

# **Agricultural Output and Economic Growth: Evidence from Nigeria**

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## **Abstract**

This study examined the effect of agricultural output on economic growth in Nigeria between 1981 and 2021. The main objective of the study was to examine the impact of crop production, livestock production, fishery and forestry on economic growth in Nigeria. The type of data necessary for this study was secondary because the research work was analytical in nature. Time series data relating to the dependent and explanatory variables were employed for a period covering 1981 and 2021. Data used in this study were sourced through Central Bank of Nigeria (CBN) Statistical Bulletin, Federal Bureau of Statistics (FBS), and World Bank Data Base (WBDB). The variables examined had varying results. Crop Production, Livestock Production and Fishery production exhibited positive correlation on Gross Domestic Product (GDP), whereas a divergent nexus was found for Forestry. Moreover, when the level of value of agricultural output declines, it mitigates against the growth of an emerging economy like Nigeria. It is hereby recommended that to improve agriculture, the government should see that special incentives are given to farmers. These should

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include: adequate funding and infrastructure such as good roads, pipe-borne water, and electricity. Moreover, the government should discourage people from the act of bush burning, especially during the dry season, in order to preserve the trees in the forest.

**Keywords:** Economic Growth, Gross Domestic Product, Nigeria, Agricultural Output, Crop Production.

### **Introduction**

Agriculture is the oldest and most significant occupation of man. It consists of the following: soil cultivation for crop planting, rearing of animals to supply food, wool, and other products for personal or general consumption. Agriculture is the largest sector in many developing countries, especially in Nigeria (CBN, 2010). It is a major source of food and raw materials for agro-industrial processing companies. It also has strong links to employment, national income, and industrial production, as well as significant potential for poverty reduction and health improvement (Eleri et al., 2012). The agricultural sector in Nigeria comprises all the sub-sectors of primary industry, including crop production, fishing, forestry, and livestock. This sector is the oldest and even the largest sector in Nigeria's economy. Until the exploration of oil began in the 1970s, Nigeria's economy largely depended on agriculture for food and revenue. The climate of Nigeria allows it to produce a variety of food and cash crops (Anyanwu, 2009).

The agricultural outputs of various kinds have been made possible in Nigeria because of its diversity in agro-ecological conditions. Nigeria has an abundance of natural resources that are favourable to agricultural production (Arokoyo, 2012). As far back as the early 1960s, the Nigerian economy prospered in the agricultural sector, since it was the key driver of growth and development. The agricultural sector is still the major contributor in low-income and middle-income countries, that is, the emerging countries, since it is a major source of inputs, food, employment opportunities, raw materials for manufacturing and other industries, and a

source of foreign exchange through the exportation of agricultural products (Okoro, 2011). The size of contribution of agriculture in most African economies is so enormous that economic growth cannot neglect or relegate the role of agriculture (Anriquez & Stamoulis, 2007).

Due to the unstable nature and performance of agriculture in Nigeria, governments, at different levels, have, over the decades, instituted and carried out many policies and projects aimed at restoring agriculture to its real position in the economy. Evidence from empirical literature shows that there is no breakthrough yet as a result of many problems facing the performance of the agricultural sector (Yusuf, 2014). Agriculture plays a critical role in the Nigerian economy. The sector contributes above 30% of the GDP in the region. More than 60% of the Nigerian population is employed in the agricultural sector. Agriculture is the main source of livelihood in rural areas, where about 70% of the Nigerian population resides. About 60% of foreign exchange earnings in Nigeria are received from the sale of agricultural goods (Pesaran, 2021). The effect of this very important sector on the economic growth of Nigeria needs to be studied.

### **Theoretical Review**

The theoretical framework for this paper is adapted from Leoning et al. (2009) who modelled economic growth in an agricultural economy by presenting an empirical economic growth model which makes it possible to test various hypotheses rather than imposing restrictions on the models, and which accounts for the specific circumstances of developing economies with a large agricultural sector.

