriculture is less than 2% of total federal annual budget expenditure. This is significantly below compared to other developing countries like Kenya (6%), Brazil (18%) and 10% goal set by African Leaders Forum, under the Comprehensive Africa Agricultural Development Programme (CAADP). In spite of poor investment, agriculture has on the average contributed 32% of the country's GDP from 1996 to 2000 and 42% between 2001 and 2009 (CBN 2010). According to CBN Governor, in 2011 agriculture accounted for 40% of the nation's GDP, yet it received only one per cent of the total commercial bank loans (People's Daily, 2011).

Agriculture is estimated to be the largest contributor to non- oil foreign exchange earnings. This means that agriculture holds abundant potential for enhancing and sustaining the country's foreign exchange and employs 65 percent, of the labour force in Nigeria (Emeka 2007). Abayomi (1997) noted that stagnation in agriculture is the principal explanation for poor economic performance, while rising agricultural productivity has been the most important concomitant of successful industrialization.

Relationship between government spending on agriculture and agriculture output (Bernard, 2009; Ariyo 1999; Thirlwall, 1976; Beck, Levine and Loayza, 2000) has long been a subject of analysis and debate. The analysis and debate are essentially about the role of government in the national economic growth because this sector is the engine of growth. These studies conclude that agriculture expenditure has impact on economic growth especially in developing countries. Some studies have also attempted to look specifically at long term financing

for the agriculture sector (Antonio and Yap, 1994; Mody 1981; Rao 1978). They observed that long-term financing for agriculture is urgently needed by developing economies, as the stages of their respective economic development are either still early or well into the transition. In the case of Nigeria, only government can embark on such expenditure through budgetary allocation. However, from a nominal point of view, it is evident that in Nigeria, government spending on agriculture continue to increase over the years while empirical evidence have revealed that the performance of the agricultural sector has been inadequate (Ekerete, 2000). The agricultural sector in Nigeria which was the main stay of the economy is no longer performing the lead role it was known for. By mid-1970's Nigeria's agriculture started to experience problems, agricultural exports began to decline and food shortages started emerging.

CBN (2014) report show that between the years 1970 and 2015 the size of government expenditures on agriculture have increased in Nigeria. The trend shows almost a consistent increase throughout the period and at the same time agriculture output has shown a lesser growth. Within that period, government established National Accelerated Food Production Programme (NAFPP) in 1972; Operation Feed the Nation (OFN) in 1976; River Basin Development also in 1976; Green Revolution (GR) in 1980; Directorate for Food Roads and Rural Infrastructure (DFRRI) in 1986; Better Life Programme (BLP) for rural women in 1987; National Agricultural Land Development Authority (NALDA) in 1992; Family Support Programme (FSP) in 1994; National Fadama Development Project (NFDP) in the early 1990s to promote simple low-cost improved irrigation technology under World Bank financing; National Economic Empowerment and Development Strategy (NEEDS) in 1999 and National, Special Programme on Food Security (NSPFS) in 2003. Government also established universities of agriculture across the country for manpower development. This involvement or the so called government intervention in the economy has led the federal government budget allocation on agriculture to increase steadily. All these were meant to launch the country into an agricultural exporting country and it is also expected that the output from this industries will serve as inputs for the manufacturing sectors like the beverage and pharmaceutical industries. This study seeks to find out if government spending on agriculture has contributed to the growth of agriculture output.

2 Literature Review

2.1 Conceptual Framework

Government spending is perhaps the single most important policy instrument available to governments of most developing countries for promoting growth and equitable distribution. This spending on agriculture in Nigeria is the total amount of money spent on agriculture in order to achieve its planned budget for the sector. Government expenditure is classified into two broad themes, namely recurrent and capital expenditures. Recurrent expenditures are goods, which includes all consumption items that occur in a year, they are payments for non-repayable transaction such as salaries, wages and allowances. Capital expenditure relates to payments for the use of non-financial assets used in production process which contributes to long-term development. Capital expenditure includes spending on health, education, agriculture, roads and electricity etc. Samuelson and Nordhaus (2003), as reported by Itodo et al. (2012) nowhere can the changes in government's role are seen more clearly than in the area of government spending. Kalra (2006) opined that there was a time when public expenditure was considered the economy's revenue and so the best policy was considered one which kept the public expenditure to its absolute minimum. He stressed further that in the course of time the thinking has gone a complete change. A sound public expenditure policy produces good effects both on production and distribution; it corrects the mal-adjustments in the personal distribution of wealth.

