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Assessment of the Effect of Government Expenditure on Agricultural Output in Nigeria (1980-2013)

Aina, G. O. & Omojola, J.T.

Department of Agricultural Economics and Extension, Anambra State University, PMB 6059, Awka Main Post Office, Anambra, Nigeria
E-mail josephomojola92@gmail.com

ABSTRACT
This study examined the effect of government expenditure on agricultural sector performance in Nigeria between 1980 and 2013. A relationship was established between government expenditure on agriculture and agricultural production output. The model for the regression analysis has government expenditure on agriculture, interest rate and exchange rate as the independent variables while agricultural production output is the dependent variable. Using secondary data from the Central Bank of Nigeria Statistical bulletin and applying the econometrics method of Ordinary Least Square and Error Correlation Mechanism (ECM) methods, the short run analysis shows that there is a significant and positive relationship between government expenditure on agriculture and agricultural production output. The regression coefficient of interest rate impacted significantly on agricultural sector output and the coefficient of exchange rate is rightly signed. The long run dynamic result shows that the coefficient of government expenditure on agriculture variable is rightly signed as well as the check variables (interest and exchange rates). There exists a long run relationship among the variables because the coefficient of ECM is rightly signed i.e. negative and significant. We recommend that budgetary allocation to the agricultural sector should be increased and infrastructural facilities such as good road network and electricity should be concentrated in the rural areas where we have bulk of our farmers. The CBN should do more to encourage borrowing by bringing the lending rate to single digit to boost agricultural production output.
Keywords: assessment, government, expenditure, agricultural output, Nigeria

INTRODUCTION

Prior to the discovery of oil boom of the 1970s, the importance of agriculture to the economic development of Nigeria is enormous owing to the fact that agriculture was the main source of food and employment for a sizeable number of the people. It also provides raw materials for industries, income for individual and government. For instance, in 1960s, more than 80% of the rural population of Nigeria was engaged in one type of agricultural activities or the other and between 1963 and 1964, the sector contributed as much as 65% of the nation's Gross Domestic Product (GDP) (Muftau and Gafar, 2003; Aina, 2015). Recently those roles seem to elude the country because of neglects resulting from the discovery of oil and the oil boom of 1970s; the global economic crisis of the nation's terms of trade, and the continuous decline in government finance to the sector (Ijaiya and Ijaiya, 2003).

Nigeria has diverse agro-ecological conditions that can support a variety of farming models. However, successive administrations over the years neglected agriculture and failed to diversify the economy away from over dependence on capital-intensive oil sector.

Nigeria, which was the largest net exporter of agricultural produce (groundnuts 42%, palm oil 27%, soya beans 28% and cocoa 18% in 1960s, now spends over 1.2 trillion importing palm oil, canned beans and other food items (Akintola, 2011). The country has however, the potentials to return to its previous position if adequate attention is given to agricultural growth policy through finance and the provision of rural infrastructure. This policy should aim at establishing a system of sustainable agricultural financing schemes and programmmes that could provide micro credit facilities (Aina, 2015). It is sad that the small-holder farmers in Nigeria lack access to inputs to increase productivity, income and reduce poverty (Alpuerto et al, 2009). Despite numerous laudable agricultural programmes like Agricultural support scheme of 2006, FADAMA Development Programmes and Agricultural Credit Guarantee Scheme Fund among others, productivity has not improved (Oriola, 2009 and Ewetan et al, 2017).

Public expenditure, which serves as the bed rock of financing for the sector has consistently fallen short of the public expectation. For instance, a collaborative study carried out by the International Food Policy and Research Institute (IFPRI) and the World Bank in 2008, revealed that Nigeria's Public expenditure on agriculture is less than 2% of total federal annual budget expenditure. This is significantly low 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 1996-2000 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 1% of the total commercial Bank Loans (People's Daily, 2011). Inadequacy of government funding of agricultural projects and programmes has been observed by researchers because lack of strong evidence of growth promotion externalities by deepening food insecurity, social inequality, rural poverty and hunger, are issues of funding (Ogiri, 2004; Ogbonna and Osondu, 2015).

This study therefore is set to determine the contribution of government funding to agricultural production in Nigeria between 1980-2013 and compare with some other factors on which agricultural output depends. This will guide policy making for increased agricultural productivity in the nation.

