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AGRICULTURAL SECTOR OUTPUT AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

The Nigerian agricultural sector has the potential to stimulate the economy and put it on the path of sustainable growth. This study therefore examined the relationship between agricultural output and economic growth in Nigeria. Specifically, the study examined the impact of crop production, livestock, fishery and forestry outputs on economic growth (proxied by per capital real gross domestic product) in Nigeria. Annual times series data covering 1981 to 2019 were used for the study. The autoregressive distributed lag (ARDL) approach was used in estimating the data. The findings showed that crop production and livestock outputs significantly contribute to economic growth in Nigeria. Fishery output has weak positive impact on economic growth while forestry output adversely affects economic growth in Nigeria. It is recommended, among other things, that governments at all levels should improve on their funding of the agricultural sector.

Keywords: Agriculture Output, Sector, Economic Growth, ARDL.

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INTRODUCTION

Before the advent of crude oil, the agricultural sector was the mainstay of the Nigerian economy. The sector contributed immensely to the country's gross domestic product. The agricultural sector which was the main source of government revenue and foreign exchange earnings, also employed over 70 percent of the country's labour force (Anyanwu et al., 1997). The discovery of crude oil and consequently, the oil boom of the 1970's diverted attention from the vibrant agricultural sector. The agricultural sector was therefore neglected as a result of the oil syndrome

(Central Bank of Nigeria, 2010). Following the oil glut of the early 1980's, the Nigerian economy started experiencing dwindling growth and other economic problems.

In 2016, the Nigerian economy plunged into recession mainly as a result of the crash in oil prices at the international oil market since the mid-2014 coupled with the resurgence of militancy in the Niger Delta region. Consequently, the economy recorded negative growth rates of 0.36%, 2.1% and 2.2% in the first, second and third quarters of 2016 respectively. After five consecutive quarters of negative growth rates, the economy recovered from recession in the second quarter of 2017 (Ministry of Budget and National Planning, 2017; Emefiele, 2019). Today the economy is in another round of recession and there is a clarion call to use the agricultural sector to drive the economy's growth recovery process.

It is generally agreed that the agricultural sector has the potential to stimulate the economy and put it on the path of sustainable growth. The argument is that, given the country's enormous human resources and diverse climatic and vegetation belts, the agricultural sector presents a viable option with which to diversify the economy from its dependence on oil. (Anyanwu et al., 1997; Ayinde, 2008). Ogen (2007) observed that given the multifaceted nature of the agricultural sector, it is capable of creating multiplier effects on industrial output, job creation and socio-economic development of the country. From the foregoing, there is the need to explore the enormous potential inherent in the agricultural sector and use it to achieve sustainable economic growth of the country.

It is against this back drop that this study examined the relationship between agricultural output and economic growth in Nigeria. In specific terms, the study examined the impact of crop production, livestock, fishery and forestry outputs on economic growth (measured in terms of the growth rate of per capital real gross domestic product) in Nigeria. The paper is organized in five sections. Section one focusses on introduction. Section two is concerned with the review of related literature. Section three takes care of methodology while section four is devoted to presentation of empirical results and discussion of findings. In section five, conclusions and policy recommendations are presented.

THEORETICAL LITERATURE REVIEW

The Theories of Agricultural Development

Theories of agricultural development are theories that explain the factors in the economy that enhance agricultural growth and development. Such theories include the conservation model, the urban-industrial impact model, the diffusion model and the high payoff input model. However, for the purpose of this study, the high payoff input is the most appropriate based on its unique features (Udemezie & Osegbue, 2018). The high payoff input model was developed during the 1960s as an alternative approach to address the short comings associated with the other three models of agricultural development. The central idea behind the high payoff input model is that the key to transforming traditional agricultural sector into a sustainable source of economic growth lies in investments geared towards providing modern high payoff inputs to farmers in developing countries (Schultz, 1964; Ruttan, 1977). Based on this theory, farmers in traditional agrarian systems were seen as rational, efficient allocators of resources. However, they remained impoverished because, in most poor countries, there were limited opportunities opened to them (Hayami & Ruttan, 1971).

