Afropolitan Journals

ISSN: 2730-7603X www.afropolitanjournals.com

Impacts of Agricultural Sub-Sectors' Performances on Nigeria's Economic Growth: An Empirical Analysis

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Abstract

The agricultural sector in Nigeria consists of crop production, livestock, fishery and forestry. Recognizing the potentials of the aggregate sector, this study investigates quantitatively the impact of the four sub-sectors on economic growth in Nigeria. Employing the Eagle-Granger Co-integration and Error Correction Model (ECM) for the time series data of 1981 to 2021, the results show that in the long and short run periods, crop production, forestry, and fishery positively and significantly impact real gross domestic product in Nigeria. Livestock on the other hand had a negative but insignificant impact on real gross domestic product. With the proven ability of these sub-sectors to significantly drive economic growth in Nigeria, the study suggests that as a matter of urgency, the government should put measures in place to improve the value chains associated with each of these sub-sectors, establish structures that can address the peculiar challenges faced by practitioners in the subsectors and the Ministry of Agriculture should organise periodic workshops for dissemination of information on available grants or policies implemented as well as create feedback mechanisms to get first-hand information on the outcome of the policies.

Keywords: Agriculture, Crop, Forestry, Fishery, Livestock, Economic Growth, ECM.

Introduction

Nigeria is endowed with substantial arable land, water resources and diverse ecology hence agriculture is possible. Agriculture is of great importance to the economy because it provides food, employment, raw materials for firms, revenue for the government and contributes to the nation's gross domestic product. It is indeed the basis of human existence. However, Ehighebolo (2022) maintains that the average contribution of agriculture to GDP is low compared to the 1960s and that its contribution to national economic growth is unsatisfactory given the potential of the aggregate sector. Supporting this assertion are Odetola and Etumnu, (2013), who stated that there is a possibility for more growth in the sector. Also, Oyakhilomen and Rekwot (2014) asserted that in recent years, the agricultural sector may have contributed significantly to improved growth performance in Nigeria, however, its actual contribution appears to be short of the overall potential. Succinctly put, Kolade (2014) averred that despite Nigeria being the largest producer of cassava, yam and cowpea, it is still a food-deficit nation and a net importer of food.

The somewhat poor performance of the sector has led to many empirical studies on the aggregate agricultural sector in Nigeria. Different suggestions have been proffered, of

which the government has enacted some policies. Have these policies enhanced the agricultural sector or have some skewed policies reduced the agricultural potential of the nation? Probably, but a lot still needs to be done given the poor performances as adjudged in literature.

Thus worthy to note, is the study of Akpan (2021) who posited that disaggregating the agricultural sector will attract specific policy recommendations that can hasten the development of the sub-sectors which are crop, livestock, forestry and fishery. Okolo (2004, as cited in Michael, 2017) avers further that there are a lot of opportunities therein that can foster the future economic development of the country. In light of the above, very few scholars have focussed on the disaggregated sector (Agboola et al., 2020; Akpan, 2021; Chandio et al., 2015, 2016; Enu, 2014; Raza et al., 2012). Consequently, in a bid to establish the need for more robust agricultural policies that accelerate productivity in the agricultural sub-sectors, this study seeks to investigate the impacts of the agricultural subsectors on the economic growth of Nigeria for a period of 40 years (1981 to 2021).

This paper adds to the existing literature by adopting a methodology that deviates from previous similar studies. This approach will provide a different perspective to analysts, policymakers and academia in explaining the agricultural sub-sector performances and its impact on the GDP of Nigeria. Consequently, the paper is divided into five sections wherein the second addresses the literature review, third methodology, fourth is, the presentation and discussion of results and the last conclusion and recommendations.

Research Questions

a. Has crop, livestock, forestry, and fishery sectors contributed significantly to Nigeria's economic growth from 1981 to 2021?
b. Has there been any specific agricultural subsection with the greatest economic impact over the study period?

