GOVERNMENT EXPENDITURE ON AGRICULTURE AND ECONOMIC GROWTH IN NIGERIA (1985-2015)

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ABSTRACT

Agricultural sector over two decades or more in Nigeria has received low boost in terms of financing despite its contribution to livelihood. This is because of the country over dependence on petroleum product which yielded over 90% of the country's export earnings. This study therefore examines the relationship between government expenditure on agriculture and economic growth in Nigeria (1985- 2015). The research was guided by two research questions and two objectives. The test of the hypotheses was done using multiple regression analysis and Johansen co-integration test. The multiple regression results of the study revealed that there exists a positive and significant relationship between government expenditure on agriculture and economic growth in Nigeria. The Johansen co-integration test result shows that the trace test statistics and max-eigen value test indicates five co-integrating equations respectively at 5% level, on the conclusion there exists a long-run relationship among the variables.The insignificant nature of domestic savings estimates was implicative on fact that the domestic savings in the country did not contribute to economic growth, and there is need for it to be encouraged to prevent difficulties among small scale famers in accessing soft loans, and purchasing adequate and mechanized farming tools.Based on the result of the findings, recommendations such as government should formulate policies aiming at promoting government expenditure and domestic savings across the country to promote economic growth among others were made.

Keywords: Agriculture, Government Expenditure, Domestic Savings, Economic growth, Nigeria.

INTRODUCTION

Over the years, agriculture has been an important sector in the Nigerian economy, irrespective of oil boom. Basically, the agricultural sector provides employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy. Economic history provides us with ample evidence that agricultural revolution is a fundamental pre-condition for economic growth, especially in developing countries like Nigeria (Woolf and Jones, 1969; Oluwasanmi, 1966; Eicher and Witt, 1964). Ukeje(2003) submits that in the 1960's, agriculture contributed up to 64% to the total GDP but gradually declined in the 70's to 48% and it continues in 1980 to 20% and 19% in 1985, this was as a result of oil glut of the 1980's. Historically, the root of the crises in the Nigerian economy lies in the neglect of the agricultural sector by the Federal Government towards developing dependence on a mono-cultural economy based on oil.

The relationship between agriculture and development, especially in Sub-Saharan Africa, cannot be overemphasized. As a roadmap to attaining development, Green Revolution, Operation Feed the Nation, and the Millennium Development Goals (MDGs) to mention but a few were to improve agricultural production in Nigeria since adopted in Africa, 70% of the development target group live in rural areas and are dependent on agriculture for a living

(IFPRI, 2004). Invariably, reducing poverty, improving nutrition and general well-being of the population would imply improving the livelihood of this majority and this hinges critically on the performance of the agriculture sector. For example, using World Development Indicator (WDI) data from Nigeria for selected periods, it was discovered that there exist a strong positive correlation between food production and primary school enrollment ratio and gender equality while there is a strong negative correlation between food production and child mortality rates. This gives some evidence on the importance of agriculture in economic development in Nigeria.

However, sustained economic development cannot be achieved without economic growth. As expressed by the World Bank (2006), high poverty level will lead to low growth and low growth will result to high poverty level. Thus, economic growth is necessary for sustained economic development (Akanbi& Du Toit, 2011; World Bank, 2006).

In Nigeria, because 70% of the population is employed in the agriculture sector, economic growth will be almost impossible to achieve without developing the sector. Furthermore, the importance of agriculture to the Nigerian economy is evident in the nation's natural endowments in production sectors – extensive arable land, water, human resources, and capital. Exploring the nation's productive advantage in this sector is the fastest way to stimulate growth in the economy. Research on this issue is therefore important to help inform policy decisions regarding resource allocation in agricultural growth and development as to achieve rapid economic growth.

Statement of the Problem

In spite of Nigeria's rich agricultural resource endowment, there has been a gradual decline in agriculture's contributions to the nation's economy. The agricultural sector during the 1960s, accounted for over 70% of the total exports in Nigeria. According to Olajide, et al (2012), the agriculture sector fell to 40% in the 1970s, and got worse in the late 1990s by less than 2%. The sudden decline in the agricultural sector was largely due to the rise in crude oil revenue in the early 1970s. As a result of this, today, small scale farmers are constrained by lots of problems including poor infrastructure, poor access to modern inputs and credit, land and environmental degradation, inability to capture the financial service requirements of farmers and agric-business owners.