As pointed out by Schultz (1964), the modern high payoff inputs can be grouped into three categories:

- the ability of both public and private sector research institutions to produce new technical knowledge; and
- the ability of the industrial sector to create and market new technical inputs; and the capacity of farmers to acquire new knowledge and utilized new inputs productively. Hence, the implications of the theory for agricultural improvement are the significance placed on development and utilization of new inputs through investments in research and development.

CONCEPTUAL CLARIFICATIONS

Concept of Agriculture

Agriculture refers to the cultivation of crops and rearing of animals for food and other human needs. Agricultural activities comprise crop cultivation, animal husbandry, fishery and forest conservation (Anyanwuocha, 2006). Agricultural output therefore refers to the total output of the agricultural sector in Nigeria measured in terms of the contribution of the sector to the country's gross domestic product.

Economic Growth

Economic growth has been defined in two different ways. In the first place, economic growth is conceptualized as annual increases in a country's real national output. Defined in this way, economic growth is measured in terms of yearly increases in a country's total real gross domestic product. This measure of economic growth is misleading since it does not take into consideration the impact of rapid population growth which may adversely affect the welfare of the people. A second, and indeed, a better way to define economic growth is to do so in terms of per capital real gross domestic product. Defined in this sense, economic growth is seen as the annual increase in per capita real gross domestic product. This measure of economic growth is better since it recognizes the implication of rapid population growth on the standard of living of the people. It is in this sense that the term economic growth is used in this work.

Review of Related Empirical Studies

Edinne-Chebbi (2010) analyzed the contributions of agriculture to economic growth in Tunisia and found that agriculture has a weak impact on economic growth. Johansen's multivariate approach is used to study the cointegration of the different sectors of the Tunisian economy and overcome the problem of spurious regression. Special attention is paid to investigate non-causality between agriculture and other economic sectors. Findings – Empirical results suggest that all Tunisian economic sectors cointegrate and tend to move together. In addition, weak exogeneity for the agricultural sector is rejected and this underlines the fact that the agricultural sector should be considered by policymakers in the analysis of intersector growth. However, in the short run, agriculture in Tunisia seems to have a partial role as a driving force in the growth

of other non-agricultural sectors and agricultural growth may be conducive only to the agro-food industry sub-sector.

Matahir and Tuyon (2013) examined the nexus between agricultural output and economic growth in Malaysia. From the analysis, the contribution of agriculture sector output to the Malaysian economy has been decreasing despite several agriculture-led economic growth policies that have been implemented, including the very recent New Economic Model (NEM). Specifically, we employ Johansen-Juselius (1990) cointegration test and reveals that agriculture and economic growth were found to be moving together in the long run. Moreover, we examine the direction of causality between agriculture output and economic growth within the vector error-correction model (VECM). The test shows that both agriculture and economic growth have no causality direction at least in the short run but there exist a bi-directional causality movement in the long run. From this empirical testing and policy analysis, we can suggest that policy makers should pay attention to the holistic and sustainable development of agriculture sector into their policy modelling in promoting sustainable economic growth.

Chandio et al. (2016) examine the contribution of agricultural output to economic growth in Pakistan. Using ARDL approach to co-integration, the empirical results indicate that agriculture sector has significant influence on GDP growth rates of Pakistan. The longrun and short-run coefficients of agriculture are estimated to be 0.31 and 0.27 respectively. Agriculture sector has been playing an important role to enhance economic growth of Pakistan. Therefore, our findings recommended that the Government of Pakistan may introduce novel modern technologies such as mechanization for the improvement of agriculture sector which bring some structural changes and ensure agriculture leading economic growth of Pakistan. Keywords: Agriculture, GDP growth rates, ARDL, Pakistan.