Objectives

The main objective of this paper is to determine the impacts of the crop, livestock, forestry and fishery sectors on the economic growth of Nigeria for the past 40 years. The distinct objectives are to establish the relationships between the subsectors mentioned above and economic growth in Nigeria.

Hypotheses

In an attempt to answer the salient questions posed by this study, the following hypotheses are created:

Hypothesis 1: Crop production has no significant impact on GDP
Hypothesis 2: Livestock output has no significant impact on GDP
Hypothesis 3: Fishery output has no significant impact on GDP
Hypothesis 4: Forestry output has no significant impact on GDP

Literature Review

Conceptual Review

Agriculture is the act of farming. It includes the cultivation of crops, the rearing of animals, and the preparation and marketing of agricultural and agro-allied products (Olabanji et al., 2017). It consists of four subsectors viz crop, livestock, forestry and fishery which produce cocoa, palm produce, cassava, rubber, cotton, yam, plantain; chicken, turkey, goat, cows; different types of fish and timbers. It is described as the mainstay of the Nigerian economy and has contributed an average of 24% to Nigeria's GDP from 2013 to 2019, employed more than 36% of the country's labour force; making the sector, the biggest employer of labour in the country (Oyaniran, 2020).

The largest segment of the agricultural sector's total output is crop production which is about 87.6%, followed by livestock, fishing and forestry at 8.1%, 3.2% and 1.1% respectively (Odetola & Etumnu, 2013). Undoubtedly Nigeria is endowed with rich resources of both crop and environment which when fully harnessed, can make her rich and prosperous (Asiegbu, 2000). Supporting this notion, Agwu et al.(2022) described the agricultural sector as a machine for economic growth. Nevertheless, the performance of the sector is a far cry from its inherent potential due to challenges such as rural-urban migration, inadequate supply of agricultural inputs for farmers in rural areas, inadequate supply of credit facilities poor adoption of relevant technology by farmers and so on (Ehighebolo, 2022). Thus, several empirical studies have emerged proffering solutions to the somewhat poor performances of the sector.

Empirical Review

Aggregate Agricultural Sector and Economic Growth

Studies that have established a relationship between agricultural sector and economic growth include Olabanji et al. (2017) who examined the long-run relationship between agricultural output and economic growth in Nigeria for the period 1981 to 2014. Using Johansen's maximum likelihood co-integration approach and Vector error correction model, the results of the investigation support a significant long-run relationship between agricultural output and economic growth. The paper recommended amongst others the strengthening of agricultural policies by the government in the area of funding, storage facilities, and market access. In the same vein, Agwu et al. (2022) examined the interaction between the agricultural sector and economic growth in Nigeria from 1981 to 2019. Adopting the Vector Error Correction Model (VECM) technique; the result shows that Agricultural output has a significantly positive relationship with GDP in the long run. The study suggested that the government and private sector increase investment in the sector. Examining the impact of agricultural sector on the economic growth of Nigeria, Sertoğlu et al. (2017) used time series data from 1981 to 2013 and a vector error correction model. The findings revealed that real gross domestic product; agricultural output and oil rents have a

long-run equilibrium relationship. Although the speed of adjustment of the variables towards their long-run equilibrium path was low, agricultural output had a positive impact on economic growth. The paper recommended that the government and policymakers should embark on diversification and improve the budget allocation of the agricultural sector.