According to Iganiga and Unemhilin (2011), agriculture is the production of food, feed, fiber and other goods by the systematic growing and harvesting of plants and animals. It is the science of making use of the land to raise plants and animals. It is the simplification of nature's food webs and the rechanneling of energy for human planting and animal consumption (Akinboyo 2008). Fei-Ran, (1987) as reported by Itodo, Apeh and Adeshina (2012) concludes that, an underdeveloped country can hope to move from the condition of stagnation to one of self-sustained growth if the agricultural sector is developed so that, surplus labour force is absorbed by the new industries. For many other developing countries, agriculture remains the gate way to several desired ends which

includes poverty reduction, rural transformation, employment generation, food security and improved national health profile of the citizenry (Okpanachi, 2004).

2.2 Theoretical Literature

The earliest theory advanced on public expenditure is the law of expanding state role', postulated by Adolph Wagner in 1890 which came to be known as "Wagner's law". The law suggests that the share of the public sector in the economy will rise as economic growth proceeds, owing to the intensification of existing activities and extension of new activities. According to Wagner, social progress has led to increasing state activity with resultant increase in public expenditure. He predicted an increase in the ratio of government expenditure to national income as per capital income rises. It is the result of growing administrative and protective actions of government in response to more complex legal and economic relations, increased urbanization, and rising cultural and welfare expenditures. According to Musgrave (1959), however, it is not fruitful to seek an explanation for the total expenditure. Tests carried out by various researchers have shown that the increase in expenditure is far more complex than in evident from the tests carried out on empirical data. Therefore according to him, it may be far more rewarding to adopt a desegregated approach (an approach which divides the study of expenditures of government) through a study of expenditures of government on capital formation, consumption and transfer payments. Irving (1968) used the law and came up with a different view (Akogwu, 2007) as reported by Itodo, et.al (2012). He opined that public expenditure (E) is an increasing function of per capital gross national product (GDP) i.e. $E = f\left(\frac{GNP}{P}\right)$ similarly, Essien (2005) carried out studies and employed modern econometric techniques, He posited that even though the variables public expenditure and economic growth were found to be stationary, that is integrate of order (1), they were not cointegrated. Thus the long run tendency for public sector spending whether as a proportion of total output, its per capital value or as its singular definition, to grow with income could not be established. He therefore concluded that he found no evidence to support Wagner's law using Nigeria data. On the contrary, earlier study carried out by Obute (1988), established a more than unity income elasticity of public expenditure for Nigeria.

Any time there is need for important economic decision making on expenditure, policy makers and economic advisers still use the Wagner's law as bases for their decision. Representing Wagner's law functionally, $TGE = f(EG)$ where TGE is total government expenditure and EG is total national output. Ram (1988) has found positive relationships between government spending and economic growth. The work of Grossman (1988) as reported by Adofu, Abula and Agama (2012) utilized a simultaneous equation model making allowance for a non-linear relationship between growth in government spending and total economic growth. Barro (1988), in his seminar work, developed a simple endogenous growth model of government spending. In this model, he finds a non-linear relationship between public expenditures which are complementary inputs to private production and a negative relationship between government expenditure and growth of the economy.

2.3 Empirical Review

Several (Itodo et al. 2012, Uger, 2013; Massimo and Sara, 2003; Devarajan *et al.*, 1996; Ariyo 1999; Thirlwall, 1976; Beck, Levine and Loayza, 2000; Guseh, 1997; Kelly, 1997; Knoop, 1999; Alexiou, 2007; Irmen and Kuehnel, 2008; Hussain et al, 2011) studies have been carried out across the globe to examine the relationship between government expenditure and economic growth, but their data periods, methodologies and findings differ from some studies indicating that government expenditure has a negative impact on economic growth and others positing that government expenditure has a positive impact on economic growth. The incongruent findings of the studies could be attributed to the short data periods of some of the studies, which must have affected the reliability of the inferences drawn from the studies. The inconsistencies between the methodologies and time series analyses of most of the studies must have also accounted for the variations in the findings of the studies. In Nigeria, Mohammed-Lawal and Atte (2006) employed Descriptive statistics as well as regression