Similarly, Azam and Shafique (2017) concluded from their study on Pakistan that the problems associated with the agricultural sector slowed down economic growth. Time-series data is used in this paper and data is collected from different articles, websites and reports. The agriculture sectors i.e. major and minor crops, fruits, livestock, fisheries and forestry are studied in this research paper. There is some agriculture problems i.e.; limited water, poor management, natural calamities and others which have negative impact on Pakistan's economy. The findings shows that due to agriculture problems there is fluctuations in Pakistan's economic growth (GDP) thus, Pakistan's economic growth is going to slowdown. Total factor of production is also going to slow down due to these instabilities.

Susilastuti (2018) examined the effect of agricultural production on gross regional growth and poverty reduction in Indonesia. Panel data from 6 provinces of center production of paddy of Indonesia for 10 years (2007-2016) were analyzed by Path Analysis method. Productivity of Agricultural Land and Wetland Area has a very strong relationship with Agricultural Production. The productivity of Agricultural Land is the dominant factor and has the significant effect on Agricultural Production. Agricultural Production has no significant effect on GRP growth rate. Agricultural Production has not been able to reduce poverty. GRP growth rate has the significant effect and is the dominant factor for poverty reduction. Based on the finding of the research, government policy programs for poverty reduction in rural areas can be done by improving agricultural cultivation technology, the extent of wetland area, increasing of agriculture-based industries and the provision of poverty reduction programs budget.

Awungo-Vitor and Sackey (2018) found a significant positive impact of agricultural foreign direct investment (FDI) inflows on economic growth in Ghana. The techniques employed to analyse the data include descriptive statistic, unit root test, Granger causality test and error

correction model (ECM). The study accepted a neutrality hypothesis between foreign direct investment to the Ghanaian agricultural sector and its covariates; trade openness, capital and government expenditure. The study also revealed positive and significant relationship between economic growth and foreign direct invest flow to the agricultural sector and volume of trade respectively. However, government expenditure exhibit negative but significant relationship with economic growth. The study contributes to economic development literature from an important but neglected research context with regards to agricultural development via foreign direct investment to support job creation and overall economic development with particular reference to Ghana. Thus, the study recommends that policy should focus on flexible trade policies to attract more foreign direct investment (FDI) inflows to Ghana's agricultural sector to accelerate growth across board.

In Nigeria, Olajide, Akinlabi and Tijani (2012) examined the impact of agricultural output on economic growth. The Ordinary Least Square regression method was used to analyze the data. The results revealed a positive cause and effect relationship between gross domestic product (GDP) and agricultural output in Nigeria. Agricultural sector is estimated to contribute 34.4 percent variation in gross domestic product (GDP) between 1970 and 2010 in Nigeria. The Agricultural sector suffered neglect during the hey-days of the oil boom in the 1970s. In order to improve agriculture, government should see that special incentives are given to farmers, provide adequate funding, and also provide infrastructural facilities such as good roads, pipe borne water and electricity.

Oyakhilomen and Zibah (2014) found a significant impact of agricultural production on economic growth in Nigeria. Time series data were employed in this research and the analyses of the data were done using unit root tests and the bounds (ARDL) testing approach to cointegration. The result of the data analysis indicated that agricultural production was significant in influencing the favourable trend of economic growth in Nigeria. Despite the growth of the Nigerian economy, poverty is still on the increase and this calls for a shift from monolithic oil-based economy to a more plural one with agriculture being the lead sector. It was recommended that pro poor policies should be designed for alleviating rural poverty through increased investments in agricultural development by the public and private sector.

METHODS

Description of the Variables of the Study

The variables employed for the study are explained in this sector.

Dependent Variable: The dependent variable used for this study is the growth rate of per capita real gross domestic product. Per capita real gross domestic product is the ratio of the inflation adjusted GDP to the total population. It is used as a proxy for economic growth.

Explanatory Variables: The explanatory variables for this is the total output of the agricultural sector in Nigeria. It is measured in terms of the contribution of the agricultural sector to Nigeria's GDP. However, the total agricultural output is disaggregated into the various output of the four sub-sectors of the agricultural sector, namely; crop production, livestock, fishery and forestry.

Model Specification

Our empirical model is based on the high payoff input model and the empirical model of Oguwuike (2018). However, the adopted models were while slightly adjusted to include the variables of this study.