Categorically, the state of agriculture in Nigeria remains poor and largely underdeveloped which is constrained by the lack of synergy between public and private expenditure in boosting agricultural production, the sector rely on primitive methods to sustain a growing population without efforts to add value. This has reflected negatively on the productivity of the sector, its contributions to economic growth as well as its ability to perform its traditional role of food production among others. According to Falola and Haton (2008), the state of this sector has been blamed on oil glut and its consequences on several occasions. Hence, the pattern was not an outcome of increased productivity in the non-agricultural sectors as expected in the industrialization process (Christiansen & Demery, 2007); rather it was the result of low productivity due to negligence of the agriculture sector.

It is evident that the agricultural sector especially the small scale farmers constitute about 70% of the population in Nigeria, yet agricultural output has been very low due to government's neglect in form of financial aid, and soft loan to boost agricultural output, which in turn has a negative effect on the Nigerian economy as a whole.

Therefore, it is on this note that this study is hinged to examine the relationship between government expenditure on agriculture and economic growth in Nigeria.

Objectives of the Study

The main objectives of this study are to:

1. examine the relationship that exist between government expenditure on agriculture and economic growth in Nigeria.
2. examine the long run relationship between government expenditure on agriculture and economic growth in Nigeria.

Research Question

The following questions have been designed to guide the study:

1. What relationship exist between government expenditure on agriculture and economic growth in Nigeria?
2. Is there a long run relationship between government expenditure on agriculture and economic growth in Nigeria?

Research Hypotheses

1. **H_0:** there exists no relationship between government expenditure on agriculture and gross domestic product (GDP) growth.
   H_1: there exists relationship between government expenditure on agriculture and gross domestic product (GDP) growth.
2. **H_0:** there is no long run relationship between government expenditure on agriculture and economic growth in Nigeria.
   H_1: there is a long run relationship between government expenditure on agriculture and economic growth in Nigeria.

Scope of the Study

The analysis and long run relationship between government expenditure on agriculture and economic growth in Nigeria was restricted to the period between 1985 and 2015 using data from Central Bank of Nigeria Statistical bulletin 2015.

LITERATURE REVIEW

Conceptual Literature

Agriculture is the largest economic activity in the rural area in Nigeria where almost 50% of the population lives. Agriculture is the art and science of crop and livestock production. In its broadest sense, agriculture comprises the entire range of technologies associated with the production of useful products from plants and animals, including soil cultivation, crop and livestock management, and the activities of processing and marketing.Originally an agriculture dependent country, Nigeria shifted focus to oil exports in the 1970s which for long has resulted to slow boost in agricultural production.

However, the agriculture sector has been the mainstay of the economy since independence and despite its several bottlenecks; it remains a resilient sustainer of the populace. In the 1960s, Nigeria was the world's largest exporter of groundnut, the second largest exporter of cocoa, palm produces, cotton, and rubber (Sekunmade, 2009). More recently, agriculture employs about two-thirds of Nigeria's labour force, contributing significantly to the GDP and provides a large proportion of non-oil earnings (CIA, 2013, Sekunmade, 2009).

On the other hand, public expenditure is the main instrument used by governments especially in developing countries to promote economic growth which is an essential ingredient for

sustainable development (Ewubare&Eyitope, 2015). Economic growth brings about a better standard of living of the people through provision of better infrastructure, health, housing, education services and improvement in agricultural productivity and food security (Loto, 2012).Nearly all the sectors in the national economies of developing countries demand more budgetary allocations every year. For instance, the agricultural sector under the Maputo Declaration of 2003 requires African Governments to increase expenditure on agricultural sector to at least 10 percent of the national budgetary resources (NEPAD, 2011).

Theoretical Framework of the Study

This study was anchored on the Endogenous (AK model) growth theory. The Endogenous growth theory holds that economic growth is primarily the result of endogenous and not external forces. This theory holds that investment in human capital, innovation, and knowledge are significant contributors to economic growth.

