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AGRICULTURAL EXPENDITURE, MAPUTO DECLARATION TARGET AND AGRICULTURAL OUTPUT: A CASE STUDY OF NIGERIA

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Abstract

African Heads of state at the Second Ordinary Assembly of African Union, in 2003, in Maputo, Mozambique endorsed a Declaration on agriculture in Africa. The Declaration contains several important decisions concerning agriculture but prominent among them was to allocate at least 10% of the national budget to agriculture, and to achieve at least 6% annual agricultural growth. Nigeria is one of the signatories to the declaration and spending on agriculture in Nigeria has been less than 4% of total federal expenditure for most years. It is also worrisome to note that the percentage contribution of the agricultural sector to GDP has been falling persistently over the years. The above observations trigger pertinent questions as to whether the low expenditure on agriculture can explain the state of poor agricultural output in Nigeria. If yes, by how much would changes in agricultural expenditure improves agricultural output in Nigeria? And what would have been the impact of allocating 10% of the budget to agriculture as required by Maputo Declaration? To answer these pertinent questions, secondary times-series data were obtained from both local and international sources and 10% allocation to agriculture was simulated from the existing total expenditure outlay for the period 2004 to 2015 in line with Maputo Declaration. Ganger Causality tests and Error Correction Estimation (ECM) technique were used in analyzing the data. The results point to three conclusions: First, there is positive and significant relationship between agricultural expenditure and agricultural output in Nigeria. Second, increasing agricultural expenditure to 10% of the total expenditure in line with Maputo Declaration would have increased agricultural output by 11-times greater than the impact of what is actually spent on agriculture. Third, educated agricultural work force is also in important

in stimulating agricultural output. Accordingly, the study recommends that government should adhere to the Maputo Declaration on budgetary allocation to agriculture and allocate at least 10% of her budget to agriculture among other recommendations.

Keywords: Maputo Declaration, Agriculture, Expenditure, Output, Nigeria

INTRODUCTION

Agriculture forms the backbone of most African economies in terms of its share in Africa's Gross Domestic product (GDP) and employment. Agriculture accounts for 32% of the continent's GDP and more than two-third of the African population depends on agriculture for their income. Unfortunately, over 30% of the population of African is chronically and severely undernourished; Africa has become a net importer of food; and currently the largest recipient of food aid in the world (FAO, 2006).

Accordingly, a key emerging challenge for African countries over the years has been to increase agricultural productivity. Realizing the role public spending can play in modern economic management generally and specifically as a key instrument in promoting agricultural productivity, African Heads of state at the Second Ordinary Assembly of African Union (AU), in July, 2003, in Maputo, Mozambique endorsed a Declaration on agriculture and food security in Africa. The Declaration contains several important decisions concerning agriculture but prominent among them were to allocate at least 10% of the national budget to agriculture, and to achieve at least 6% annual agricultural growth.

The Maputo commitment created a political will among the AU leaders which led to the adoption of the Comprehensive Africa Agriculture Development Programme (CAADP) the same year as part of the New Partnership for African Development (NEPAD) initiative. CAADP's objective was in line with the Maputo Declaration and pledges: to raise agricultural productivity by at least 6 percent per year and to increase public expenditure in agriculture to at least 10 percent of the national budget each year.

Nine (9) out of 54 countries of AU member states have met the Maputo target of spending 10 percent of national budgetary resources on agricultural and rural development and Nigeria is not among them. Out of the 9 countries that have met the target, only 7 countries have been consistent over the years. These countries include Burkina Faso, Ethiopia, Ghana, Malawi, Mali, Niger and Burundi (Benin and Yu, 2012; and Newettie, 2017).

Some of the countries that have achieved impressive growth rate in their agricultural sector, have their success stories linked to increased public investment on their agricultural

sector. Countries like Ghana, Ethiopia, Burkina Faso, etc, that have achieved tremendous improvement on their agricultural GDP growth rate have all surpassed the 10 percent national budgetary allocation to their agricultural sector. For instance, Ghana's average annual growth rate has exceeded 5 percent over the past 10 years. Ghana is among the top five performers worldwide. Ethiopia has witnessed its most rapid growth period in history, with average growth rate of 9.5 percent in the agricultural sector between 2005 and 2014. This is attributed to increased public expenditure on their agricultural sector. The Ethiopia level of public expenditure on the agricultural sector has surpassed the Maputo target of 10 percent.