The functional form of our model is specified as

$$\text{PCRGDP} = f(\text{CRP}, \text{LST}, \text{FSH}, \text{FRST}) \text{-----} \quad 3.1$$

Where PCRGDP = Per Capita Real Gross Domestic Product,

CRP = Crop Production Output,
LST = Livestock Output
FSH = Fishery Output
FRST = Forestry Output, and
F = Funtionality Notation

PCRGDP is the dependent variable while CRP, LST, FSH and FRST are the explanatory variables.

The ordinary least squares multiple regression equation based on the above mathematical relation is specified as:

$$\text{PCRGDP} = \beta_0 + \beta_1\text{CRP} + \beta_2\text{LST} + \beta_3\text{FSH} + \beta_4\text{FRST} + U \text{-----} \quad 3.2$$

Where β_0 is the intercept term, β_1 , β_2 , β_3 , and β_4 are the coefficients of the explanatory variables, and U is the white noise random variable. All other terms are as earlier interpreted. Expressing equation 3.2 in logarithmic terms, we have

$$\text{PCRGDP} = \beta_0 + \beta_1\log\text{CRP} + \beta_2\log\text{LST} + \beta_3\log\text{FSH} + \beta_4\log\text{FRST} + U \text{-----} \quad 3.3$$

Where log is the natural logarithm of the variables.

Apriori Theoretical Expectations

Based on a priori reasoning, the following signs of the parameter estimates are expected

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0$$

Nature and Sources of Data

This study employed annual time-series data covering the period 1981 to 2019. The data were collected from secondary sources namely; the Central Bank of Nigeria annual statistical bulletin for 2019 and the CBN annual reports and financial statements (various years).

Technique of Data Estimation

The ordinary least squares (OLS) regression technique was used in estimating the data. However, considering the fact that time-series variables have some peculiar features, particularly, the problems of non-stationarity and spurious regression, the OLS technique was preceded by stationarity test. The stationarity test was conducted using the Phillips-Perron unit root test. Based on the results of the unit root test, the autoregressive distributed lag (ARDL) approach to cointegration was used in estimating the specified model.

RESULTS

Descriptive Statistics

The result of the descriptive statistics is presented in table 1

Table 1: Descriptive Statistic

Variables	PCRGDP	LOG (CRP)	LOG(LST)	LOG(FSH)	LOG(FRST)
Mean	1.615693	8.767904	6.545897	4.235150	4.736389
Median	1.500000	8.287104	6.342002	4.186072	4.452530
Maximum	11.75000	11.86735	7.087536	4.677397	5.344718
Minimum	-9.850000	7.498667	5.944095	3.705888	4.208409
Std. Dev.	4.273710	1.056283	0.402442	0.196007	0.321286
Skewness	-0.089438	1.385601	0.334479	0.004674	0.685359
Kurtosis	3.261187	5.387772	1.665303	4.726482	2.025248
Jarque-Bera	0.168334	20.53359	3.405427	4.786485	4.607236
Probability	0.942586	0.000038	0.193473	0.082744	0.077903
Sum	59.85000	328.4496	245.3930	160.5284	175.9684
Sum Sq. Dev.	670.6865	40.51866	5.848540	1.284850	3.604675
Observations	38	38	38	38	38

In table 1 above, the mean values of the variables, i.e. PCRGDP, LOG(CRP), LOG(LST), LOG(FSH) and LOG(FRST) are 1.61593, 8.767904, 6.545897, 4.235150 and 4.736389 respectively. The standard deviation showed that PCRGDP (4.273710) is the most unstable variable while LOG(CRP) (1.056283) is the least unstable variable. The Skewness statistic shows that PCRGDP is negatively skewed while LOG(CRP), LOG(LST), LOG(FSH), and LOG(FRST) are positively skewed. The kurtosis statistic shows that PCRGDP, LOG(CRP), and LOG(FSH) are normally distributed while LOG(LST) and LOG(FRST) are platykurtic (i.e less than 3).