The AK model, which is the simplest endogenous model, gives a constant-savings rate of endogenous growth and assumes a constant, exogenous, saving rate. It models technological progress with a single parameter, *A*. It uses the assumption that the production function does not exhibit diminishing returns to scale to lead to endogenous growth. Various rationales for this assumption have been given, such as positive spillovers from capital investment to the economy as a whole or improvements in technology leading to further improvements. However, the endogenous growth theory is further supported with models in which agents optimally determined the consumption and saving, optimizing the resources allocation to research and development leading to technological progress (Romer, 2011).

Consider the production function:

$$Y(t) = AK(t) \quad \ldots\ldots[1]$$

which is linear in the aggregate capital stock. Assume population grows at rate *n*.

Where, A, is a positive constant that reflects the level of technology,K, is the capital.

Denoting per-capita variables with small letters, the growth rate of output per capita is therefore:

$$\frac{y(t)}{y(t)} = \frac{k(t)}{k(t)},$$

equal to the growth rate of capital per capita. The Solow growth equation, in per capita terms is;

$$k(t) = sAk(t) - (\delta + n)\,k(t)$$

$$\frac{k(t)}{k(t)} = sA - (\delta + n)$$

which means that both capital and output grow permanently at a constant rate

$$g_y = sA - (\delta + n) \quad \ldots\ldots[2]$$

As long as $sA > (\delta + n)$ this economy displays positive long-run growth, notwithstanding the absence of exogenous productivity growth. This class of models where output per capita grows without the need of exogenous technical progress are called endogenous growth models.

Notice that this AK(linear) economy is a limiting case of the Solow model as the capital share $a \rightarrow 1$. When $a = 1$, the decreasing returns in production which are the force that impede permanent growth in the standard Solow model, disappear and output is produced with constant returns to capital.

An alternative, complementary, way to explain why this economy displays endogenous growth is that the reproducible factor (capital in this case) is produced without decreasing marginal returns, i.e. investment (new capital) can be generated with a production structure that is linear in physical capital;

$$i = sy = sAk \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots[3]$$

Empirical Literature

Anyanwu, *et al* (2013) examined the structure and growth of the GDP over the 49 years (1970-2012), sourced from CBN statistical bulletin of 2013, using multiple regression analysis and discovered that agriculture was among the key significant determinant of Nigeria's GDP with clear dominance. The variables used were GDP, agriculture output, service output, industry output, building and construction output, and wholesale output. The study also showed that other subsectors contributed significantly to agriculture and by extension the GDP.

Umaru and Zubairu (2012) investigated the contribution of agricultural sector and petroleum sector to the economic growth and development (GDP) of the Nigerian economy between 1960 and 2010, with data sourced from central bank of Nigeria statistical bulletin of 2011, through the application of Augmented Dickey-Fuller technique with variables which included GDP, agricultural output, and petroleum output. The result of the study revealed that agricultural sector contributes higher than the petroleum sector, though possessed a positive impact on economic growth and development of the economy.

In the same vein, Suleiman andAminu (2010) investigated with the help of a review of literature and analysis of secondary time series data by the use of multiple regression technique from the period of 2005 to 2014 on the contribution of agriculture, petroleum and manufacturing sector of the Nigerian economy with data sourced from CBN statistical bulletins, and found out that agricultural sector is contributing higher than both petroleum and manufacturing sectors. Their study reveals that agriculture is contributing 1.7978 units to GDP while petroleum is contributing 1.14 units to GDP, which is less than the contribution of agriculture.

Oji-Okoro (2011) employed multiple regression analysis to examine the contribution of agricultural sector on the Nigerian economic development between the periods of 1986 – 2007 with data sourced from CBN statistical bulletins of 2008. They found that a positive relationship between Gross Domestic Product (GDP) vis-a-vis domestic saving, government expenditure on agriculture and foreign direct investment. It was also revealed in the study that 81% of the variation in GDP could be explained by Domestic Savings, Government Expenditure and Foreign Direct Investment.

Muhammad and Atte (2006) focused on the growth of the agricultural sector of the Nigerian economy using the descriptive statistics and multiple regression techniques from 1985 to 2005, with data sourced from the central bank of Nigeria statistical bulletin of 2006. The study revealed that the overall agricultural production average growth rate was 5.4% and that GDP growth rate, population growth rate, and the consumer price index were the main variables and factors affecting domestic agricultural production.

