Impact of Agricultural Sector on Nigeria's Economic Growth Using Regression and Percentage Ratio Measure

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Abstract:- **The study underscores the impact of agricultural sector on the economic growth of Nigeria. The yearly data sets on real gross domestic product (RGDP) and agricultural variables such as crop production (CP), livestock (LS), forestry (FO) and fishing (FI).covered the period of 1981to 2017. Applying multiple linear regression model and trend pattern of percentage ratio measure, the results showed that all the agricultural variable except CP have insignificant positive impact on RGDP and CP effect is significant under 1% level. And the trend pattern of percentage ratio measure showed that agricultural sector contributes positively to economic growth in Nigeria. Therefore, government and stake holders in the agricultural sector should put more effort towards improving some sub-sectors such as fishery, forestry and livestock for a robust agricultural sector contribution to economic growth in Nigeria.**

Keywords: **Agriculture, economic growth, regression, ratio measure and trend**

I. INTRODUCTION

Agriculture provides food which is one of the basic needs of man and a nation at large. Any nation that produces enough to feed her citizenry and also export to other nations will have its agricultural sector contributing significantly to its gross domestic product. Conceptually, agriculture is the production of food, feed, fibre and other goods by the systematic growing and harvesting of plants and animals. According to [7], agriculture's contribution to the gross domestic product (GDP) has remained stable at between 30% and 42%, and employs about 75% of the labour force in Nigeria.

The relationship between agriculture and economic development in Nigeria cannot be overemphasized. The importance of this study stem from the role of agriculture in Nigerian economy based on its large population, potential and prospects. Furthermore, the importance of agriculture to the Nigerian economy is evident in the nation's natural endowments in production factors –extensive arable land, water, human resources, and capital.

In the 1960's, agriculture contributed up to 64% to the total GDP but retrogressively decline in the 1970's to 48% and falls to 20% in 1980 and 19% in 1985 as a result of oil discoveries in large quantity coupled with economic mismanagement pronounced in these periods ([19]). Moreover, the two consecutive quarters of declining growth in 2016 that necessitated the declaration of economic recession in Nigeria is an indication that even the agricultural sector which was the economic main stay before the discovery and exploration of oil in commercial quantity in the 1970's has not motivated economic development in Nigeria. Hence, the study tends to investigate the impact of Agricultural sector on Nigeria's economic growth.

Since 70's, different agricultural support programmes have been launched to generally improve the agricultural sector in Nigeria. Some of these programmes are National Accelerated Food Production Programme (NAFPP) initiated in 1972 by the Federal Department of Agriculture during General Yakubu Gowon's regime launched on 21st May 1976 under the military regime of General Olusegun Obasanjo. The programme focused on bringing about a significant increase in the production of maize, cassava, rice and wheat in the Northern states through subsistent production within a short period of time. The programme was designed to spread to other states in the country after the pilot stage that was established in Anambra, Imo, Ondo, Oyo, Ogun, Benue, Plateau and Kano states.

The River Basin Development Decree promulgated in 1976 to establish eleven River Basin Development Authorities (RBDAs) (Decree 25 of 1976), Green Revolution that was inaugurated by Shehu Shagari in April 1980, the Nigerian Agricultural Land Development Authority (NALDA) that was established in 1992, The first National Fadama Development Project (NFDP-1) was designed in the early 1990s to promote simple low-cost improved irrigation technology under World Bank financing, in 1976, the Federal Military Government of Nigeria launched the Operation 'Feed the Nation' Programme (OFN), as a result of the chronic inability of the agricultural sector of the economy to satisfy the food needs of the country, there was hope for a revival of interest in agriculture. Unfortunately, after two years of operation, the scheme has not achieved the expected goals, the National Accelerated Food Production Programme (NAFPP) initiated in 1972 by the Federal Department of Agriculture during General Yakubu Gowon's regime.