Nigeria, who is one of the signatories to the declaration have not met the target of 10 percent budgetary resources to agricultural sector. Nigerian budgetary allocation to agriculture from inception of Maputo Declaration in 2003 to 2015 was less than 4 percent on average (Ebi, Uduma and Amumu, 2008; and Ayunku and Etale, 2015).

This spending contrasts dramatically with the sector's importance in the Nigerian economy and the policy emphases on diversifying the economy away from oil, and falls well below the 10% goal set by African leaders in the 2003 Maputo agreement. Nigeria also falls far behind in agricultural expenditure by international standards (FAO Percent Recommendation is 25%). It is also worrisome to note that the percentage contribution of the agricultural sector to GDP have been falling persistently from 0.37% in 2009 to 0.22% in 2012 and to 0.20% in 2014 (Central Bank of Nigeria CBN, 2014).

In view of the above observations, the pertinent question is could it be that, the low expenditure on agriculture is the reason for poor agricultural output in Nigeria? If expenditure on agriculture had increased up to 10% of the total budget, is there reason to believe that agricultural output would have increased and, if so, by how much? Hence, this paper examine whether the low expenditure on agriculture can explain the state of poor agricultural productivity in Nigeria. If yes, by a how much would changes in expenditure on agriculture improve agricultural output in Nigeria? And what would have been the impact of allocating 10% of the budget to agriculture as required by Maputo Declaration?

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Literature review on Maputo Declaration

African Heads of State established the Maputo Declaration in 2003 in Mozambique and agreed to allocate at least 10% of their national budgets to the agricultural sector. The countries were to increase their share of expenditure to agriculture with the aim of expanding agricultural productivity by 6% annually. By 2009, only Mali, Madagascar, Malawi, Niger, Namibia, Chad, and Ethiopia had reached or exceeded the 10% target of agriculture budget share. At least nine

countries had managed to exceed the 6% target on productivity (Newettie, 2017). According to Benin and Yu (2012), as of late 2012, 13 countries had already surpassed the 10% target showing an improvement from 2009.

Benin and Yu (2012) came up with a report on the trends in public expenditure to agriculture in African countries. Their study assessed country performances to see if they measure up to the requirements set by the Maputo Declaration. According to Benin and Yu, (2012), even if many countries had increased their public agricultural expenditure (PAE) by 2012, Africa as a whole had not reached the 10% set target. One of the reasons why public agricultural expenditure is still very low among African countries is the small size of their revenue base. The low revenue has constrained many governments to invest in crucial economic activities such as agricultural research and infrastructure development.

Ebi et al (2009) In their study on Nigerian Agricultural sector and Budgetary allocation, 1990-2008, employed descriptive statistics to analyze the data in order to examine trends in budgetary allocation to agricultural in Nigeria. The result showed that the average budgetary allocation is very low with a highly unstable and unpredictable trend. And concluded that Nigerian Government has neglected the Maputo declaration to the commitment of at least 10 percent of the total national budget to agriculture and the allocation is far worse off 5 years after Maputo declaration in 2003.

Empirical Literature on the impact of government expenditure on agriculture output

Newettie (2017) examined the component of public expenditure that is more growth enhancing for the agricultural sector in Zambia, Malawi, South Africa and Tanzania between 2000 and 2014. Vector Error Correction Model (VECM) was used to test the impact of public expenditure, private investment and net trade on agricultural GDP growth. The results from the analysis revealed that agricultural growth responds differently to the agricultural spending types across the chosen countries. The implication of Newettie (2017) findings was that more efficient targeting of public investments by the governments stimulates growth in the agricultural sector. Hence, Newettie (2017) recommended that governments should shift their spending priorities and focus more on areas that stimulate growth to the sector.

Chauke, Manyise, Francis, Pfumayaramba, Raidimi, and Maiwanashe (2015) carried out a comparative study on the impact of public expenditure on agricultural growth in South Africa and Zimbabwe, using agricultural GDP as the dependent variable. Their study employed co-integration tests together with VECM and the results showed capital expenditures being positively related to agricultural growth in both the short-run and long-run, in both countries. However, their descriptive analysis indicated that governments in both countries spent more

funds on current expenditures at the expense of capital expenditures for the observed periods. According to the, such a practice is regarded as growth retarding by classical economists as well as the early adopters of endogenous growth models such as Barro (1990). Therefore, Chauke et al (2015) recommended governments in both South Africa and Zimbabwe to shift priorities and focus more on capital expenditures.