Todaro and Smith (2003), while studying Lewis' theory of development, assume that the underdeveloped economies consist of two sectors. These sectors are the traditional agricultural sector, which is characterised by zero marginal labour productivity and the modern industrial sector. The primary aim of the model is the labour transfer and the growth of output and employment in the modern sector. Todaro and Smith (2003) argued further that, for development to take place and become self-sustaining, it will have to contain the rural area in general and the agricultural sector in particular.

### **Literature Review**

Agriculture has been defined in different ways by various authors, but common among these definitions is that it is the production of food and raw materials through the systematic growing and harvesting of plants and animals. It is the science of making use of the land to raise plants and animals (Akinboyo, 2008).

Ikala (2010) has described agriculture as the profession of the majority of humans. The United Nations Organisation (UNO) (2008) postulated that more than fifty percent (50%) of the world population engage in agriculture or are dependent on it for a living. This is a general description of the sector. The sector encompasses farming, fishing, animal husbandry and forestry.

According to Oji-Okoro (2011), the agricultural sector is the largest sector in the Nigerian economy, with its dominant share of the GDP, employment of more than seventy percent (70%) of the active labour force and the generation of about eighty-eight percent (88%) of non-oil foreign exchange earnings. Its share of the GDP increased from an annual average of thirty-eight percent (38%) from 1992 to 1996 to forty percent (40%) between 1977 and 2001.

Simon Kuznets defines a country's economic growth as "a long-term rise in capacity to supply increasingly diverse economic goods to its population; this growing capacity is based on advancing technology, and the institutional and ideological adjustments that it demands" (Todaro and Smith, 2023). This definition implies that economic growth is the same with a sustained rise in national output, provision of a wide range of economic goods, improved technology, institutional, attitudinal and ideological adjustments.

There is large amount of literature suggesting that agriculture contributes significantly to economic growth. For instance, Iyoha and Oriakhi (2002) carried out a study with the objective of explaining sources of economic growth in Nigeria. Their findings reveal that agriculture is one of the major sources of economic growth, which contributes more than expected to GDP growth. They also observed that the share of the labour force in the agricultural sector is too high and suggest reallocation of this input to other sectors of the economy to accelerate economic growth.

Similarly, Gollin et al. (2002) investigated the role of agricultural output on economic growth.

They observed that an improvement in agricultural productivity would assist in releasing resources for other non-agricultural activities.

### **Empirical Review**

Olutoye and Olutoye (2014) examined the contributions of the agricultural sector to Gross Domestic Product (GDP) from 1990 to 2013. Ordinary Least Square (OLS) multiple regression method was used to analyse the data. The results showed a positive relationship between agricultural output and Gross Domestic Product (GDP) in Nigeria. Specifically, the study clearly shows that Agricultural Output has a strong influence on the Gross Domestic Product (GDP).

Akinwumi, (2013) estimated the impact of macroeconomic policies on agricultural growth in Nigeria using time series data and econometrics analysis. The results show that Gross Domestic Product (GDP) and Credit Loan to Agriculture (CLA) are significant with positive influences.

Gollin et al. (2002) investigated the role of agricultural development on economic growth. They observed that improvements in agricultural productivity would assist in releasing resources for other non-agricultural activities.

Olajide et al. (2012) analyse the relationship between agricultural output and economic growth in Nigeria for the period between 1970 and 2010. Their findings show that there is a positive causal relationship between GDP and agricultural output.

Odetola and Etumnu (2013) investigate the contributions of the agricultural sector to economic growth in Nigeria using data series between 1960 and 2011. The authors found that the sector has contributed positively to economic growth. They also used Granger-causality test to prove that agricultural growth Granger-causes GDP growth, but no reverse relationship was found.

Yusuf (2014), using the Johansen's approach, examined the long-run and short-run effects of agricultural output on economic growth. His result shows strong evidence of long-run relationship between agricultural output and economic growth. The response function shows that a positive

agricultural output causes economic growth. The variance decomposition analysis showed the significant role played by the agricultural sector in the development process.