Ojeh,Orgho and John (2012) examined agriculture as an index of socio-economic development of Delta state of Nigeria using primary data from the Delta state household survey. The Stratified random sampling technique was used in administering 2,024 questionnaires to respondents in Delta state, and simple percentages, bar graphs and pie charts were used for the analysis. It was revealed that agricultural practices in Delta state is gender sensitive with more males and females participating in agricultural production, and

fish farming and livestock production are on the decline, while crop farming is the major interest of the farmers.

Izuchukwu (2011) studied the contributions of the agricultural sector to Nigeria's economic development between 1986 and 2007 using multiple regression to analyze the data sourced from CBN statistical bulletin of 2008. The result showed a positive relationship between Gross Domestic Product and domestic saving, government expenditure on agriculture and foreign direct investment.

Itodo, Apeh and Adeshina (2012) examined the impact of government expenditure on agriculture and Agricultural output in Nigeria from 1975-2010, with data sourced from the National Bureau of statistics and CBN statistical bulletins, using Cob-Douglas production function and OLS econometric technique to estimate a multiple regression of agricultural output against some variables. The results revealed a positive but insignificant relationship between government expenditure to the agricultural sector and agricultural output within the scope of the research.

Ebere and Osundina (2014) empirically examined the impact of government expenditure on agriculture on economic growth in Nigeria over the years from 1980 to 2012 with data sourced from the central bank of Nigeria statistical bulletin of 2013, using the Ordinary Least Square (OLS) technique of data analysis. In their analysis, GDP was used as a proxy to economic growth, while agricultural output and government expenditure on agriculture were used as indicators of government expenditure on agriculture. From their analysis, it was found that a significant relationship exist between government expenditure in the agricultural sector and the economic growth in Nigeria.

Based on the above revealed literatures by Anyanwu, et al (2013); Umaru and Zabairu (2012); Suleiman and Aminu (2010); Izuchukwu (2011) and Oji-Okoro (2011), and Ojeh, Orgho& John (2012), it was discovered that all the studies employed the multiple regression analysis and descriptive methods to establish the relationship between the agricultural sector output and economic growth which all yielded a positive result (relationship) in Nigeria. But among the researchers, none of them captured the relationship and impact of government expenditure on agriculture and economic growth as well as variables such as capital formation, commercial bank credit to agriculture and domestic savings; in order to determine if the government have a role to play in improving the agricultural sector as well as the growth of the economy in Nigeria.
It is based on these, that this paper employs the multiple regression technique, the Augmented Dickey-Fuller test, and the Johansen co-integration test method to ascertain therelationship between the government expenditure and there variables on the agricultural sector and economic growth in Nigeria.

RESEARCHMETHODOLOGY

Sources of Data

The data utilized consists of annual observations on growth (GDP), government expenditure on agriculture, capital formation, commercial bank to agriculture, and domestic savings. The data was obtained from various issues of Central Bank of Nigeria statistical bulletins 2015.

Model Specification

This work adapted the Ordinary Least Square (OLS) technique and the Augmented Dickey Fuller (ADF) test method. The model incorporates government expenditure on agriculture,

capital formation, commercial bank credit to agriculture, domestic savings, and economic growth proxied by RGDP growth. The incorporation of capital formation, commercial bank credit to agriculture, and domestic savings examine the level and effect of investment and productivity in the agriculture sector in Nigeria.

Our multiple regression is structured as thus

$$RGDP = f(AGO, CF, CCA, DS) \quad \ldots\ldots [4]$$

Where

RGDP = Real Gross Domestic Product
AGO = Government Expenditure on Agriculture
CF = Capital Formation
CCA = Commercial Bank Credit to Agriculture
DS = Domestic Savings

Econometrically the model is specified as:

$$\text{Ln}RGDP = a_0 + a_1 LnAGO + a_2 LnCF + a_3 LnCCA + a_4 LnDS + u \quad \ldots [5]$$

a_0, a_1, a_2, a_3, and a_4 are coefficients while u is the residual.