Wangusi and Muturi (2015) examine the impacts of agricultural public spending on agricultural productivity in Kenya over the period 1973 to 2012. Correlation analysis was used to analyze the data and determine the relationships between variables with the major determining factors being the correlation (R) and the p-value of significance. The results showed that there was a positive and significant relationship between agricultural productivity, and public spending to the agricultural sector.

Ewubare and Eyitope (2015) employed time series data to study the effect of public expenditure on agricultural output in Nigeria. The study used multiple regression, the Johason Co-integration Techniques and Error Correction Model. The result of the study showed that funding is very crucial for the development of the agricultural sector in Nigeria, and that, for the agricultural sector to contribute significantly to the Nigerian economy as a major source of sustainable employment generation in Nigeria, the sector's share of the government expenditure should be increased.

Okezie A. et al (2013) analyzed the relationship between the Nigerian government expenditure on agricultural sector and it contribution to the Gross Domestic Product (GDP) between 1980 to 2011 using Engle-Granger two step Modeling (EGM) procedure to co-integration based on unrestricted Error Correction Model and pair wise Granger causality test. The results of the findings revealed a co-integration between the agricultural sector contribution to (GDP) and total expenditure on agriculture. The result also indicated that the speed of adjustment to equilibrium was 88% within a year when the variables wander away from their equilibrium value. They concluded that any reduction in government expenditure on agriculture would have a negative repercussion on agricultural growth in Nigeria.

Armas, Osorio, Dodson and Abriningrum (2012) examined the impact of different agricultural spending types on agricultural growth in Indonesia. Their study disaggregated the total agricultural expenditure into spending on irrigation as well as spending on subsidies. An error correction model was then used to assess the impact of spending on these two sub-sectors on agricultural growth from 1976 to 2006. They found a positive relationship between infrastructure spending and agricultural growth while spending on input subsidies had an opposite effect.

Adofiu et al (2012) investigated the effect of government budgetary allocation to agricultural sector on agricultural output in Nigeria. The result reveals a significant positive effect

of government budgetary allocation on agricultural production in Nigeria. They concluded that budgetary allocation to agricultural sector should be increase and monitored to guarantee food security, employment and overall economic growth and development in Nigeria.

A study by Iganiga and Unemhilin (2011) also looked at the impact of federal government expenditure on agricultural output in Nigeria. In their study, the value of agricultural output was regressed against total agricultural expenditure, total commercial bank credit to the sector and the food import value among other explanatory variables. Their study applied a Cobb-Douglas Growth Model to analyze the data from 1970 to 2008. After applying techniques of co-integration and error correction modeling, their results showed that government capital expenditure positively influences output in the agricultural sector. It is consistent with the results found by early scholars such as Barro (1990), who regarded capital expenditure as productive.

Lawal (2011), examined the trend in federal government expenditure on agriculture for thirty years period (1977 – 2007). Evidence obtained from the analysis showed that government spending does not follow a particular pattern and that the contribution of the agricultural sector to the GDP is in direct relationship with the government funding to the sector.

Though a number of studies like Ebi, et al (2009), Iganiga and Unemhilin (2011), Okezie et al (2013), Ewubare and Eyitope (2015), Abula and Ben 2016), etc, investigated this subject Mather in respect to public spending on agriculture and agricultural output in Nigeria, this paper in addition to examining this nexus between government spending on agriculture and agricultural output in Nigeria, simulates what the impact of 10% budgetary allocation to agriculture would have been on agricultural output if Nigeria had adhere to the Maputo Declaration in 2003. This if unravel will form a concrete evidence in support of ever increasing calls for increase expenditure on agriculture in order to enhance improve agricultural output in Nigeria.

Theoretical Framework

This work is anchored on the Cobb-Douglas production theory which was developed jointly by Charles Cobb and Paul Douglas in 1928, when seeking a functional form that relates output to labour (workers) and capital. They modeled the growth of the American economy during the period 1899 - 1922. They considered a simplified view of the economy in which production of output is determined by the amount of labor involved and the amount of capital invested. In its standard form, the production of a single good with two factors can be expressed as follows:

$$Y = AK^{\alpha}L^{\beta} \qquad (1)$$

Where: Y = total production (the real value of all goods produced in a year)

L = labor input (the total number of person-hours worked in a year)

K = capital input (investment)

A = total factor productivity

α and β are the output elasticities of capital and labour, respectively.