MATERIALS AND METHOD

Nigeria is situated in the Western part of Africa. Its coastal boundary is delimited by the Gulf of Guinea in the South and the land boundary is shared by Cameroon and Chad in the East, Niger in the north and the Benin in the west. Nigeria covers a total area of 923,768sqkm making it the 32^{nd} largest country of the world. The latitudinal and longitudinal extent of the country is 4^{o} –14^{o}N and 2^{o} –15^{O}E respectively. The climate of the country varies from equatorial in the south to grid in the north and tropical in the center with the estimated population of over 170million people (Wikipedia, 2016). Time series (secondary) data relating to the dependent and independent variables from 1980 – 2013 were collected from Central Bank of Nigeria statistical bulletin and other sources including librarian and publications from the Federal Office of Statistics. See Table 1.

Table 1: Data on Nigeria ASP, GCA and GRA from 1980-2013

YEAR	ASP(₦'M)	GCA(₦'M)	GRA(₦'M)
1980	6501.800	435.6000	32.50000
1981	57909.70	775.1000	33.90000
1982	59450.80	1035.100	34.10000
1983	59009.60	1185.200	29.30000
1984	55918.20	252.5000	32.80000
1985	65748.40	985.4000	32.70000
1986	72135.20	892.5000	32.90000
1987	69608.10	365.1000	29.20000
1988	76753.70	595.7000	54.30000
1989	80878.00	981.5000	81.10000
1990	84344.60	1758.500	208.1000
1991	87503.50	551.2000	121.1000
1992	89345.40	763.0000	161.5000
1993	90596.50	1820.000	1015.300
1994	92833.00	2800.100	919.0000
1995	96220.70	4691.700	2236.000
1996	100216.2	3892.800	1681.200
1997	104514.0	6247.400	1682.200
1998	108814.1	8876.600	2963.800
1999	114570.7	6912.600	31347.20
2000	117945.1	5761.700	4834.700
2001	122522.3	57879.00	7064.900
2002	1901334.	32364.40	12439.40
2003	203409.9	8510.900	7534.300
2004	216208.5	48047.80	11725.60
2005	231463.6	79939.40	10858.80
2006	248599.0	15176.80	18739.80
2007	266477.2	22518.58	15781.42
2008	283175.4	39211.59	15126.71
2009	299823.9	25635.66	16549.29
2010	317281.7	29121.94	NA
2011	335180.1	31323.07	15831.74
2012	348490.8	28693.56	17733.34
2013	348600.4	29712.86	18128.04

Source:*CBN Statistical Bulletin (Various Issues)*

Note:*(i)* *Agricultural Production Output (ASP), (ii) Government Capital Expenditure on Agriculture (GCA) (iii) Government Recurrent Expenditure on Agriculture (GRA)*

The econometric techniques of the Ordinary Least Square (OLS) and co-integration were adopted to explain the short and long run relationship between government expenditure and agricultural performance in Nigeria between 1980 – 2013.

MODEL SPECIFICATION

The functional and econometric relationship between the dependent and independent variables are provided in the equations below. The model for the study is cast in line with Iganiga and Unemhilin (2011) in form.

APO = *f*(TGE)

Where

APO = Agricultural Production Output

TGE = Total Government Expenditure

and now, with modification in numbers of independent variables and time frame.

ASP = *f*(GCA, GRA)

$ASP = \alpha_o + \alpha_1 GCA_t + \alpha_2 GRA_t + U_t$

In order to put the variables on the same scale and also reduce the problem of multiculinearity, we estimated the log – linear form of the model thus:

$Log\ ASP = Log\ \alpha_o + \alpha_1\ Log\ GLCA_t + d_2\ Log\ GRA_t + U_t$

Where:

ASP = Agricultural Production Output
GCA = Government Capital Expenditure on Agriculture
GRA = Government Recurrent Expenditure on Agriculture
Log = National Logarithm
U = Error term
t = Time/period

Our a priori expectation is $\alpha_1 > 0$ and $\alpha_2 > 0$

The result in table 2 shows that the log-linear specification of the AGS model is better than the linear at 5% level. This is so because it has a high R^2 of 60% lesser values for Akaike Info criterion (SCC), which are 1.89 and 2.02 respectively.

Our acceptance follows the observation made by Gujarati and Sangetha (2007) that in comparing two or more models, the model with the lowest value of AIC is preferred.