Apriori: $a_1, a_2, a_3, a_4 > 0$.

However, all the variables in the model were logged as *LnRGDP*, *LnAGO*, *LnCF*, *LnCCA* and *LnDS* respectively in order to linearize the model.

Data Analysis Technique

This study utilized the use of Ordinary Least Square (OLS) method in its analysis. This was facilitated through the use of E-view Econometric software version 4.0. To ensure that the outcome of the regression is not spurious, the data set was subjected to a stationary test using the Augmented Dickey Fuller test. The Johansen Co-integration test was used to ascertain the long run relationship between the variables in the model of the study.

DISCUSSION OF ESTIMATED RESULTS

Interpretations of the Ordinary Least Square (OLS) Estimation Result

Table 1 documents the static regression (OLS) results. The results shows that the model's estimates are generally robust; with an R-squared value indicating 99% goodness of fit. This implies that approximately 99 percent of the total variation in the dependent variable is explained by the explanatory variables, also with a large F-statistic of 949.9 and an extremely small (less than 5% level of significance, i.e. 0.000000) probability value, indicate that the model is highly significant and that all the independent variables are fairly capable of explaining the changes in the real gross domestic product (RGDP). Although LnDS was not significant noting that the probability of its coefficient is greater than 5%, but LnAGO, LnCF, LnCCA were highly significant noting that their probability values of 0.0523, 0.0014, and 0.0009 were less than 5% significance level. The DW value of 1.82 indicates the absence of serial autocorrelation.

Results from the regression model shows that a percentage increase in LnAGO holding other regressors constant will lead to a 13 percentage increase in LnRGDP. This implies that there is a positive relationship between real gross domestic product growth (RGDP) and government expenditure in agriculture; a percentage increase in LnCF, holding other variables constant leads to a 42 percentage increase in RGDP which means it has a positive relationship with real gross domestic product (RGDP). Also a percentage increase in LnCCA leads to a 41 percentage increase in RGDP which means it has a positive relationship with real gross domestic product (RGDP). Lastly, a percentage increase in LnDS leads to a 10 percentage increase in RGDP which means it has a positive relationship with real gross

domestic product (economic growth). Thus, with its insignificant nature, it suggests that Domestic savings (DS) do not contribute to real domestic growth.

Unit Root Test Result

The Augmented Dickey-Fuller unit root test result is presented in Table 2.The result of the Augmented Dickey-Fuller test at their levels were 1(0), this means that they are non-stationary, therefore, proceeding to test their first difference, it was found that all variables where integrated atfirst order 1(1), indicating stationarity.

Test of Co-Integration Result

The Johansen Co-integration test result was used to ascertain the existence of long run relationship in the model.The test result on Table 3shows thatthe tracetest statistics indicates 5cointegrating equations while the Max-Eigen statistics indicates 5 co-integrating equations at the 5% level. On the basis of Trace test and Max-eigen value test, the conclusion that there exists a long run relationship among the variables is made.

Policy Implications

The study revealed that an increase in government expenditure on agriculture leads to an increase in economic growth in Nigeria. The insignificant nature of domestic savings estimates in the study is implicative on fact that the domestic savings did not contribute to economic growth in Nigeria. This means domestic savings need to be encouraged to prevent difficulties among small scale famers to enable them easily access soft loans, and purchase adequate and mechanized farming tools. It is also implicative on the fact that Nigeria's agricultural sector is still characterized by low yields, attributable to the use of crude implements, a low level of inputs and limited areas under cultivation, among others.

This development created unwarranted situation that led to poor output of crops and livestock which hitherto served as foreign exchange earnings for the country. Factors such as environment degradation, desertification and global warming contribute to poor forestry development and crops production .Similarly, it was confirmed that positive development witness by the agricultural sector is developing rapidly making the sub sector production very vibrant in the economy. The relative progress have been attributed to the country's constant policy reviews, emphasis placed on agriculture by international community, and technical assistance by such organizations as Food and Agriculture Organization (FAO), the United Nation Millennium Development Goals (MDGs), and collaboration with country like China.