METHODOLOGY RESEARCH

Model specification

The model is anchored on the Augmented Cobb-Douglas production function. According to the Cobb-Douglas production function, production output is determined by the amount of labor involved and the amount of capital invested. The Cobb-Douglas production theory enables us to introduce modifications and extension into the original function so as to bring it more variables in line with observed empirical phenomena. Hence, to capture the impact of agricultural expenditure on agricultural output, the original Cobb-Douglas is augmented by extending the original production function to include agricultural expenditure as one of the variables affecting output. Other factors affecting agricultural output as identified in literature include credit allocation to the agriculture, adult literacy, lending rate, and rainfall index etc.

Therefore, the Cobb – Douglas production function in equation (1)is augmented to include government expenditure on agriculture and other macroeconomic variables affecting agricultural output written as:

$$Y = \alpha_0 K^{\alpha 1} L^{\alpha 2} AGREX^{\alpha 3} \omega^{\alpha 4} U^{\varepsilon} \quad (2)$$

In equation (2), agricultural output replaces total output, agricultural labour force replaces aggregate labour force, AGREX is Expenditure on agriculture, ω captures other macroeconomic variables such as adult literacy, lending rate, and rainfall index and U is the error term. Hence, we can conveniently express government agricultural expenditure - agricultural output - nexus as:

$AGP = \alpha_0 AGREX^{\alpha 1} AGREX_{10}^{\alpha 2} AGLF^{\alpha 3} ADLT^{\alpha 4} INT^{\alpha 5} RFALL^{\alpha 6}$ (3)

Where:

AGP = Agricultural output in tons

AGREX = Actual Government expenditure on agricultural sector in #.

$AGREX_{10}$ = Actual Government expenditure on agricultural from 1980 to 2003 and projected 10% expenditure on agriculture from 2004 to 2015 due to Maputo Declaration in #.

AGLF = Agriculture labour force

ADLT = Adult literacy in %

INT = lending rate in Nigeria (in percent)

RFAL = rainfall index in Nigeria (in millimeters)

U = the random error term.

Equation (3) can be further modified in its reduced form thus:

$AGP = \beta_0 + \beta_1 AGRE + \beta_2 AGRE_{10} + \beta_3 AGLF + \beta_4 ADLT + \beta_5 INT + \beta_6 RFAL + U$ (4)

Where:

β_0 = the autonomous intercept of the model,

β_1, = elasticity of actual Government expenditure on agricultural sector for the entire period of study.

β_2, = elasticity of government expenditure on agricultural sector from 1980 to 2003 and the projected 10% expenditure on agriculture from 2004 to 2015 due to Maputo Declaration.

β_3 = elasticity of government expenditure on agricultural due to Maputo declaration and

β_3 to β_6= elasticities of other control variables in the model.

The theoretical expectations about the signs of the elasticitires of the parameters are:

$\beta_0 > 0$ and

β_1 to β_4 and $\beta_6 > 0$, while $\beta_5 < 0$.

Estimation Strategy

The paper adopted both descriptive and analytical designs techniques. The descriptive techniques involved the use of tables, percentage, and mean to analyze the trend performance of the variables. The analytical technique uses various econometric methods in estimating equation (4). The procedures began with a test of unit root, co-integration among variables in the model and a test for Granger causality. The unit root test is conducted using the Augmented Dickey Fuller (ADF). Co-integration captures equilibrium long-run relationship between (co-integrating) variables and Error Correction Mechanisms (ECM) is a means of reconciling the short-run behaviour of an economic variable with its long-run behaviour.

RESULTS

Description of Data

Table 1 presents the data used in analyzing the nexus between actual government spending on agriculture and agricultural output in Nigeria as well as what would have been the impact if government had allocated 10% of her budget to agriculture. While data on Total government expenditure (TOTALEXP), agriculture expenditure (AGREX), agriculture labour force (AGLF), adult literacy rate (ADLT), interest rate (INT), rain fall (RFALL) agricultural output (AGP) were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin various issues, 10 % expenditure on agriculture ($AGREX_{10}$) was obtained by computing 10% of the total expenditure which would have been the yearly expenditure on agriculture had Nigeria adhered to Maputo

declaration since 2003. Hence, $AGREX_{10}$ comprises of actual expenditure on agriculture from 1980 to 2003 and projected 10% expenditure on agriculture from 2004 to 2015. The essence is to capture the impact of actual government spending on agriculture and compare it with what would have been the impact if government had adhere to the Maputo declaration from 2004.A descriptive statistics of the variables are presented in table 2.