analysis to analyze Agricultural production in Nigeria from 1981-2003. Finding from the study revealed that agricultural production only grew by 5.4%. Result also showed that, all the component of the agricultural sector of the economy have not had any appreciable growth in production, the trend in agricultural production can be described as not impressive, and that agricultural growth has been slow and not even steady. The study recommended that there should be increase in per-capita productivity of the people through improved technological innovation and farmers should be empowered to market their produce at reasonably good prices. This may require government buying excess of the farmers' produce particularly during the season at guaranteed minimum prices. Maku (2009) discovered that both government expenditure and private investment have no significant influence on economic growth in Nigeria, and that the rate of government expenditure to real GDP has been rising since the enactment of the Structural Adjustment Programme (SAP) without contributing significantly to economic growth in Nigeria. Nurudeen and Usman (2010) used the data period of 1970 to 2008 in their study, and the estimation results showed that total capital expenditure (TCAP), total recurrent expenditure (TREC), expenditures on transport and communication (TRACO), education (EDU), and health (HEA), including inflation (IFN) and overall fiscal balance (FISBA), are statistically significant in explaining changes in economic growth. However, expenditures on defence (DEF) and agriculture (AGR) are not significant in explaining economic growth. Loto (2011) investigated the growth effect of sectoral expenditures on economic growth and discovered that expenditures on national security, transportation, and communication were positively related to economic growth, but were not statistically significant. Meanwhile, expenditure on education, though negative, was not significant; expenditure on agriculture was negatively related to economic growth; and expenditure on health was positively related to economic growth.

Most of the studies mentioned above on this subject matter have employed simple descriptive assessment of some relevant indices and did not explicitly confront the issue of causality and simultaneity bias. This study will exclude rainfall and exchange rate. It will also improve on the existing literature both in terms of econometric techniques and scope; it will also use two econometric techniques to confront the issue of knowing if government expenditure on agriculture is an endogenous factor or an outcome and to control for the simultaneity bias that may arise from the investigation. It is hoped that researchers will find the methodology of this study useful and that the result will improve evaluations of government expenditure policies. The study covers the period from 1970 to 2014.

2.4 A Review of Total Spending on Agriculture and Agricultural Output

Government spending on agriculture has been very low over the years. The country has over the years failed to reach the 10 per cent agriculture budget standard of the Maputo declaration, which has led to insufficient food production. Total expenditure on agriculture, as a percentage of overall expenditure, averaged 4.2 per cent between1970-1985, to an average of 2.6 per cent per annum between 1986-1998, to 3.5 percent between 1999 and 2014; this reflects intensified efforts by the government to reduce its size see figure 1. The total expenditure on agriculture, as a percentage of overall expenditure of Shehu Shagari regime average of 7.1 per cent per annum between 1979 and 1983, Obasanjo was 3.7 percent between 1999 and 2007 and Yar'dua/Jonathan 2.7 percent between 2007 and 2015. The entire military regimes total expenditure on agriculture, as a percentage of overall expenditure was 2.7 percent during the period of study.

The performance of agricultural output could be measured by its contribution to Gross Domestic Products (GDP), in 1970, it contributed 59 percent by 1974 and as a result of the oil boom it was 23.3 percent. In 1980 it was 20.3 percent, 1985, 36.2, 1990, 30 percent. It fell to 25.3 in 2000 and rose to 47.1 percent in 2002 and fell to 31.3 percent in 2014 and see figure 2. The military regime throughout the period of study, agriculture contributed approximately 33 percent to the national GDP while the civilian regime contributed approximately 32 percent which is less than that of the military after receiving more as percentage from total allocation. This incessant reduction in agricultural expenditure over the years relative to the overall expenditure of Nigeria has led to inadequate funds for the sector which will never make the sector sustainable. The degree of

responsiveness of agriculture output as a result to change in agriculture expenditure was 0.2 (inelastic) i.e. a change in government allocation to agriculture causes a lesser change in agriculture output during the period of study.

Agriculture expenditure elasticity of Agriculture output=

$$\frac{\Delta AGDP}{AGDP} \times \frac{AEXP}{\Delta AEXP} = \frac{53,158,28265}{1,887.70} \times \frac{10}{1338120} = 0.210447056.$$

This shows that there is a relationship, but the amount of allocation is not sufficient to bring about equal or greater change in the level of agriculture growth in Nigeria.

Agriculture output grew by 1025.2 percent between 1970 and 2014, and was highest in 2010, 3324.6 percent and lowest in 2014, -41.7 percent. Comparing the growth during democracy and military regimes, the data show that agriculture output was highest during democracy in 2010, 3324.6 percent; 1981, 791.9 percent and also lowest during democracy in 2014, -41.7 percent. The data also show that whenever there was a coup in the country, agriculture always had a negative growth, in 1975, it was 108 percent but fell to -10 percent in 1976; in 1983, it was -0.7 percent but further fell to -5.2 percent in 1984. Agriculture output always increased in years before the general election, in 1982, it was 2.5 percent and fell to 0.7 percent in 1983; it was 55.2 percent in 2002 and fell to 7 percent in 2003; it was 7.4 percent in 2006 and fell to 7.1 percent in 2007; it was 3324.6 percent in 2010 and fell to 12.9 percent in 2011 see figure 3. This development could be attributed to the amount of money politicians spend before election in buying food items they share to voters; grains, fertilizers and drugs for farmers.