Unit Root Test Results

The results of the Phillips-Perron unit root test are presented in table 2

Table 2: Phillips-Perron Root Test Results

Variables	Phillips-Perron Test Statistic (Levels)	5% Critical Value	Phillips-Perron Test Statistic (1 st Diff.)	5% Critical Value	Order of Integration
PCRGDP	-2.971437	-3.544284	-16.21642*	-3.54890	I(1)
LOG (CRP)	-3.196243*	-2.945842	-6.538140	-2.946427	I(0)
LOG (LST)	-2.766995	-2.945842	-3.893875*	-2.946427	I(1)
LOG (FSH)	-3.010274*	-2.945842	-9.174801	-2.946427	I(0)
LOG (FRST)	-1.991817	-2.945842	-6.248905*	-2.946427	I(1)

Note: *denote rejection of the null hypothesis of unit root at the 5% significant level.

Results in table 2, shows that LOG(CRP) and LOG(FSH) are stationary at levels (i.e, I(0)) while PCRGDP, LOG(LST) and LOG(FRST) are stationary after taking their first differences (i.e, I(1)) at the 5% level of significance.

ARDL Bounds Test Result

The result of the ARDL bounds test for cointegration is presented in 3

Table 3: ARDL Bounds Test Result (F-Bound Test Null Hypothesis: No Long-Run Relationship)

Test Statistics	Value	Significance	I(0)	I(1)
F-Statistic	13.48687	10%	2.3	3.08
K	4	5%	2.67	3.58
		2.5%	2.99	3.98
		10%	3.38	4.48

Result from table 3, shows that the computed F-statistic of 13.48687 is greater than the upper bound critical value of 3.58 at the 5% level of significance. Based on the result, we reject the null hypothesis of no long-run relationship and conclude that there is long-run relationship between agricultural output and economic growth in Nigeria.

ARDL Estimated Regression Results

It should be noted that the order of log selection in the ARDL process for the model was automatically decided based on the Akaike Information Criterion (AIC). The ARDL estimated long-run and short-run regression results are presented in table 4.

Table 4: ARDL Estimated Long-Run and Short-Run Regression Results (Cointegrating Form)

Variable	Coefficient	Std. Error	t-statistic	Prob.
D(PCRGDP (-1))	3.612920	0.429353	8.414801	0.0008
D(PCRGDP(-2))	3.220184	0.395492	8.1435201	0.0024
D;PG(CRP)	6.096976	0.929650	6..559415	0.0026
DLOG(CRP(-1))	22.25686	2.560706	8.691689	0.0012
DLOG(CRP(-2))	18.67487	2.207374	8.460220	0.003
DLOG(LST)	377.8200	31.75520	11.89789	0.0001
DLOG(LST(-1))	-287.3808	34.26601	-8.386759	0.0023

DLOG(LST(-2))	-38.30199	31.12783	-1.230474	0.2564
DLOG(FSH)	12.47975	10.62599	1.174455	0.4031
DLOG(FSH(-1))	-153.7471	19.79302	-7.767743	0.0004
DLOG(FSH(-2))	4.796476	7.035708	0.681733	0.6454
DLOG(FRST)	-632.1228	53.40603	-11.83617	0.0001
DLOG(FRST(-1))	360.4303	61.79176	5.832983	0.0048
DLOG(FRST(-2))	-58.31489	45.25008	-1.288724	0.2517
CointEq(-1)	-0.955637	0.371175	-2.574626	0.0401
Long-Run Coefficients				
Variable	Coefficient	Std. Error	t-statistic	Prob.
LOG(CRP)	20.46148	2.081176	9.831767	0.0005
LOG(LST)	119.9307	8.115807	14.777421	0.0000
LOG(FSH)	63.67730	39.83136	1.598673	0.2318
LOG(FRST)	-108.1912	9.188266	-11.77493	0.0002
C	81.51075	13.513030	6.032011	0.0031

Source: Authors' computation from E-view 10.0

Result in table 4.4, the short-run result is presented in the upper panel while the long-run result is presented in the lower panel. The short-run result indicates that the error correction variable (i.e., CointEq (-1)) turned up with the right negative sign and it is significant at the 0.05 level of significance. The coefficient of error correction variable is -0.955637 indicating a speed of adjustment of about 95%. Thus, 95% of any disequilibrium in the short-run is adjusted to long-run equilibrium within a year.