Table 1: Data and Data computation

year	TOTALEXP	AGREX	AGREX10	AGLF	ADLT	INT	RFALL	AGP
1980	14968.6	17.1	17.1	4471376	32.94	7.75	260.00	10,011.50
1981	11413.7	13	13	4598605	34.51	10.25	256.00	13,580.30
1982	11923.2	14.8	14.8	4723615	36.10	10.00	346.00	15,905.50
1983	9636.5	12.8	12.8	4848416	37.68	12.50	315.00	18,837.20
1984	9927.6	15.7	15.7	4976143	39.25	9.25	372.00	23,799.40
1985	13041.1	20.4	20.4	5109038	40.80	10.50	420.00	26,625.20
1986	16223.7	20.7	20.7	5247681	42.40	17.50	395.00	27,887.50
1987	22012.7	46.1	46.1	5391206	43.98	16.50	294.00	39,204.20
1988	25749.5	83	83	5538705	45.54	26.80	467.00	57,924.40
1989	41028.3	151.8	151.8	5688742	47.10	25.50	398.00	69,713.00
1990	60267.6	258	258	5840297	48.66	20.01	442.00	84,344.60
1991	66589.4	208.7	208.7	5993207	50.21	29.80	470.00	97,464.10
1992	92799.4	456	456	6147930	51.75	18.32	352.00	145,225.30
1993	191229.2	1803.8	1803.8	6304788	53.30	21.00	295.00	231,832.70
1994	160893.2	1183.3	1183.3	6464328	54.86	20.18	193.00	349,244.90
1995	248768.1	1510.4	1510.4	6626958	56.44	19.74	286.00	619,806.80
1996	337418.1	1592.6	1592.6	6792726	57.95	13.54	241.00	841,457.10
1997	427679.1	2058.9	2058.9	6961608	59.47	18.29	250.00	953,549.40
1998	487113.4	2891.7	2891.7	7133952	60.99	21.32	305.00	1,057,584.00
1999	947690.3	59316.2	59316.2	7310172	62.51	17.98	430.00	1,127,693.10
2000	701050.9	6335.8	6335.8	7490544	64.02	18.29	367.00	1,192,910.00
2001	1017996.5	7064.5	7064.5	7675080	65.59	24.85	1,279.00	1,594,895.50
2002	1018178.1	9993.6	9993.6	7863648	66.80	20.71	1,282.00	3,357,062.90
2003	1225988.3	7537.4	7537.4	8056194	66.22	19.18	1,150.00	3,624,579.50
2004	1384000	11256.2	138400	8252616	62.37	17.95	1,150.00	3,903,758.70
2005	1743200	16325.6	174320	8452716	63.10	17.26	1,207.20	4,773,198.40
2006	1842587.7	17900	184258.77	8656392	62.37	16.94	1,282.60	5,940,237.00
2007	2348593	32500	234859.3	8863308	69.30	15.14	1,310.80	6,757,867.70
2008	3078262	65400	307826.2	9072738	66.00	18.99	1,065.00	7,981,397.30
2009	3280768.1	22440	328076.81	9280492	73.40	17.59	786.70	9,186,306.10
2010	3993248.5	29560	399324.85	9488665	61.30	16.02	1,389.20	13,048,892.80
2011	4233013.33	41169.9	423301.333	9696838	60.40	16.79	1,367.50	14,037,825.83
2012	4199978	33300	419997.8	9905011	55.60	16.72	1,363.70	15,815,997.51
2013	4323000.34	39431.0122	432300.034	10113184	51.10	16.55	6,582.87	16,816,553.01
2014	4210000.06	30849.771	421000.006	10321357	57.10	59.66	5,718.70	18,018,612.87
2015	4650000.33	39831.0122	465000.033	11265423	57.10	59.68	5,863.23	19,018,612.87

Sources: 1. Central Bank of Nigeria (CBN) Statistical Bulletin various issues

2. World Bank 3. Author's computation ($_{AGREX10}$)

Table 2 shows the descriptive statistics of each of the variables. Specifically, the minimum actual expenditure on agriculture from 1980 to 2015 was 12.800 Million naira and the Maximum was 65400.00 Million naira, while the mean expenditure for the period was 13404.72 Million naira. Had it been that Nigeria allocated 10% of her yearly budget to agriculture from 2004, the maximum for the period 1980 to 2015 would have been 465000 Million naira while the average spending on agriculture for the period would have been 111979.0 million naira. That is, more than 8-times (111979.8/13404.72) average of what was actually allocated. The implication of this difference is pertinent and would be unravel in the subsequent analyses of data in this work.