The National, Special Programme on Food Security (NSPFS) that was launched in January 2002 in all the thirty six states of the federation during the Olusegun Obasanjo's regime, the

Root And Tuber Expansion Programme (RTEP) which was launched on 16th April 2003 under Olusegun Obasanjo's administration and so on were all inclusive agricultural programme designed to address the problem of food production and rural poverty.

The question is how has agricultural sector positively influenced our economic growth? This is the thrust of this study with the following objectives; to underscore the contribution of agricultural sector to economic growth using percentage ratio measure and to identify the aspect of agricultural sector that needs urgent attention as regarding positive contribution to economic growth of Nigeria. The remaining part of the paper is arranged as follows; section 2 deals with the literature review, section 3 presents materials and methods, section 4 presents the data analysis and results and section 5 presents the conclusion.

II. LITERATURE REVIEW

The literature is replete with studies that analyze the agriculture sector of the Nigerian economy. It gives evidence of a positive relationship between agriculture sector investment and GDP growth. [18] argued that growth of gross domestic product is influenced by agriculture in 85 developing countries. [3] argued that agriculture still can be the engine of growth based on the causality direction from agriculture to economic growth in developing countries. In 2008, UNDP reported that the 12.6% reduction recorded in the proportion of underweight children between 1990 and 2008 can be attributed largely to growth in the agriculture sector in Nigeria ([20]).

A study carried out by [16] reported unidirectional granger causality running from agriculture to industrial growth in the West African States. [1] are of the view that both agricultural and industrial sector have to be in balance in order to sustain growth and ultimately development. [2] using correlation matrix find that production of major staples in Nigeria contributed significantly to GDP growth (except wheat) between 1990 and 2001. [8] and [11] found that agricultural output is significantly influenced by government capital expenditure. [4] conducted a study with the objective of investigating the relationship between the agriculture and economic growth in Thailand. Result found from the study indicates a bi-directional relationship between agriculture and economic growth. [17] undertaken a study on the cointegration and causal relationship between GDP and agriculture sector in India. The study found a long-run relationship between agriculture and GDP in India. Results obtained from the Granger causality test indicated a bi-directional causal relationship between GDP and agriculture sector.

Research study carried out by [10] found one-way causality direction running from industrial to agricultural sector both in the short run and long run in Malaysia. [15] conducted a research on the role of agriculture in the economic growth of Pakistan. Results obtained from the study suggest that there is the significance role of agriculture sub-sectors towards the economic growth although forestry showed insignificant relationship with GDP. Similar research was also conducted by [12] to measure the relationship between agricultural resource and economic growth in Nigeria. The Ordinary Least Square (OLS) regression method was used for data analysis and the result showed a positive cause and effect relationship between GDP and agricultural outputs. Agricultural sector was estimated to contribute more than 30% to the GDP between 1970 and 2010 which implied that agricultural sector for the period of analysis has significant influence on macroeconomic output level.

[13] study focused on Nigerian economy and agricultural contribution. Data available were analyzed using tools such as descriptive statistics and error correction model (ECM). The descriptive statistics showed that Nigerian economy had grown over the period of 32 years and this is obvious in the wider gap between the minimum and maximum values of the GDP and agricultural output respectively. The coefficient of R^2 was about 0.96 and the coefficient of agricultural output was found positive and statistically significant at 1% level. The coefficient of ECM (u-1) was significant at 1% level and this implies that GDP co-integrated with agricultural output and inflation. [6] examined the interaction and feedback mechanism between agricultural and oil sectors with output in Nigeria from 1981 to 2012, using vector auto regression (VAR) methodology. Their result indicated that oil revenue innovation was only additive in the shortest but agriculture output exhibited positive effect of economic development through investing in the agricultural sector in Nigeria.

[15] investigated the relationship between agriculture and economic growth in Bangladesh, employing the Vector Autoregression (VAR) approach. Their result showed that there is a long run relationship between agriculture and economic growth as it is confirmed by both Trace statistics and Maximum Eigen-value test statistics. Results found from Granger causality test suggest that uni-directional causality running from agriculture to economic growth exists in Bangladesh. The VAR results confirm that changes in agricultural GDP respond more critically to economic growth, suggesting that boosting agricultural sector will effectively stimulate economic growth in Bangladesh.