Figure 1: Agricultural Expenditure As Share Of Total Government Expenditure Over The Study Period (1970-2014)

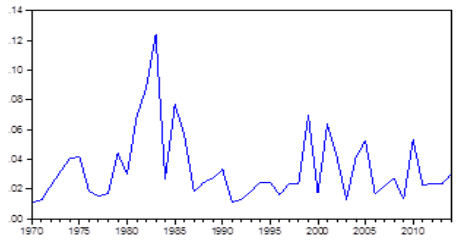


Figure 2: Agriculture's Contribution to GDP (1970-2014)

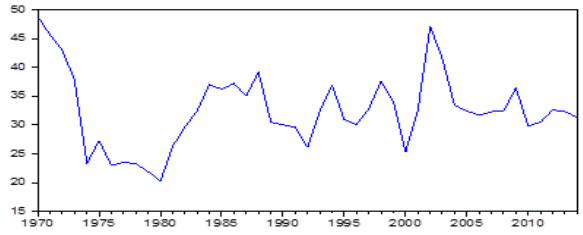
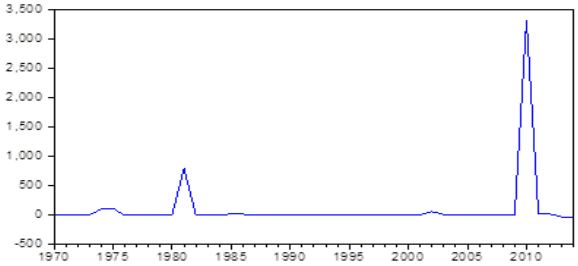


Figure 3: Growth rate of Agriculture output (1970-2014)



Source: CBN, 2014

3 Method of Study

The method of study deals with the fundamental principles and techniques that guild the ensuing empirical analysis. We agree with the view of Udida, Udofia and Ozurumba (2008) that the importance of methodology is underscored by the fact that it is a necessary condition or sine qua non for validating the results of studies such as the present one.

3.1 Scope of study

This study employed time series secondary data covering a period of 45 years (1970- 2014) for carrying out the empirical investigations. The data on various variables such as Agriculture Output, government expenditure on Agriculture, foreign direct investment on agriculture, money supply, were obtained from various Central Bank of Nigeria's Statistical Bulletins (2010 and 2013).

3.2 Methods of Data Analysis

Specifically, the Engle-Granger two step modeling (EGM) procedure (Engle and Granger, 1987) involving: Cointegration analysis and error correction model will be used. Additionally, Granger causality test will be carried out to determine the direction of causation between total government expenditure on agriculture and agriculture output in Nigeria.

If X_t and Y_t are individually I(1) processes and there exist a linear combination of this variables that is I(0) process, then X_t and Y_t are cointegrated. In other words, a long run equilibrium relationship exists among these variables. Based on the Granger Representation Theorem (GRT), if two or more variables are cointegrated, there exists an Error Correction Model (ECM) which relates these variables in the short-run while maintaining the consistency of the OLS estimated long-run parameter obtained in the cointegrating regression. In this instance, ECM indicates the periodic change in the time series variables and how it eventually returns to its long run equilibrium value. Since the ECM equation contains only stationary variables which preclude spurious regression, granger causality test can be applied. This is because cointegration analysis shows that there is causality amongst variables but it does not reveal the direction of such causality.

3.3 Model Specification

The model specification benefited from several studies (see Sankhayan 1988, Ojewumi and Aremo 2009, Alfaro 2003, Hermes and Lensink 2003 and Todaro and Smith 2009). The growth model begins with the neoclassical production function, as extended by Solow (1957), Khan (1997), and Iyoha (2000). Consider a Cobb-Douglas production function of the form.

$$G_t = A_t f(L_t K_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

K = Labour, K = Capital stock, A = Efficiency of labour, T= Time dimension. Expressed in growth form, equation (1) becomes

$$G_G = G_A + P_K + P_L + G_L + G_K \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, P depicts percentage growth in variables. However, the emergence of endogenous growth theory and models suggests that other endogenous factors such as government policies, political stability, human capital, education, trade policies and others can also affect sustainable growth. Accordingly, several studies, for instance those reviewed by Renelt (1991), have attempted to integrate exogenous for as with endogenous variables in explaining growth in output across countries. In these studies, the augmented solow (1957) neoclassical production function is used specifically, the formulation employed by Mankiw et al. (1992), Grammy and Assane (1996) Odusola (1998), Urhie (2008) can be expressed as

$$G_t = A_t L\xi_1 K\xi_2 H\xi_3 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where