Table 2. Descriptive Statistics (E-view 8.0 output)

	AGP	AGREX	AGREX10	AGLF	ADLT	INT	RFALL
Mean	4191122.	13404.72	111979.8	7239547.	54.39472	19.97361	1109.792
Median	1005567.	2475.300	2475.300	7047780.	56.77000	17.96500	436.0000
Maximum	19018613	65400.00	465000.0	11265423	73.40000	59.68000	6582.870
Minimum	10011.50	12.80000	12.80000	4471376.	32.94000	7.750000	193.0000
Std. Dev.	5986549.	18236.64	168081.8	1882372.	10.71996	10.86010	1574.794
Skewness	1.360486	1.334085	1.090390	0.295156	-0.421245	2.708551	2.666938
Kurtosis	3.432191	3.792013	2.493200	2.000366	2.176693	10.66504	8.920459
Jarque-Bera	11.38572	11.61963	7.518974	2.021604	2.081435	132.1467	95.25311
Probability	0.003370	0.002998	0.023296	0.363927	0.353201	0.000000	0.000000
Sum	1.51E+08	482569.8	4031271.	2.61E+08	1958.210	719.0500	39952.50
Sum Sq. Dev.	1.25E+15	1.16E+10	9.89E+11	1.24E+14	4022.111	4127.961	86799158
Observations	36	36	36	36	36	36	36

Unit Root Result

The test for unit root is invariably, the test for stationarity. The test was carried out on each variable in the model in order to avoid the estimation of a spurious relationship arising from using two or more non-stationary time series data to estimate long-run relationship. The Augmented Dickey Fuller (ADF) method was used to test for the unit root. The initial set of analysis involves the test on the data series in their level and if the variables are stationary at level, we difference it to make it stationary. The results of the unit root are presented in table 3.

Table 3. Unit Root Result (E-view 8.0 output)

Variables	LEVEL	1^{ST} DIFF	REMARK
AGP	-1.756022	-10.76687*	I(1)
AGREX	-2.833320	-6.937413*	I(1)
$AGREX_{10}$	-2.207886	-12.55684*	I(1)
AGLF	-0.3162293	-5.948482*	I(1)
ADLT	-1.908607	-3.907591*	I(1)
INT	-1.110665	-6.576921*	I(1)
RFALL	-0.411807	-6.942205*	I(1)

Critical values at level: 1% = -3.632900, 5% = -2.948404, 10% = -2.612874

Note *; and ** indicate statistical significance at 1%, and 5% levels

The result of the unit root using ADF test reported in table 3. It shows that all the variables are statistically insignificant at 1% and 5% respectively at level. However, after first difference all the variables became stationary at 1% level of significance.

Using the Mackinnon critical values for rejection of hypothesis of a unit root, we therefore rejects the null hypothesis that there is no unit root for all the variables in the model whose ADF test statistic values are greater than the critical values at 5%, and accept that there is unit root for all the variables. Conclusively, the series are integrated of order one. Hence, the model cannot be estimated at level without the risk of obtaining a spurious result unless they are cointegrated. It is therefore necessary to carry out a cointegration test.

Cointegration Results

Confirming that all the variables are integrated of order one (1(1), we proceed to establish the long run cointegration relationships among the variables in the models. The Johansen cointegration tests revealed that both the Maximal Eigen value and the Trace tests showed existence of 5 cointegrated equations. The detailed result of the cointegration is presented in table 4a and 4b for Trace test and maximal Eigen test respectively.

Accordingly, the null hypothesis of no co-integration between the dependent variable (agricultural output (AGP)) and the independent variables is rejected at 5 percent significance level. This implies that there is at least five co-integrated equations. The result suggests that there is a long run equilibrium relationship among the variables. The variables are found to be co-integrated so it implies that residuals obtained from long run relationship are integrated of order zero and there is need for error correction modelling (ECM).