[21] studied the contribution of agriculture sector in the GDP growth rate of Pakistan. The important variables of his study were major crops, live stocks, other crops which contributed in the agriculture sector and after that study also provide the results of whole contribution of agriculture sector in the GDP growth rate of Pakistan. His data covered the period of 1990-2014. The results showed that there is a strong relationship between agriculture sector and GDP growth rate. Research also provides the significant impact of Major crops and other crops on agriculture sector and contribution towards (GDP) Gross Domestic Product. Live-stock is also major part of agriculture and has significant contribution in agriculture sector.

Several studies have investigated the relationship between agricultural and economic growth in abroad, few studies especially in this research topic, were found in the case of Nigeria. Most of the existing studies on relationships between agriculture and economic growth are either cross country studies or have methodological pitfalls. The difficulty with such studies is the homogeneity assumption across the countries, which is improbable due to variations in social, economic, political and institutional conditions. Therefore, country specific studies are needed to throw more light on the dynamic relationships between agriculture and economic growth. In Nigeria, Such studies are either trifling or not up to date.

III. MATERIALS AND METHOD

This section provides information on source of data collection, variable measurement and definition, model specification and estimation and method of unit root test.

3.1. Source of Data Collection

The data sets on real gross domestic product (RGDP) and agricultural sector were obtained from published Central Bank of Nigeria (CBN) statistical bulletin of 2018. The data sets cover the period of 1981 to 2017.

3.2. Variable Measurement

This paper uses real gross domestic product (RGDP) as the proxy for economic growth and agricultural sector which includes crop production (CP), livestock (LS), forestry (FO) and fishing (FI).

3.3 Unit Root Test

The unit root test here, is based on Augmented Dickey Fuller (ADF) test and is of the form

$$\nabla y_t = \alpha + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (1)$$

$$\nabla y_t = \alpha + \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (2)$$

$$\nabla y_t = \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (3)$$

where k is the number of lag variables. In (1) there is intercept term, the drift term and the deterministic trend. The non deterministic trend term removes the trend term as seen in (2) And (3) removes both the constant and deterministic trend term in the above regression. ADF unit root test null hypothesis $H_0 : \beta = 0$ and alternative $H_a : \beta < 0$. According to [5], if the ADF test statistic is greater than 1%, 5% and 10% critical values, the null hypothesis of a unit root test is accepted.

3.4 Model specification and method of estimation

Equation (4) below is a multiple regression model showing the direct effects of agricultural sector on RGDP and it is given as follows;

$$\Delta\log(RGDP)_t = \beta_0 + \beta_1 \Delta\log(CP)_t + \beta_2 \Delta\log(LS)_t + \beta_3 \Delta\log(FO)_t + \beta_4 \Delta\log(FI)_t + e_t \quad (4)$$

where $\beta_i (i = 0,1,\cdots,4)$ are parameter coefficients, β_0 is the intercept (constant term) and e_t is the error term and it assumed to be normally distributed with mean zero and variance σ^2.

3.5 Linear Trend of Percentage Ratio Measure(PRM)

The percentage ratio measure here, is calculated as the ratio of agricultural contribution to RGDP at time t to total RGDP at time t, mathematically represented as y_t such that

$$y_t = \frac{Agric_t}{RGDP_t} \times 100 \quad (5)$$

Hence, the linear trend is of the form;

$$y_t = b_0 + b_1 t \quad (6)$$

where b_0 and b_1 are the parameter coefficients of the trend equation. The value of b_1 will reveal whether contribution of agriculture to economic growth has been increasing or decreasing over the period under review.

3.6 Model diagnostic test

Model diagnostic test will be based on residual diagnostics such as test for serial correlation and heteroscedasticity tests and stability test via CUSUM test using recursive estimates.