Ocholi (2011) opines that the agricultural sector in Nigeria is being constrained by a farming method that is traditional in nature and characterised by low capital from the government, which leads to low productivity and meagre savings from agricultural investment.

According to Gries and Redlin (2012), agricultural output significantly influences the level of economic growth. The long-run impact of agricultural output on economic growth was discovered to be positive and significant. However, in the short run, the positive relationship was ascribed to income growth.

Gorgi and Aliapourian (2008) inquired into how agricultural output influenced the level of growth in Iran and some members of the Organisation of Petroleum Exporting Countries (OPEC). The results showed that there was evidence of growth induced by agricultural output.

After examining how agricultural output impacted economic growth among Non-OECD countries, Kahnemoui (2013) concluded that the improvement of agricultural output significantly influenced economic growth.

Ouma et al. (2016) examined agricultural output and economic growth in the East African Countries (EACs). Results showed heterogeneous outcomes for various EACs. There was unidirectional causality in Rwanda and bidirectional causality between agricultural output and economic growth in Kenya. No causal relationship existed in Burundi, Tanzania and Uganda.

Bakari and Mabrouki (2018) inquired into the effect of agricultural output on economic growth in North Africa. Results showed that agricultural outputs have a positive correlation with GDP. Therefore, agricultural outputs were found to be the key determinants of economic growth. The study recommended the creation of more dynamic agricultural output policies.

Fankem and Oumarou (2020) assessed the effects of agricultural output on economic growth in South African countries. Using Generalised Method of Moments (GMM) technique, the study indicated that

agricultural output had a positive effect on economic growth. However, when accompanied by insufficient policies on price stability and human capital development, agricultural output did not encourage economic growth. Therefore, improvement in agricultural output should be accompanied by complementary policies.

Ghimire et al. (2021) examined the impacts of agricultural output on economic growth in Bangladesh. The study pointed out that there was a long-run relationship between agricultural output and economic growth.

Agyei and Idan (2022) observed critically the role of institutions in the nexus between agricultural output and economic growth in Asia. Using Generalised Method of Moments (GMM) technique, the results of the study supported the view that institutions have a positive influence on the relationship between agricultural output and economic growth. The recommendation was that institutions should be strengthened to promote the positive link between agricultural output and economic growth.

Denwi et al. (2022) investigated how agricultural output impacted economic growth in Forty-Two (42) African countries. Using a pooled mean group technique, the results of the study showed that agricultural output contributes to economic growth only up to a certain threshold. The result supported the fact that the relationship between agricultural output and economic growth in African countries is nonlinear.

Sunde et al. (2023) examined the impact of agricultural output on economic growth in Namibia. Using the ARDL cointegration technique, the study showed that the relationship between economic growth and agricultural output was positive. Short-term economic growth was driven by an increase in agricultural output. The results further suggested that agricultural output was crucial in the economic growth of Namibia.

Matahir (2012) took a different stand on his study on the role of agricultural output in economic growth and how it interacts with other sectors in the economy. Time series Johansen cointegration technique was employed to investigate the non-causality relationship between agricultural output and other economic sectors of Tunisia. From his findings, it was postulated that policy-makers should see agricultural output as a vital tool in their analysis of inter-sectorial growth policies. Though, agricultural output has not benefited immensely from the growth

of the service and commerce sectors of Tunisia, but its contribution to the economic growth of the economy can never be overemphasised. This leads to suitable support from the study carried by out on Thailand economy by Jatuporn et al. (2011). They also stressed that policy-makers should emphasise agriculture and see it as a major contributor to Thailand's economy.