Table 4a Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.968428	285.6797	111.7805	0.0000
At most 1 *	0.835310	168.1935	83.93712	0.0000
At most 2 *	0.758833	106.8681	60.06141	0.0000
At most 3 *	0.578420	58.51103	40.17493	0.0003
At most 4 *	0.434684	29.14371	24.27596	0.0113
At most 5	0.201306	9.751107	12.32090	0.1298
At most 6	0.060136	2.108666	4.129906	0.1727

Trace test indicates 5 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4b Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.968428	117.4862	42.77219	0.0000
At most 1 *	0.835310	61.32544	36.63019	0.0000
At most 2 *	0.758833	48.35707	30.43961	0.0001
At most 3 *	0.578420	29.36732	24.15921	0.0090
At most 4 *	0.434684	19.39260	17.79730	0.0285
At most 5	0.201306	7.642441	11.22480	0.1987
At most 6	0.060136	2.108666	4.129906	0.1727

Max-eigenvalue test indicates 5 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Granger Causality Results

Table 5 shows the Pairwise Granger Causality tests for hypothesis one. The results as depicted in table 5 showed that there were all unidirectional causality running from actual agricultural expenditure (AGREX), 10% projected expenditure (AGREX10, agricultural labour force (AGLF), adult literacy rate (ADLT), interest rate (INT) and rain fall (RFALL) to agricultural output (AGP). That is, changes in actual agricultural expenditure (AGREX), 10% projected expenditure (AGREX10), agricultural labour force (AGLF), adult literacy rate (ADLT), interest rate (INT) and rain fall (RFALL) causes changes in agricultural output (AGP). This is because; the F-statistics for the null hypothesis that, actual agricultural expenditure (AGREX) does not Granger cause agricultural output (AGP) was 6.51508 with a probability value (Prob.) of 0.0046. Hence, the null hypothesis that AGREX does not Granger cause AGP was rejected and the alternative that agricultural expenditure (AGREX) causes agricultural output (AGP) was accepted at less than 1% level of significance (0.56%) level of significance. Similar explanation also holds for causality between other variables and agricultural output (AGP). Obviously, AGREX10 also cause AGP at a better level of significance (0.0000) than AGREX (0.0056).

Table 5: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
AGREX does not Granger Cause AGP	34	6.51508*	0.0046
AGP does not Granger Cause AGREX		1.62270	0.1574
AGREX10 does not Granger Cause AGP	34	8.35495*	0.0000
AGP does not Granger Cause AGREX10		0.73870	0.4865

AGLF does not Granger Cause AGP	34	3.60197*	0.0401
AGP does not Granger Cause AGLF		0.54965	0.5830
ADLT does not Granger Cause AGP	34	8.12198*	0.0016
AGP does not Granger Cause ADLT		2.60571	0.0911
INT does not Granger Cause AGP	34	7.37437*	0.0026
AGP does not Granger Cause INT		0.47076	0.6292
RFALL does not Granger Cause AGP	34	1.34020	0.2775
AGP does not Granger Cause RFALL		1.42270	0.2574

Table 5...

*Note: *, denote significance at 1%.*

Source: Researcher's computation using E-view 8.0

Error Correction Results for Impact of Actual and Maputo Projected Agricultural Expenditure on Agricultural Output

The results of the parsimonious ECM model for impact of actual and Maputo projected agricultural expenditure on agricultural output is presented in table 6. Here, the estimated adjusted R-2value of 0.7956 implies that about 79.56% of variations in agricultural output (AGP) is explained by the combined effects of all the explanatory variables. While the F-statistics value of 882.34 and probability value of 0.0000 shows that the overall regression is significant at even less than 1% level of significance. The ECM value of -4777 implies that the speed of adjustment of the agricultural output to the long-run equilibrium path is high. Specifically, about 47.77% of the disequilibrium errors, which occurred in the previous year, are corrected within 6-months.

Importantly, as shown in table 6, the coefficients of actual agricultural expenditure (AGREX), 10% projected expenditure to agriculture (AGREX10) , agriculture labour force (AGLF), adult literacy rate (ADLT) and rain fall (RFALL) had the expected positive sign, while interest rate had a negative sign as required by economic theories, and they were all significant at less than 1 % level of significance as indicated by their probability values except rain fall (RFALL) which was insignificant even at 10 % level of significance as indicated by its probability value of 0.2722.

Actual agricultural expenditure (AGREX) having a positive coefficient of 2.597317, and 10% projected expenditure to agriculture (AGREX10) having a positive coefficient of 29.40143, implies that the impact of the projected 10% expenditure on agriculture would have been about 11-times the impact of actual agricultural expenditure if federal government of Nigeria had implemented the Maputo Declaration of 10 % allocation of total budget to agriculture annually.

The coefficients of other variables showed a 1% increase in agriculture labour force (AGLF), adult literacy rate (ADLT) and interest rate(INT) would lead to about 1.15 %, 14.47%, 2.98% and 2.98% in agricultural output (AGP) respectively.