G = output

H = Additional Input

Note: $\xi_1 + \xi_2 + \xi_3 = 1$ (assuming constant returns to scale)

Taking the natural logarithm of both sides of equation 3 gives a linear form of

$$LnG = \xi + \xi_1 InL + \xi_2 Ink + InH \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

In line with their studies, the empirical model adopted in this study is given as follows assuming government spending on agriculture being the sole determinant of agricultural output.

$$LnAGDP = \xi_0 + \xi_1 InTGSA \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Introducing other factors into equation 5, the long-run cointegrating regression will be given as follows:

$$LAGDP_t = \xi_1 LTGSA_t + \xi_2 EXR_t + \xi_3 PS_t + \varepsilon_t \ldots\ldots\ldots (6)$$

Based on the theoretical framework, the ξ_1 priori expectations are:

$$\xi_1 > 0, \xi_2 < 0, \xi_3 > 0$$

Where,
LAGDP = Log of Agriculture contribution to GDP (This a proxy for agriculture output)
LTGSA = log of total government spending on agriculture
EXR = Exchange rate
PS= Political stability
t = time subscript
ε = is the residual

The variables are nonstationary variables and integrated of order one (i.e. *I(1)*). The necessary condition for cointegration is that the estimated residual from equation (1) be stationary (i.e $U_t \sim I(0)$). If the above conditions are met, ECM is estimated from this model.

$$\Delta LAGDP_t = \xi_0 + \xi_1 \Delta LTGSA_t + \xi_2 \Delta EXCR_t + \xi_3 PS_t + \Phi_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where Δ is the first difference operator. GRT requires that the coefficient Φ in the short-run equation (6) be negative and statistically significant to confirm the cointegration of the variables. Note that the estimation of the ECM precludes the question of spurious regression since the variables are stationary and equally incorporates both the static long-run and dynamic short-run components.

3.3.1 (i) Unit root Test

In order to avoid estimating spurious regression, the stochastic properties of the series were tested. This was carried out by testing for unit root which involved testing the order of integration of the individual series under consideration. Several procedures for the test of order of integration have been developed in which the most popular one is the Augmented Dickey-Fuller (ADF). The ADF test relies on rejecting a null hypothesis of unit root in favour of the alternative hypothesis of stationarity. The tests were conducted with or without a deterministic trend for each of the series in order to ascertain the level of their stationarity. The general form of the ADF is estimated by the following regression.

$$\Delta y_t = ao + a_1 y_{t-1} + \sum_{i=1}^{n} a\Delta y_1 + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

$$\Delta y_t = ao + a_1 y_{t-1} + \sum_{i=1}^{n} a_1\Delta y_1 + \vartheta_t + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where:

y_t = time series, it is a linear time trend,
Δ = First difference operator,
ao = constant
n = optimum number of lags in dependent variable
e_t = random error term.

3.3.2 Granger Causality Test

Granger causality analysis is used to test the hypothesis of prediction of future values of a particular variable(s) while incorporating the past lags of other variables in the model. In other words, a time series variable X_t is said to granger cause another time series variables Y_t if the former contains useful information to predict future values of the later. In this framework, if the F-test of the included lagged variables is statistically significantly different from zero, it implies that there is causality which can either be unidirectional or bidirectional.
The granger causality test is estimated from the following equations

$$\Delta AGCONT_t = \sum_{i=1}^{n} \alpha_i \Delta TGSA_{t-i} + \sum_{i=1}^{n} \beta_j \Delta AGCONT_{t-j} + u_{1t} \ldots\ldots\ldots(10)$$

$$\Delta TGSA_t = \sum_{i=1}^{n} \lambda_i \Delta TGSA_{t-i} + \sum_{i=1}^{n} \gamma_j \Delta AGCONT_{t-j} + u_{2t} \ldots\ldots\ldots\ldots\ldots(11)$$

Where α, β, λ and γ are the respective coefficient of the variables, t represents time while i and j are their lags, u_{1t} *and* u_{2t} are uncorrelated white noise error term. The null hypothesis is $\alpha = 0$ for all i_s and $\gamma = 0$ for all j_s while the alternative hypothesis is given as $a_i \neq 0$ *and* $\gamma_j \neq 0$.