IV. DATA ANALYSIS AND RESULTS

The result of the ADF unit root test, linear multiple regression model of equation (4), and model diagnostic test are presented in this section.

4.1 ADF Unit Root Test

In order to check the order of integration of the variables under study, ADF unit root test is carried out and the result is presented in Table1 below;

Table 1. Analysis of order of integration using ADF unit root test

Variable	Deter-ministic Term	Lags	Test Value	1% level 5%level 10%level	Prob.	Remark
Log(RGDP)	C,T	1	-2.421317	-4.243644 -3.544284 -3.204699	0.3629	I(1)
$\Delta \log(RGDP)$	C,T	0	-3.259346	-4.243644 -3.544284 -3.204699	0.0899	I(0) under 10% level
Log(CP)	C,T	0	-2.201319	-4.234972 -3.540328 -3.202445	0.4746	I(1)
$\Delta \log(CP)$	C,T	0	-5.742636	-4.243644 -3.544284 -3.204699	0.0002	I(0) under 1% level
Log(FI)	C,T	4	-2.102471	-4.273277 -3.557759 -3.212361	0.5250	I(1)
$\Delta \log(FI)$	C,T	3	-8.627729	-4.273277 -3.557759 -3.212361	0.0000	I(0) under 1% level
Log(FO)	C,T	1	-1.105852	-4.243644 -3.544284 -3.204699	0.9137	I(1)
$\Delta \log(FO)$	C,T	0	-6.488893	-4.243644 -3.544284 -3.204699	0.0000	I(0) under 1% level
Log(LS)	C,T	1	-1.261106	-4.243644 -3.544284 -3.204699	0.8811	I(1)
$\Delta \log(LS)$	C,T	0	-4.263502	-4.243644 -3.544284 -3.204699	0.0095	I(0) under 5% level

The result of ADF unit root test in Table1 specifies that all the variables are integrated order one in their log level series and integrated order zero in their first log differences. The results indicate that the stationarity of the variables are achieved at the first log difference.

4.2 Multiple Linear Regression Result

The result of the multiple linear regression of Equation(4) is presented in Table2 below;

Table2 Estimates of Multiple Linear Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012397	0.010542	1.175937	0.2486
Δ LOG(CP)	0.264102	0.068793	3.839054	0.0006
Δ LOG(FI)	0.053460	0.037534	1.424281	0.1644
Δ LOG(FO)	0.098289	0.108399	0.906733	0.3715
Δ LOG(LS)	0.270340	0.225309	1.199863	0.2393
R-squared	0.400266	Mean dependent var		0.041711
Adjusted R-squared	0.322881	S.D. dependent var		0.042786
S.E. of regression	0.035207	Akaike info criterion		-3.726873
Sum squared resid	0.038426	Schwarz criterion		-3.506940
Log likelihood	72.08371	Hannan-Quinn criter.		-3.650110
F-statistic	5.172402	Durbin-Watson stat		1.423726
Prob(F-statistic)	0.002606			

Dependent variable: Δ log(RGDP), Method : Least Squares

The regression result in Table2 above showed that all the explanatory agricultural variables have positive effect on RGDP but only the effect of CP is significant under 5% level. The value of R-squared indicates that about 40% of the variations in RGDP have been explained by the explanatory variables. The p-value of F-statistic is significant hence, specifying the existence of linear relationship between the explained variable and the explanatory variables. Durbin-Watson statistic reveals presence of serial correlation but a further test of serial correlation using Breusch-Godfrey Serial Correlation LM test as shown in Table3 indicates absence of serial correlation in the model residuals.

Table3. Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.869310	Prob. F(12,19)	0.5883
Obs*R-squared	12.75976	Prob. Chi-Square(12)	0.3867

The result of Breusch-Pagan-Godfrey heteroscedasticity testis presented in Table4 below.

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.049602	Prob. F(4,31)	0.3978
Obs*R-squared	4.294019	Prob. Chi-Square(4)	0.3677
Scaled explained SS	6.319565	Prob. Chi-Square(4)	0.1765

The probability values of Chi-Square (0.3677) and F-statistic (0.3978) are not significant; showing that there is no heteroscedasticity present in the model residuals..