Table 6. Parsimonious result for Impact of Actual and Maputo Projected Agricultural Expenditure on Agricultural Output (Dependent variable is AGP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGREX	2.597317	0.734947	3.534016*	0.0015
AGREX10	29.40143	2.747786	10.70004*	0.0000
AGLF	1.154453	0.357930	3.225360*	0.0033
ADLT	14.47357	2.785352	5.196316*	0.0000
INT	2.980602	1.005043	2.965648*	0.0062
RFALL	1.382621	1.233398	1.120985	0.2722
ECM(-1)	-0.477782	0.132617	-3.602720*	0.0009
C	-48.17424	87.75503	-0.548963	0.5875

R-squared	0.795648	Mean dependent var	4310582.
Adjusted R-squared	0.764519	S.D. dependent var	6030257.
S.E. of regression	446435.7	Akaike info criterion	28.05361
Sum squared resid	5.38E+12	Schwarz criterion	28.40912
Log likelihood	-500.4382	Hannan-Quinn criter.	28.17633
F-statistic	882.3486	Durbin-Watson stat	2.013463
Prob(F-statistic)	0.000000		

*Note: *, denote significance at 1%.*

Source: Researcher's computation using E-view8.0

DISCUSSION OF RESULTS

Increasing government expenditure on agriculture to the tune of 10% from 2004 as prescribed by Maputo Declaration would have had a greater impact on agricultural productivity in Nigeria. It is well known fact that Agriculture is the largest sector in Nigeria, and most of active but poor live in rural areas and are primarily engage in agriculture. Government intervention in the agricultural sector through increase spending would significantly increase output. This in tandem with studies likes, Ebi, et al (2009); Lawal, (2011); Okezie et al, (2013) Abula and Ben (2016), etc, that in developing countries spending to agriculture is one of the most important government instruments for promoting agricultural growth.

Again, interest rate being positive implies existence of Shaw 1973 hypothesis emphasizing the importance of increasing lending rate in developing economies with capital

inadequacy. Specifically, from the result presented above, the coefficient of actual government expenditure on agriculture which is 2.597317 is positive and statistically significant conforms with the a priori expectation as regards the sign and magnitude that increase in government expenditure on agricultural sector will in turn increase agricultural output in Nigeria. This implies that if government increases her expenditure on agriculture by 1% will give a corresponding increase in agricultural output by 2.597317 percent.

The coefficient of the projected 10% increase by government as prescribed by Maputo Declaration of 29.40143 implies that if the federal government of Nigeria had adhered to the Maputo Declaration, that a 1% increase in government expenditure would have yielded a corresponding 29.40143 percent in agricultural output which 11.3199236 times greater than the output of the actual government expenditure on agriculture.

The coefficient of labour force which is 1.154453 is positive but not significant and confirms with the a priori expectation that increase in agricultural labour force will contribute positively to agricultural output in Nigeria. It implies that a 1% increase in agricultural labour force will give a corresponding 1.154453 increase in output. Therefore, government should discourage rural urban migration by providing infrastructural and social amenities to the rural areas.

The coefficient Adult literacy (ADLT) which is 14.4757 is positive and statistically significant. This is in conformity with the a priori expectation, and it implies that a 1% increase in adult literacy rate will bring about 14.47357% increase in agricultural output in Nigeria. This emphasizes the role education can play in agricultural development in Nigeria, and stresses the need for government to take the adult literacy program serious more especially in the rural communities.

Rainfall index (RFALL) coefficient of 1.38262 implies that 1% increase water supply to the agricultural sector will bring about 1.38262 increase in agricultural output in Nigeria. Therefore, Government should improve on their expenditure in the area of providing irrigation facilities to farmer to ensure steady agricultural product supply.

The t-statistic of all the explanatory variables are positive and statistically significant except Rainfall index which is positive but not significant. It depicts that government should lay much more emphasis on irrigation facilities to the farmers.

CONCLUSIONS

The results of this study point to three conclusions: First, there is positive and significant relationship between agricultural expenditure and agricultural output in Nigeria. Second, increasing agricultural expenditure to 10% of the total expenditure in line with Maputo

Declaration would increase agricultural productivity by 11-times. Third, educated agricultural work force is also very in important in stimulating agricultural output. The implication of this finding is that government intervention in the agricultural sector through increase spending would significantly increase agricultural output.

Further Studies should focus on the relationship between government spending on various subsectors of the agricultural sector and the output of the various subsectors. Especially, the livestock subsector since production and consumption of animal protein is still very low in Nigeria.

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