Oji-Okoro (2011) employed multiple regression analysis to examine the contributions of the agricultural sector to the Nigerian economic growth. He found that a positive relationship exists between Gross Domestic Product (GDP) and domestic savings, as well as government expenditure on agriculture and Foreign Direct Investment (FDI) between 1986 and 2007. The study also revealed that 81% of the variation in GDP could be explained by changes in Domestic Savings, Government Expenditure and Foreign Direct Investment.

Itodo, Apeh and Adeshina (2012) examined the impact of government expenditure on agriculture and agricultural output in Nigeria between 1975 and 2010, using Cob-Douglas production function and the Ordinary Least Squares (OLS) econometric technique to estimate a multiple regression of agricultural output against some variables. The results showed a positive but insignificant relationship between government expenditure on the agricultural sector and agricultural output within the period of the research.

Loto (2011) examines the growth effect of government expenditure on economic growth in Nigeria for the period between 1980 and 2008, with a particular focus on five sectoral expenditures, including security, health, education, transportation, communication and agriculture. The result discovers that in the short run, expenditure on agriculture was found to be negatively related to economic growth. The impact on education was negative and not significant. The impact of expenditure on health was positively related to economic growth, while expenditures on national security, transportation and communication were positively related to economic growth. Their impacts were not statistically notable.

The effective synergies between agricultural output and economic growth in Tanzania were analysed by Lema and Paul (2018). The recently developed asymmetric Auto-Regressive Distributed Lag (ARDL) cointegration methodology was used in the research work. It was revealed



that agricultural output has a significant influence on economic growth, as equated to unfavourable disturbances, while any adverse economic situation would negatively affect agricultural output. This research concluded and recommended that the present lopsided nexus between agricultural output and economic growth should be taken into consideration, and the government should boost its funding to the sector.

The effect of agricultural output on economic growth in Nigeria was examined by Ayim and Orok (2017). The timeframe for the research was 1981 to 2016, and the specific goals were to determine whether agricultural output had a significant impact on economic growth, with Nigeria's crop, livestock industry, and fisheries industry. The multiple Ordinary Least Squares (OLS) technique was used in this study to analyse the variables, and a direct significant relationship between agricultural output and economic growth was found.

The nexus between agricultural output and Nigeria's economic growth was examined by Ayeomoni and Aladejana (2016). This research made use of the Autoregressive Distributed Lag (ARDL) estimation method to explore the nexus between agricultural output and Nigeria's economic growth. Research results specified that there exists a short- and long- run link between agricultural output and Nigeria's economic growth. The study concluded that the explanatory variables used are agricultural loans, exchange rates, rate of interest, domestic private investment and inflation affect Nigeria's Gross Domestic Product (GDP). The study proposed that concerned measures be taken by policy-makers in expanding the efficiency level of Nigeria's agrarian sector by providing it with sufficient credit to boost Nigeria's economic growth.

Onunze (2012) researched on the impact of agricultural output on Nigeria's growth within (1980-2010), a 30-year period. The study clears the argument that has existed among development economists about whether agricultural output leads to national development and industrialisation. The study made use of Ordinary Least Squares (OLS) techniques and variables such as agricultural development, capital formation, inflation rate and interest rate to inquire into the question whether agricultural output leads to economic growth and development. It

was empirically shown that a positive relationship exists between agricultural output and economic growth.

In an empirical study on the contributions of agricultural output to economic growth in Nigeria, Bekun (2015), covering the period of 33 years between 1981 and 2013, using Augmented Dickey-Fuller (ADF) test and Johansen Cointegration test and using Real Gross Domestic Product (RGDP) as the dependent variable, while agricultural output and oil rent were the explanatory variables, shows the central role agricultural output could play in enhancing the economic growth of Nigeria if given full attention.

Olajide et al. (2012) analysed the relationship between agricultural output and economic growth in Nigeria using the Ordinary Least Squares Regression (OLSR) method. The results displayed a positive cause-and-effect relationship between Gross Domestic Product (GDP) and agricultural output in Nigeria.