4 Data Analysis

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

4.1 Stationarity Test

The time series behavior of each of the series is presented in Table 1 below using Augmented Dickey-Fuller (ADF) test at both level and first difference of the series and the study also used (PP) Phillips and Perron (1988) test as a confirmatory test. 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 variables; Agricultural Gross Domestic Product (AGDP), Total government spending on agriculture (TGSA) and Exchange rate (EXR) were not Stationary at their levels thus they needed to be difference in order to make them stationary. On application of the Augmented Dickey-Fuller (ADF) test on their first differences and Phillips-Perron, the non-stationary variables became stationary as indicated by the t–values of the 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), Total Agriculture Budget Allocation (TABAL) and Exchange rate (EXR) are integrated of order 1 that is they are I (1).We then proceed to discuss the results of cointegration between the explained and each of the explanatory variables.

Table 1: ADF and PP Unit Root Test

Variable		ADF Test				PP Test			
		ADF	**1%**	**5%**	**10%**	**PP**	**1%**	**5%**	**10%**
LTGSA	Level	-1.86	-3.59	-2.93	-2.60	-1.69	-3.59	-2.93	-2.60
	1st Difference	-4.58*	-3.59	-2.93	-2.60	-4.55*	-3.59	-2.93	-2.60
LAGDP	Level	-0.78	-3.59	-2.93	-2.60	-0.69	-3.59	-2.93	-2.60
	1st Difference	-4.38*	-3.59	-2.93	-2.60	-4.38*	-3.59	-2.93	-2.60
EXR	Level	-1.35	-3.59	-2.93	-2.60	0.75	-3.59	-2.93	-2.60
	1st Difference	-3.78*	-3.59	-2.93	-2.60	-3.73*	-3.59	-2.93	-2.60

Source: Authors Computation: Note that * signifies stationarity

4.2 Empirical Result and Analysis

Firstly, as a benchmark, the study estimated the impact of total government expenditure on agriculture on agriculture output using equation 6. In estimating the long run function, due care has been taken to ensure that all the variables chosen are the ones integrated to the first order. This is in line with Gujarati (2004) who noted that in the Engle-Granger cointegration technique, the time series employed in the regression equation should be the ones integrated to the same order.

Table 3: The Estimation Results of the Cointegration (Long Run) Equation (Ordinary Least Squares Technique)

Dependent Variable	Explanatory Variables	Coefficients	Standard Error	t-Statistic	(Prob)
DLAGDP	C	-0.004360	0.030110	-0.144820	0.8856
	DLTGSA	10.66000	1.209027	8.817006	0.0000
	DEXR	0.002295	0.002027	1.132222	0.2645
	PS	0.013136	0.029565	0.444301	0.6593

R-Squared = 0.73: Adjusted R-squared: 0.71: DW = 2.0: F = 0.000000

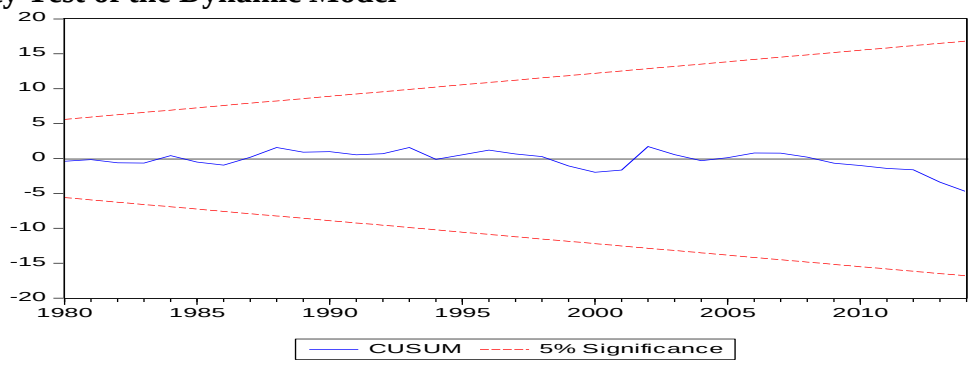
The long run equation is presented in Table 2. The economic growth model has been estimated using Agricultural Gross Domestic Product (AGDP), Total government spending on Agriculture (TGSA), Exchange rate (EXR) and Political Stability (PS). The signs of the coefficients of Agriculture Expenditure (AEXP) and Political Stability (PS) variables are consistent with economic theory and in line with a priori expectations.