RECOMMENDATIONS

From the result of the findings, the following recommendations were made:

1. As domestic savings and government expenditure can accelerate productivity in the agricultural sector in Nigeria, it is important to formulate policies aiming at promoting government expenditure and domestic savings across the country to promote economic growth.
2. Government should create favourable conditions and policies in order to mobilize domestic savings from small depositors, especially small scale farmers to enable them purchase modern mechanized farm tools to promote higher productivity in the agricultural sector.
3. The Central Bank of Nigeria should come out with stable policy guideline to enable the commercial banks disburse loans to farmers at a very lower interest rate, in order to help them expand their production capacity.

4. Government should increase its level of expenditure, thereby providing more funding in the agricultural sector to raise its productivity and increase its contribution to economic growth in Nigeria.

CONCLUSION

The study examined the relationship between government expenditure on agriculture and economic growth in Nigeria from 1985 to 2015. In achieving the objectives, multiple regression (OLS) technique and Johansen co-integration test were employed for the nature of the impact and long-run relationship of the variables. The results of the analysis showed that government expenditure on agriculture has a positive and significant relationship with economic growth in Nigeria. The result also revealed the presence of long-run relationship between the variables in the model.

However, domestic savings was found to be insignificant. The insignificant nature of domestic savings estimates was implicative on fact that the domestic savings in the country did not contribute to economic growth, and there is need for it to be encouraged to prevent difficulties among small scale famers inaccessing soft loans, purchasing adequate and mechanized farming tools. This is also implicative on the fact that Nigeria's agricultural sector is still characterized by low yields, attributable to the use of crude implements, a low level of inputs and limited areas under cultivation, among others.

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APPENDICES

Appendix 1

Table 1: *OLS Regression Results*

Dependent Variable: LNRGDP
Method: Least Squares
Date: 03/10/18 Time: 11:58
Sample: 1985 2015
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnAGO	0.133033	0.065416	2.033639	0.0523
LnCF	0.424764	0.119012	3.569077	0.0014
LnCCA	0.412776	0.109741	3.761380	0.0009
LnDS	0.108527	0.094683	1.146221	0.2621
C	6.023567	1.023225	5.886846	0.0000

R-squared	0.993204	Mean dependent var	15.40516
Adjusted R-squared	0.992158	S.D. dependent var	2.042402
S.E. of regression	0.180861	Akaike info criterion	-0.435489
Sum squared resid	0.850476	Schwarz criterion	-0.204200
Log likelihood	11.75008	F-statistic	949.9341
Durbin-Watson stat	1.822501	Prob(F-statistic)	0.000000

Appendix 2

Table 2: Augmented Dickey-Fuller Unit Root Test

Variable	Order of Stationarity	ADF Calculated	ADF Critical Value	Order of Integration	Decision
LnRGDP	At level	-1.727565	-3.568379	1(0)	Not stationary
	1st difference	-5.711307	-3.574244	1(1)	Stationary
LnAGO	At level	-3.471654	-3.568379	1(0)	Not stationary
	1st difference	-8.576818	-3.574244	1(1)	Stationary
LnCF	At level	-1.721047	-3.587527	1(0)	Not stationary
	1st difference	-4.425366	-3.587527	1(1)	Stationary
LnCCA	At level	-2.624077	-3.568379	1(0)	Not stationary
	1st difference	-6.200643	-3.574244	1(1)	Stationary
LnDS	At level	-1.970074	-3.568379	1(0)	Not stationary
	1st difference	-4.098418	-3.574244	1(1)	Stationary

Computed at 5% ADF critical value

Appendix3

Table 3: Johansen Co-integration Test

Hypothesized No. of CE(s)	Trace Statistic	5 Percent Critical Value	Max-Eigen Statistic	5 Percent Critical Value
None **	136.1389	68.52	62.08196	33.46
At most 1 **	74.05691	47.21	32.63484	27.07
At most 2 **	41.42207	29.68	21.35549	20.97
At most 3 **	20.06658	15.41	15.46338	14.07
At most 4 *	4.603203	3.76	4.603203	3.76