Salako et al (2015) empirically explored the agricultural and economic growth nexus in Nigeria. The objective of the study was to examine the role played by agriculture in the economic growth of Nigeria. The quantitative technique was used in a multivariate (VAR) model with emphasis on the Variance Decomposition Analysis with the aid of E-view 7. The study revealed that the agricultural sector has been neglected and the whole attention is paid to crude oil. This has caused the dwindling of agricultural sector's contributions to economic growth. The study concludes that agriculture is a lifeline of the economy. A set of policy directions was proposed to open the sector so it can become economically functional, capable of catalysing the industrialisation need of the nation and contribute meaningfully to the development objective of the nation.

Oluwafemi, Adedokun and Ogunleye (2015) worked on the empirical analysis of the contribution of agricultural output to Nigerian Gross Domestic Product (GDP). They focused on the study of the Nigerian economy and agricultural contributions. Generally, the descriptive statistics shows that the Nigerian economy had grown over the period of 32 years under study.

## Methodology

### *Research Design*

This research used the quasi-experimental design to achieve the study's objectives. The research adopted the econometric analysis techniques of Unit Root Test, Co-integration and Error Correction Methods (ECM). This research design is required because the research problem is empirical, quantitative, and analytical in nature, where dependent and explanatory variables are observed over a time frame for any change that may occur.

### *Types and Sources of Data Collection*

The type of data necessary for this study is secondary because the research work is analytical in nature. Time series data relating to the dependent and explanatory variables were employed for a period covering 1981 to 2021. Data used in this study were sourced through the Central Bank of Nigeria (CBN) Statistical Bulletin, Federal Bureau of Statistics (FBS), and World Bank Data Base (WBDB).

### *Model Specification*

The functional and econometric relationship between the dependent variable and the independent variables is seen in the equation below:

$$RGDP = f(CRP, LIV, FRS, FIS) \dots\dots\dots (1)$$

The econometrics form of the model displayed in equation 1 can be written as equation 2.

$$RGDP_t = \alpha_0 + \alpha_1 CRP_t + \alpha_2 LIV_t + \alpha_3 FRS_t + \alpha_4 FIS_t + e_t \dots\dots (2)$$

Where:

RGDP = Real Gross Domestic Product; (Proxy for economic growth).

CRP = Crop Production;

LIV = Livestock Production;

FRS = Forestry Production;

FIS = Fishery Production;

$e_t$  = Random variable or Error term.

$\alpha_1 - \alpha_4$  = Elasticity of the independent variables

On the a priori, we expect;  $\alpha_1 > 0$ ,  $\alpha_2 > 0$ ,  $\alpha_3 > 0$ ,  $\alpha_4 > 0$ .

That is,  $RGDP/RGDP > 0$ ,  $CRP/RGDP > 0$ ,  $LIV/RGDP > 0$ ,  $FRS/RGDP > 0$ ,  $FIS/RGDP > 0$ .

### **Estimation Technique**

#### ***i. Unit Root Test***

Unit root test is a test of stationarity. It is used to determine the order of integration for each variable's time series, which is the first step in conducting a time series analysis. Unit root test can be used to determine if trending data should be first differenced or regressed on deterministic functions of time to render the data stationary. Moreover, economic theory often suggests the existence of long-run equilibrium relationships among nonstationary time series variables.

#### ***ii. Co-integration Test***

Co-integration test is used to test for the presence of cointegration between the series of the same order of integration through forming a cointegration equation. The main reason why co-integration test is used is that if, in the long-run, two or more series move closely together, it is possible to regard these series as defining a long-run equilibrium relationship since the difference between them is stationary. Absence of cointegration implies that such variables have no long-run relationship. Under the Johansen cointegration Test, the trace statistic determines whether co-integrated variables exist or not.

#### ***iii. Error Correction Model***

This study employs the Error Correction Model (ECM) as the estimation technique because it is an efficient technique for estimations involving long-run relationships. Time series data are employed in this study because they are heavily used in econometric studies.