Table 2: Short Run Results of ASP on GCA and GRA

Variable	Coefficient	Std. error	t-statistic	Prob.
C	8.796198	0.720469	12.20900	0.0000
LOG(GCA)	0.255526	0.158140	1.615819	0.1166
LOG(GRA)	0.111299	0.104907	1.060924	0.2972
R^2	0.608905	Mean Dependent vari		11.71037
Adj. R^2	0.582832	S.D dependent variable		0.0922062
S.E of regression	0.595547	Akaike Info Criterion		1.887834
Sum squared resid	10.64027	Schwarz criterion		2.023880
Log likelihood	-28.14926	Hannan-Quinn crites.		1.933609
F.statistics	23.35383	Durbin-Watson stat.		1.653470
Prob (F.statistic)	0.000001			

Source: Computed Result (E-view 7.1)

It is also revealed in table 2 that the explanatory power of the model estimated is 61%. This is because the coefficient of determination – R^2 is 0.608, meaning that the variation in agricultural production output explained by government spending on agriculture, government capital expenditure on agriculture and government recurrent expenditure on agriculture is 61%. The coefficients of government capital and recurrent expenditures on agriculture variables are positively signed but not significant at 5% level. Meaning that we reject the null hypothesis which says there is no significant relationship between government spending on agriculture and agricultural production output. The overall model is significant at 5% level given the t-value which is greater than the F-table. The Durbin Watson value of 1.65 depict the presence of serial auto correlation. However, these results suggest that though the log-linear seems good, it's adoption for policy formulation and implementation may be misleading given the presence of serial auto correlation shown by the Durbin Watson and the insignificance of the explanatory variables. This may be informed by the characteristics of time series data which are usually non-stationary at levels. Therefore, there is need for further test of stationarity to eliminate the unit root problems associated with time series data.

Table 3. Unit Roots Stationary Test (1980-2013)

Variables	ADF Test	Critical Value			Order of Integration
		1% critical value	5% critical value	10% critical value	
DLOG (ASP)	-3978238	-3.646342	-2.954021	-2.615817	(0)=All level
DLOG (GCA)	-9.477050	-3.661661	-2.960411	-2.619160	(1)=1st Diff.
DLOG (GRA)	-7.660637	-3.679322	-2.967767	-2.622989	(1)=1st Diff.

Source: Computed Result (E-View 7.1)

The unit root test in table 3 above shows that at various levels of significance (1%, 5% and 10%), the time series were stationary. From the result, ASP was integrated of Order Zero (at level), while the remaining two variables (GCA and GRA) were integrated of Order one (First difference). Therefore all the time series in this study were stationary.

Co-integration was conducted based on the test proposed by Johansen. According to Iyoha and Ekanem (2002), co-integration deals with the methodology of modeling non-stationary time series variables.

Table 4: Johansen Test for Co-integration

Eigen Value	Max-Eign Statistics	5% critical value	Prob.**	Hypothesis of CE(s)
0.585087	21.99215	21.13162	0.0378	None *
0.439242	14.46162	14.26460	0.0465	At most 1*
0.145611	3.934212	3.841466	0.0473	At most 2*

Source: Computed Result (E-view 7.1)

Note: "denote acceptance of the hypothesis at the 0.05 level. **Mackninon – Haug-Michelis (1999) P – value. Max-Eigen value test indicate 3 Co-integrating egn(s) at 0.05 level.

From table 4 above, it shows that there are three co-integrating equations at 5% level significance. This is strong evidence from the unit root test conducted where we observed that

Table 5: Over-Parameterized Error Correction Mechanism

Variable	Coefficient	Std Error	t-statistic	Prob.
C	0.201383	0.109813	1.833925	0.0842
DLOG (ASP(-1))	0.106376	0.239994	-0.443246	0.6632
DLOG (ASP(-2))	0.029278	0.140583	0.208259	0.8375
DLOG(GCA)	0.157011	0.147828	1.062124	0.3030
DLOG(GCA(-1))	0.118061	0.147561	0.800085	0.4347
DLOG(GCA(-2))	0.090916	0.158357	0.574120	0.5734
DLOG(GRA)	-0.037582	0.127125	-0.295628	0.7711
DLOG(GRA(-1))	-0.199203	0.133097	-1.496674	0.1528
DLOG(GRA(-2))	-0.449813	0.141142	-3.186951	0.0054
ECM(-1)	-0.823813	0.282812	-2.912941	0.0097
R^2	0.763453	mean dependent var.		0.059928
Adj R^2	0.638223	S.D dependent var.		0.693639
S.E of regression	0.417210	Akaike Info. Criterion		1.367661
Sum squared resid	2.959084	Schwarz criterion		1.847600
Log likelihood	-8.463421	Hannan-Quinn criter		1.510372
F-statistic	6.096379	Durbin-Watson stat.		1.554177
Prob (F-statistic)	0.000719			

Source: Computed Result (E-View 7.1)

some variables were stationary at order one while some were stationary of order zero. Given that the exists co-integrating equations, the requirement for fitting in an error correction model is satisfied.