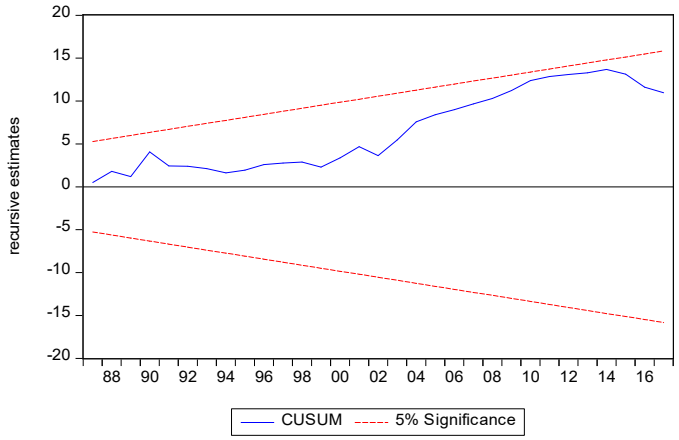

Figure1. CUSUM Test foe stability diagnostic using recursive estimates

The result of the CUSUM test in Figure1 above indicates that the estimated parameter coefficients are stable. Hence, the model is adequate.

4.3 Trend Analysis

The result of the percentage ratio of the contribution of agriculture to RGDP growth in Nigeria over time is shown using the trend line as presented in Figure2 below;

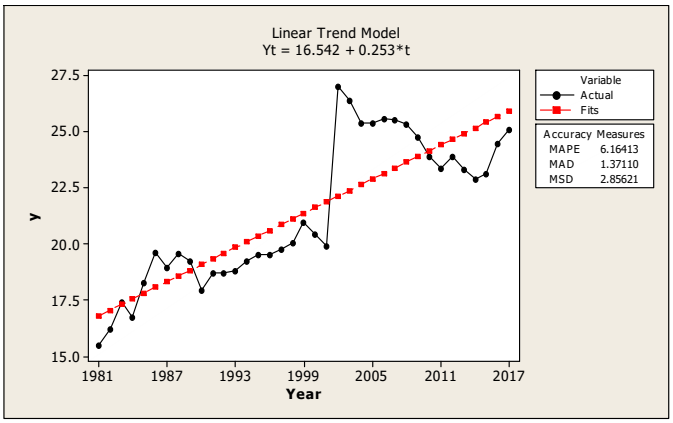

Figure2. Trend analysis plot of the contribution of agriculture to RGDP in Nigeria (1081-2017).

The result of the trend analysis plot of the contribution of agriculture to RGDP in Nigeria

for the period under review reveals that agricultural sector contributes positively to .economic RGDP growth at the rate of 25.3%. this is visible from the value of the trend coefficient. Hence, the trend line equation becomes Y_t = 16.542+0.253t. Therefore, it can be extrapolated that in 2018, that the percentage ratio estimate of agricultural to RGDP will be about 26.16% accounting for a growth rate of 1.0731% higher than that of 2017.

4.4 Discussion of results

The finding reveals that all the agricultural variables have insignificant positive relationship with economic growth except crop production that has significant positive effect on economic growth. Also the result using the trend pattern of percentage ratio measure showed that agricultural sector contributes positively to economic growth in Nigeria. This finding is slightly related to that of [15] who suggested that there is the significance role of agriculture sub-sectors towards the economic growth for Pakistan, although forestry showed insignificant relationship with GDP and that of [12] who showed a positive cause and effect relationship between GDP and agricultural outputs in Nigeria

V. CONCLUSION

On the bases of the findings, it can be concluded that agricultural sector has contributed significantly to economic growth in Nigeria. Nevertheless, more effort should be geared towards improving some sub-sectors such as fishery, forestry and livestock for a robust agricultural sector contribution to economic growth in Nigeria..

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