The increase in total government spending on agriculture translates to enhanced agriculture output. The higher the level of government expenditure on agriculture, the higher the agriculture output will be. The total government spending on agriculture is rightly signed when compared with a priori expectations and also significant at 1% while Exchange rate has a positive sign but not significant. Political stability possesses the right signs when compared with the a priori expectations and not statistically insignificant at 1%, 5% and 10% levels. From the regression result, the model performed relatively well with multiple correlation coefficient(R-squared) which is 0.75. This shows the strength of the model, 75% indicate a strong model. This was also backed up by an Adjusted R-squared of 73% also, suggesting that about 73% variations in the agricultural output in Nigeria were explained by fluctuations in the specified explanatory variables. The standard error of 0.030; shows that a high level of confidence can be placed on the estimates. The Durbin-Watson-statistics (DW) value of 1.82 also shows that there is no serial correlation. However, the result of the joint test reported in table 3 reveal that jointly, all explanatory variables included in the estimated long-run model are statistically significant at one percent level, meaning that jointly, the explanatory variables influence change in AGDP

To check if the regression results are spurious. Hence, the need to compare the ADF statistic on residuals to the MacKinnon response surface values since the Augmented Dickey Fuller (ADF) critical values are not appropriate for testing cointegration (see Gujarati 2003). If the residual series is stationary, it means the regression is not spurious and that there is cointegration, implying that there is a long run equilibrium relationship among the variables.

The ADF test statistic for the residual of the cointegrating equation is -3.691028. Thus, the computed 10% critical value is -2.603064, 5% critical value is -2.929734 and 1% Consequently critical value is -3.588509, the decision rule is that since the ADF test statistic of -3.691028 is less than the 10%, 5% and 1% (critical value of -2.603064, -2.929734 and -3.588509), there is evidence of cointegration at the 10%, 5% and 1% significance levels. The model was also tested for stability and the result as presented in figure 4, indicated that the cusum plots did not touch the 5 percent critical lines, hence the model is stable and can be used for meaningful inferences and prediction.

Figure 4: Stability Test of the Dynamic Model



The Short-Run Dynamics: Error Correction Model (ECM)

After the estimation of the long run cointegration relationship, based on the Granger Representation Theorem (GRT), if two or more variables are cointegrated, there exists an Error Correction Model (ECM) which relates these variables in the short-run while maintaining the consistency of the OLS estimated long-run parameter obtained in the cointegrating regression. In this instance, ECM indicates the periodic change in the time series variables and how it eventually returns to its long run equilibrium value. The error correction model is provided in

Table 4: Error Correction Model

Dependent Variable	Explanatory Variables	Coefficients	Standard Error	t-Statistic	(Prob)
DLAGDP	C	0.008417	0.028144	0.299054	0.7665
	DLTGSA	10.00980	1.139049	8.787857	0.0000
	DEXR	0.003238	0.001900	1.704360	0.0965
	POLSTAB	0.009797	0.027295	0.358914	0.7216
	ECML	-0.434905	0.155288	-2.800641	0.0080

R-Squared = 0.78: Adjusted R-squared: 0.75: DW = 1.67: F = 0.000000

Three regressors, that is, total government spending on agriculture, exchange rate and political stability were employed to explain the short run dynamics in the behaviour of agriculture output. In line with economic theory, exchange rate and political stability are expected to be positively related to economic growth on a priori basis while exchange rate is negative. The coefficients of the differenced variables are all significant political stability. Total government expenditure on Agriculture is significant at 1%. The adjusted R^2 of 0.75 indicates that the explanatory variables explain 75% of the variation in agriculture output in the short term. The F statistic indicates that the variables in the ECM are jointly significant in explaining the dependent variable. The coefficient of error correction terms (ECM) bears the required negative sign and also significant at 1%. Its magnitude of 0.434905 implies that approximately 40 percent of the previous year disequilibrium in agriculture's output is adjusted for in the following year. This points to the fact that, to a greater extent, the value of agricultural output is endogenously determined in Nigeria.

Statistically, the equilibrium error term is zero suggesting that AGDP adjusts to changes in the explanatory variables in the same period. Moreover, DLAGDP in the current period adjusts to approximately 40% of the changes in LTGSA, EXR and PS in the previous period.

Table 4. Pair wise Granger causality test between Total Government Expenditure on Agriculture and Agriculture Output

Direction of Causality	Number of Lags	F value	P value	Decision
DLTGSA→DLAGDP	2	1.99833	0.1496	Reject
DLAGDP→ DLTGSA	2	4.39287	0.0192	Do not Reject
DLTGSA →DAGDP	3	1.82338	0.1609	Reject
DLAGDP→ DLTGSA	3	2.67287	0.0624	Do not Reject
DLTGSA →DAGDP	4	2.00527	0.1174	Reject
DLAGDP→DLTGSA	4	1.78866	0.1554	Reject

The arrow shows the direction of causality.