The Error Correction Model (ECM) was estimated based on the general-to-specific rule. To do this, we begin with over-parameterized ECM which shows the main dynamic processes in the model. It sets the Lag length such that the dynamic process would not be constrained by too long a Lag length. Table 5 below presents the result of the over-parameterized Error Correction Model for agricultural production output model.

In order to achieve the parsimonious ECM, we transform the over-parameterised, which would be more interpreted for forecasting and policy implementation. Table 6 below presents the results.

Table 6: Parsimonious Error Correction Mechanism

Variable	Coefficient	Std Error	t-statistic	Prob.
C	0.062934	0.098752	0.637288	0.5305
DLOG (ASP(-1))	-0.188944	0.229543	-0.823130	0.4193
DLOG (ASP(-2))	0.030014	0.145373	0.206463	0.8383
DLOG(GCA)	0.010666	0.120296	0.088661	0.9302
DLOG(GCA(-1))	0.164302	0.134557	1.221058	0.2350
DLOG(GRA)	0.074087	0.127278	0.582085	0.5664
ECM(-1)	-0.741215	0.290437	-2.552069	0.0182
R^2	0.609909	Mean dependent var.		0.057148
Adj R^2	0.503520	S.D dependent var.		0.668508
S.E of regression	0.471040	Akaike Info. Criterion		1.538756
Sum squared resid	4.881322	Schwarz criterion		1.868793
Log likelihood	-15.31196	Hannan-Quinn criter		1.642119
F-statistic	5.732846	Durbin-Watson stat.		1.974504
Prob (F-statistic)	0.001027			

Source: Computed Result (E-View 7.1)

The result of the estimated Parsimonious Error Correction Model above suggests that the overall fit is satisfactory with an R^2 of 0.609. Thus, 61% systematic variation in agricultural production output is explained by government capital and recurrent expenditure on agriculture. The remaining 39% are caused by factors exogenous to the model captured by the error term. Furthermore, the overall model is significant at 5% level as shown by the f-statistics of 5.73.

The coefficient of ECM is positively signed and statistically significant at 5% level. Thus, it corrects any deviation from Long-run equilibrium. The Durbin-Watson value of 1.97 which is approximately 2.0, suggests a lesser level of auto-correlation.

Moreover, for the current and one Lag length period, the coefficients of government capital expenditure on agriculture (GCA) are rightly signed but statistically not significant at 5% level. This implies that the government capital spending on agriculture contribute positively to agricultural sector performance in Nigeria during the period under review. But the non impact of GCA on AGS during the period suggests that government capital spending alone will not contribute significantly to agricultural sector performance. This is consistent with Nembee (2012) who opined that inadequate capital expenditure will not improve the agricultural sector performance in Nigeria.

However, the regression coefficient of the current forms of government recurrent expenditure on agriculture is positively signed but statistically insignificant implying that government recurrent expenditure on agriculture contributed positively to agricultural sector performance in Nigeria during the period under review. Comparatively, the result shows that the percentage contribution of government capital expenditure on agriculture is higher than that of the recurrent expenditure. This shows a workable economy whereby government budget to the agricultural sector is been spend more on capital expenditure in the purchase of basic inputs as well as social amenities. This corroborate the view of Iganiga and Unembilin (2011) who noted that adequate capital expenditure on agriculture contribute positively to agricultural sector performance in Nigeria.

CONCLUSION AND RECOMMENDATIONS

Government spending contributes positively to the agricultural sector performance in Nigeria. However, government budget to the sector is been spent more on capital expenditure in the purchase of basic inputs as well as social amenities. Government budgetary allocation to the agricultural sector should be consistently increased and infrastructural facilities provided in the rural areas to ameliorate the problems of food insecurity, hunger and poverty in Nigeria. The CBN should do more to encourage borrowing by bringing the lending rate to single digit to boost agricultural production output.

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