Post Estimation Tests for ARDL Model

Since the ARDL is a linear regression model, it is necessary that the underlying assumptions of the classical linear regression model (CLRM) are satisfied. These assumptions include, linearity, serial independence (i.e., no autocorrelation), homoscedasticity, normality and stability. The results and decision for these tests are presented in table 5.

Table 5: Post Estimation Test Results

Test	Value	Prob.	Decision
Linerarity (Ramsey Reset) Test			Accept (model correctly specified)
t-statistic	0.392254	0.7336	
F-statistic	0.146381	0.7336	
Breusch-Godfrey LM Test			Accept (No auto correction)
F-statistic	0.096781	0.9103	
Heteroscedasticity (Glejser) Test			Accept (residuals have content variance)
F-statistic	0.986448	0.4860	
Normality (Jarque-Bera) Test	1.413930	0.484771	Accept (Data normally distributed)
F-statistic			

DISCUSSION OF FINDINGS

Estimated Long-Run Result

The long-run regression result showed that crop production has strong positive impact on economic growth. A one percent increase in crop production output increases economic growth

by 0.204614 percent. Similarly, livestock production output is positively related to economic growth. It is also statistically significant. Hence, 1 percent increase in the output of livestock leads to about 1.199307 percent increase in economic growth. The output of fishery has an insignificant positive relationship with economic growth. One percent increase in the output of fishery, on the average, leads to about 0.6367730 percent increase in economic growth. Forestry output has significant negative relationship with economic growth. A one percent increase in the output of forestry, on the average, leads to 1.081912 percent decrease in economic growth. These findings support the findings of Oguwuike (2018).

Estimated Short-Run Regression Result

From the upper parcel of table 4.4, the short-run regression result indicated that economic growth in both periods 1 and 2 have significant positive impact on economic growth in the current period. Similarly, crop production outputs in current period and its values in periods 1 and 2 have significant positive impact on economic growth. Livestock output in the current period has significant positive impact on economic growth. However, livestock output lagged by one period has significant negative impact on economic while its value lagged by two periods has insignificant negative impact on economic growth. Fishery output in the current period has insignificant positive impact on economic growth while the value of fishery output lagged by one period has significant negative impact on economic growth. Also, fishery output lagged by two periods has insignificant positive impact on economic growth. For forestry output, its current value has significant negative impact on economic growth. However, forestry output lagged by one period is positively and significantly related to economic growth. Also, forestry lagged by two periods has insignificant negative effect on economic growth.

CONCLUSIONS

Based on our findings, the study concluded that crop production has the potential to significantly contribute to economic growth in Nigeria, livestock output strongly supports the growth of the Nigerian economy, the contribution of the fishery sub-sector to economic growth is weak, and the forestry sub-subsector has a significant adverse effect on the growth of the Nigerian economy.

Recommendations

Based on our findings, the following policy recommendations are suggested:

- Governments at all levels should increase their budgetary allocation to the agricultural sector. This will help to boost the performance of the sector and hence, improve its contribution to economic growth.
- The role of credit in the development of the agricultural sector can hardly be overemphasized. To this end, the Bank of Agriculture should be revitalized and encouraged to extend more credit facilities to farmers. Also, the Central Bank of Nigeria should persuade deposit money banks to grant more credit facilities to farmers. The agricultural Credit Guarantee Scheme Fund (ACGSF) of the CBN should be revamped to assist farmers access loans from the financial institutions.

- The government should assist farmers with subsidized agricultural inputs like chemicals, fertilizers, improved planting materials, etc.
- The governments at all levels should embark on public enlightenment campaigns to awaken every Nigerians on the need to take up farming as a business.
- To improve the performance of the forestry sub-sector, the government should embark on forest conservation advocacy campaigns.

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