Since causality test is affected by number of lags included, the study tested using 2, 3 and 4 lag lengths. The results in Table 4 shows that at all conventional level of significance and at two lag lengths, a unidirectional causality running from agriculture output to total government expenditure on agriculture with no reverse causality (no feedback) from total government expenditure on agriculture to agriculture output. At 10% level of significance and 3 lag lengths, there was unidirectional causality running from agriculture output to total government expenditure on agriculture with no reverse causality from total government expenditure on agriculture to agriculture output. This is line with Wagner law (1890) which suggests that the share of the public sector in the economy will rise as economic growth proceeds, owing to the intensification of existing activities

and extension of new activities. The hypothesis that the lag values of LAGDP and LTGSA are statistically significantly different from zero is not rejected for the second and fourth lag length as the p-values of the F-test indicate. This does not tally with this scenario; the long run static regression analysis portrays a positive relationship between total government expenditure on agriculture and agriculture output which is difficult to explain. Based on the result of granger causality, we conclude that a very weak causality exist between the two variables used in this study

5 Conclusion

The general notion is that public capital and private capital are complementary factors in the production process, so an increase in the public capital stock raises the productivity of all factors in production (Anderson et al. 2006). With respect to total government spending on agriculture, the outcome of this study points to the fact that there is a positive or adverse relationship between total government spending on agriculture and agriculture output in Nigeria. The relationship is statistically significant in the long-run and also significant in the short-run. This finding is in line with a priori theoretical expectations that government expenditure can have important positive effects on economic growth. This finding of positive effect of total government expenditure on agriculture and agricultural output supports findings from previous studies like, (Bernard, 2009; Ariyo 1999; Thirlwall, 1976; Beck, Levine and Loayza, 2000; FAO, 2008, Obute, 1988; Iganiga, and Unemhilin, 2011). The finding is not in line with (Essien, 2005; Itodo, Apeh and Adeshina, 2012; that government expenditure does not have significant influence on agricultural output in Nigeria.

Although the test revealed/confirmed this result, however the effect cannot be said to be satisfactory enough in terms of bringing the nation closer in tackling the inherent challenges raised earlier in this study, hence more government allocation is required in Nigeria to boost/increase agricultural productivity (output). Spending on agriculture sector has the capacity to increase its output by 10.7% if the allocation increases by 1% in the long run while in the short run, one percent increase in total government spending on agriculture will bring about 10% increase in agriculture output. The allocation is exceedingly low, less than 3 percent (2.7%) of total federal expenditure was allotted to agriculture during 1970 to 2014, far lower than spending in other key sectors such as education, health, and water.

Exchange rate is positively related with agriculture's output and also statistically significant which is not in line with the a priori expectation and also, does not support the work of Morley (1992) who analyzed the effect of real exchange rates on output for twenty eight developing countries that have devalued their currencies using a regression framework. After the introduction of controls for factors that could simultaneously induce devaluation and reduce output including terms of trade, import growth, the money supply, and the fiscal balance, he discovered that depreciation of the level of the real exchange rate reduced output.

This finding show that the level of mechanized farming is still very low in the country because, mechanized farming is the only type of farming that can really increase output. Modern technologies, however, tend to be expensive or require large initial capital outlays to acquire them and so many farmers (especially the poor) may not be able to obtain them due to their own lack of financial capital or affordable credit and financial facilities. Thus, leaving foreigners and the rich to invest in this sector and also repatriate their proceeds abroad. Most Nigerian farmers are not educated and modern technologies tend to be highly complex, knowledge-intensive, and location-specific and so human capital development is critical for successful adoption. Basically, highly educated farmers would be better positioned to adopt improved technologies and influence adoption among their colleagues.

The findings on the relationship with exchange rate is supported by World Bank (2006) that food pricing and exchange rate policies of government have over the years been faulty thus affecting the financing of agriculture in Nigeria. The pricing policies the government had pursued over the years have been relatively low to the

world market prices and in most cases, what is paid the farmers is half the world prices. The continuous depreciation of the Naira and the ineffective system of subsidies for inputs has also had their toll on agriculture finance. For instance, the subsidies which were aimed at helping the poor ended up reducing the income of the farmers who are much poorer than many of the urban consumers who actually benefit from the subsidies.
The consequence of this is that the policies have reduced farmer's incentives for production while increasing the consumption of urban dwellers making government to rely on imported foods dumped by industrialized countries which in turn make farmers to abandon their farms and migrate to the cities.

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