**(**) denotes rejection of the hypothesis at the 5%(1%) level*

Appendix 4

Johansen Cointegration Test Results

Date: 03/10/18 Time: 12:19
Sample(adjusted): 1988 2015
Included observations: 28 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: LNRGDP LNAGO LNCF LNCCA LNDS
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.891088	136.1389	68.52	76.07
At most 1 **	0.688243	74.05691	47.21	54.46
At most 2 **	0.533593	41.42207	29.68	35.65
At most 3 **	0.424355	20.06658	15.41	20.04
At most 4 *	0.151597	4.603203	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 5 cointegrating equation(s) at the 5% level
Trace test indicates 4 cointegrating equation(s) at the 1% level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.891088	62.08196	33.46	38.77
At most 1 **	0.688243	32.63484	27.07	32.24
At most 2 *	0.533593	21.35549	20.97	25.52
At most 3 *	0.424355	15.46338	14.07	18.63
At most 4 *	0.151597	4.603203	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates 5 cointegrating equation(s) at the 5% level
Max-eigenvalue test indicates 2 cointegrating equation(s) at the 1% level

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNRGDP	LNAGO	LNCF	LNCCA	LNDS
9.590930	0.608156	-5.869752	-6.037594	0.520531
-3.068722	2.085688	-0.626430	-0.610760	1.423687
1.380767	-0.232424	6.011375	-5.229322	-2.750713
-6.811996	3.416605	5.070389	-1.101759	-0.377426
0.512259	0.025826	1.718019	1.761361	-3.401402

Unrestricted Adjustment Coefficients (alpha):

D(LNRGDP)	-0.133372	0.064697	0.007746	-0.011750	-0.009174
D(LNAGO)	-0.197230	-0.078439	0.055639	-0.279922	0.065128
D(LNCF)	-0.036713	0.108539	-0.017284	0.002782	0.025998
D(LNCCA)	0.071651	0.001069	0.084254	-0.072534	-0.028152
D(LNDS)	0.032496	-0.010711	0.071658	0.014747	0.030712

1 Cointegrating Equation(s): Log likelihood 70.56577

Normalized cointegrating coefficients (std.err. in parentheses)

LNRGDP	LNAGO	LNCF	LNCCA	LNDS
1.000000	0.063410	-0.612011	-0.629511	0.054273
	(0.03230)	(0.06895)	(0.06342)	(0.04229)

Adjustment coefficients (std.err. in parentheses)

D(LNRGDP)	-1.279166
	(0.23059)
D(LNAGO)	-1.891615
	(1.15521)
D(LNCF)	-0.352110
	(0.35821)
D(LNCCA)	0.687201
	(0.42595)
D(LNDS)	0.311664
	(0.30942)

2 Cointegrating Equation(s): Log likelihood 86.88319

Normalized cointegrating coefficients (std.err. in parentheses)

LNRGDP	LNAGO	LNCF	LNCCA	LNDS
1.000000	0.000000	-0.542365	-0.558808	0.010052
		(0.07217)	(0.04997)	(0.04397)
0.000000	1.000000	-1.098342	-1.115021	0.697388
		(0.56479)	(0.39103)	(0.34412)

Adjustment coefficients (std.err. in parentheses)

D(LNRGDP)	-1.477702	0.053826
	(0.17913)	(0.03865)
D(LNAGO)	-1.650908	-0.283546
	(1.19672)	(0.25819)
D(LNCF)	-0.685186	0.204051
	(0.25843)	(0.05576)
D(LNCCA)	0.683920	0.045805
	(0.44722)	(0.09649)
D(LNDS)	0.344532	-0.002576
	(0.32375)	(0.06985)

3 Cointegrating Equation(s): Log likelihood 97.56093

Normalized cointegrating coefficients (std.err. in parentheses)

LNRGDP	LNAGO	LNCF	LNCCA	LNDS
1.000000	0.000000	0.000000	-0.952089	-0.206937
			(0.07298)	(0.05263)
0.000000	1.000000	0.000000	-1.911452	0.257965
			(0.30401)	(0.21924)
0.000000	0.000000	1.000000	-0.725121	-0.400079
			(0.12502)	(0.09015)

Adjustment coefficients (std.err. in parentheses)

D(LNRGDP)	-1.467008	0.052026	0.788897
	(0.17973)	(0.03864)	(0.14898)