### **Discussion of Results a.**

#### ***Unit Root Test***

**Table 1: Unit Root Test Result**

AUGMENTED DICKEY FULLER (ADF)			PHILIP PERRON (PP)		
Variables	Test Statistics	Critical Value @ 5%	Test Statistics	Critical Value @ 5%	Order of Integration
LNGDP	-6.2487	-4.4723	-3.3476	-4.4723	I(1)
LNCRP	-4.7629	-4.4723	-4.2698	-4.4723	I(1)
LNLIV	-3.8416	-4.4723	-4.5327	-4.4723	I(1)
LNFRS	-5.9175	-4.4723	-4.4678	-4.4723	I(1)
LN FIS	+2.5068	-4.4723	-4. 5138	-4.4723	I(1)

*Source: Author's Computation*

Augmented Dickey Fuller (ADF) test and Philip Perron (PP) test results were presented in Table 1. This shows the compliance with the condition for Vector Error Correction Model (VECM), which affirms stationarity of all variables at first difference I(1), that is, at difference One (1).

#### ***b. Co-integration Test***

**Table 2: Unrestricted Co-integration Rank Test Result**

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Probability**
None*	0.583472	65.73144	42.134866	0.0003
At most 1*	0.217988	58.07138	33.956641	0.0269
At most 2*	0.318543	21.87441	15.543143	0.0628
At most 3*	0.148932	9.37162	4.236030	0.0361
At most 4*	0.134893	45.19110	35.508164	0.0132

*Source: Author's Computation*

Table 2 shows the Johansen co-integration test, which reveals that two co-integrating equivalences as trace statistic is greater (5% significance) than the corresponding Mackinon critical value. Given this, all trace test statistics are all greater than the Critical Values at 5%. The absolute values of the variables are  $(65.73 > 42.13)$ ,  $(58.07 > 33.96)$ ,  $(21.87 > 15.54)$ ,  $(9.37 > 4.24)$   $(45.19 > 35.51)$ . This implies that there is a long-run equilibrium relationship among the variables.

**c. Vector Error Correction Mechanism**

**Table 3: Vector Error Correction Mechanism Result**

Variables	Coefficient	Standard Error	t-statistic	Probability
LNCRP	0.055934	0.650246	0.355905	0.3712
LNLIV	0.743781	0.233949	0.401519	0.6587
LNFRS	-0.128722	0.275712	0.764943	0.5721
LNFIS	0.313204	0.593949	0.781211	0.4862

$R^2 = 74$

*Source: Author's Computation*

Table 3 shows a positive coefficient of 0.055934 and a significant probability of 0.3712. The implication is that Crop Production has nonsignificant affirmative effect on economic growth in Nigeria during the period of study. Livestock production has a significant effect on the economic growth in Nigeria compared with crop production. Forestry (FRS) has a negatively insignificant impact on economic growth, whereas Fishery Production is positive, though insignificant too. The  $R^2$  test from the VECM shows that three explanatory variables in the model account for 74% of the variations in the dependent variable.

**Discussion of Findings**

The variables examined had varying results. Crop Production, Livestock Production and Fishery Production exhibited a positive correlation on Gross Domestic Product (GDP), whereas a divergent nexus was found for

Forestry (FRS). It should be noted that when the level of value of agricultural output declines, it mitigates against the growth of an emerging economy like Nigeria.

### Recommendations

The Agricultural sector suffered neglect after the discovery of oil in the 1970s. In order to improve agriculture, government should see that special incentives are given to farmers, like adequate funding; government should also provide infrastructural facilities like good roads, pipe borne water and electricity. Moreover, government should improve on the forestry production, since its contribution to the economic development from this research is negative. Forest guards should be encouraged to wake up to their responsibilities in order to stop people who cut the forest trees without passing through the normal channels. Likewise, government should discourage people from the act of bush burning, especially during the dry season, in order to preserve the trees in the bush.

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