D(LNAGO)	-1.574083	-0.296477	1.541292	
	(1.19961)	(0.25788)	(0.99437)	
D(LNCF)	-0.709052	0.208069	0.043602	
	(0.25712)	(0.05527)	(0.21313)	
D(LNCCA)	0.800255	0.026223	0.085238	
	(0.39740)	(0.08543)	(0.32941)	
D(LNDS)	0.443474	-0.019231	0.246730	
	(0.27135)	(0.05833)	(0.22493)	

4 Cointegrating Equation(s): Log likelihood 105.2926

Normalized cointegrating coefficients (std.err. in parentheses)

LNRGDP	LNAGO	LNCF	LNCCA	LNDS
1.000000	0.000000	0.000000	0.000000	-0.439473
				(0.09341)
0.000000	1.000000	0.000000	0.000000	-0.208883
				(0.15781)
0.000000	0.000000	1.000000	0.000000	-0.577181
				(0.06598)
0.000000	0.000000	0.000000	1.000000	-0.244238
				(0.10077)

Adjustment coefficients (std.err. in parentheses)

D(LNRGDP)	-1.386970	0.011882	0.729322	0.738176
	(0.21336)	(0.07072)	(0.17147)	(0.14100)
D(LNAGO)	0.332745	-1.252860	0.121979	1.256152
	(1.16287)	(0.38543)	(0.93454)	(0.76850)
D(LNCF)	-0.728001	0.217573	0.057707	0.242685
	(0.30941)	(0.10255)	(0.24866)	(0.20448)
D(LNCCA)	1.294356	-0.221597	-0.282538	-0.793930
	(0.42383)	(0.14048)	(0.34061)	(0.28010)
D(LNDS)	0.343019	0.031153	0.321502	-0.580623
	(0.32353)	(0.10723)	(0.26000)	(0.21381)

Appendix 5: *Data Presentation*

YEAR	LnRGDP	LnAGO	LnCF	LnCCA	LnDS
1985	11.80996	10.55176	9.082448	0.270027	2.527327
1986	11.81009	10.59496	9.337102	0.604316	2.634045
1987	12.1711	10.96092	9.630929	0.883768	2.927453
1988	12.48103	11.36888	9.773505	1.121678	3.146305
1889	12.85386	11.69575	10.19711	1.244155	3.169686
1990	13.06611	11.71366	10.59966	1.439835	3.389462
1991	13.20977	11.88244	10.71864	1.611436	3.630721
1992	13.68237	12.28958	11.16774	1.943049	4.009513
1993	13.90139	12.76582	11.48159	2.374906	4.443004
1994	14.15177	13.17865	11.56718	2.876949	4.70926
1995	14.88276	13.75396	11.86302	3.230014	4.686658
1996	15.20985	14.05905	12.22611	3.504355	4.901564
1997	15.24803	14.18372	12.4004	3.330059	5.179815
1998	15.19916	14.28587	12.39775	3.302481	5.298667
1999	15.35864	14.34897	12.35303	3.435599	5.626433

2000	15.71964	16.70671	12.71005	3.714304	5.953737
2001	15.74634	14.69516	12.82701	4.02267	6.190418
2002	15.86909	14.86182	13.12173	4.091841	6.383659
2003	16.10941	14.98844	13.6715	4.128746	6.485764
2004	16.25009	16.00198	13.66825	4.215677	6.681507
2005	16.49728	15.37428	13.59785	3.8828	7.183081
2006	16.73677	15.59726	14.25152	3.899748	7.461433
2007	16.84358	15.72622	14.47663	5.007831	7.898615
2008	17.00584	15.89262	14.53482	4.666736	8.323164
2009	17.02612	16.03322	14.93084	4.910447	8.659302
2010	17.81577	16.14869	15.20503	4.855228	8.691862
2011	17.95833	16.26595	15.17861	5.542087	8.784455
2012	18.0882	16.4118	15.02668	5.756881	8.995029
2013	18.19869	16.50398	14.99586	5.839769	9.066022
2014	18.30464	17.65829	15.0825	6.171513	9.393348
2015	18.35432	17.618	15.10999	6.107713	9.346455

Source: CBN Statistical Bulletin, 2015.