Disaggregated Agricultural Sector and Economic Growth

Few scholars have componentized the sector in a bid to proffer better solutions to the problems besieging it. Investigating the contribution of different agricultural subsectors to economic growth in Nigeria, Agboola et al. (2020) employed a vector error correction model, dynamic ordinary least squares and fully modified ordinary least squares on data from 1981 to 2016. The Findings showed that in the long run, the effect of forestry, crop production, and fishery on economic growth was statistically significant and positive. Diversification of the economy amongst others was suggested. What's more, Akpan (2021) utilized per capita GDP as a proxy for economic growth and autoregressive regressive distributed lag (ARDL) testing bound model on time series data from 1981 to 2020 to study the relationship between the agricultural sub-sectors production and the growth of the Nigerian economy. The result showed that crop subsector output, livestock subsector output, forestry and fishery subsector outputs had significant positive relationships with the per capita GDP. The prioritization of the agricultural sector and intensification of agricultural production were some of the suggestions provided to accelerate economic growth in Nigeria. Furthermore, using the growth accounting framework and time series data from 1960 to 2011, Odetola and Etumnu (2013) investigated the contribution of the agriculture sector to economic growth in Nigeria. The results revealed that the crop production subsector contributes the most to agriculture sector growth and that growth in the aggregate agriculture sector is overly dependent on growth of the crop production subsector. It recommended increased efforts in the development of the livestock, fisheries and forestry subsectors to enable improvements in the gross contributions of agriculture sector to the Nigerian economy.

For other climes, Raza et al. (2012) identified the significant relationship between agricultural sub-sectors and GDP in Pakistan, utilizing a data set of 1980-2010 and simple regression. The results revealed a significant role of agriculture sub-sectors towards economic growth except for forestry which showed an insignificant relationship with GDP. Insufficient facilities, untrained and unskilled labour force were some of the reasons given for insignificant relationships. (Enu, 2014) sought to determine the impact of the agricultural sector on Ghana's economic growth and the effect of the various sub-sectors of the agricultural sectors on Ghana's economic growth. Using time series (1996-2006) data and employing OLS the results revealed that agricultural output had a significantly positive impact on Ghana's growth and the cocoa subsector was identified to be vital to economic

growth and development in Ghana. Hence, it was recommended that cocoa subsector should not be prioritized despite the discovery of oil.

Theoretical Framework

This paper is anchored on the theory of structural change. Structural change is a broad economic process that entails changes in the structure of production and employment within all sectors of the economy as well as the emergence of new sectors and the disappearance of old ones (Gabardo et al., 2017). According to Akpan, (2021), the theory focuses on the mechanism by which developing economies like Nigeria can transform their subsistence agricultural system into a modern and advanced agricultural system through massive investment in structural transformation. It suffices for this study since the goal is to investigate how changes in the segments of the agricultural sector have influenced economic growth in Nigeria.

Methodology

To investigate the impact of crop, livestock, fishery and forestry subsectors on the economic growth of Nigeria, time series data from 1981 to 2021 for all the variables were obtained from the Central Bank of Nigeria's website (CBN). To distinctively deviate from the approach adopted by Akpan (2021) who used per capita GDP as a proxy for economic growth and ARDL; this study utilized Real GDP as a proxy for economic growth and the Error Correction Model.

Model Specification

Modifying the regression model obtained from Akpan, (2021), the baseline equation for this study is expressed as

$RGDP_t = f(CRP_t, FOR_t, FISH_t, LIVS_t, \varepsilon_t)$ 1

Where

RGDP = Real Gross Domestic Product

CRP = Crop production

FOR = Forestry

FSH = Fishery

LIVS = Livestock

Equation 1 is transformed to natural logarithms as follows:

$LRGDP_t = \alpha_0 + \beta_1 LCRP_t + \beta_2 LLIVS_t + \beta_3 LFOR_t + \beta_4 LFSH_t + \varepsilon_t$ 2

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

The econometric analysis used in this study consists of three steps; the first being the unit root test which examines the stationarity of the series; the Engle and Granger residual based co-integration technique that tests the residuals of the model for unit roots test and the Error correction model that determines the speed of adjustment of the dependent

variables returns to equilibrium after some possible shocks in the system. The following sections present and discuss the results obtained from the analysis.

Results and Discussion

Table 1: Augmented Dickey-Fuller Unit root tests

Variables	ADF computed value at level	5% Critical value	ADF computed value at 1st difference	5% Critical value	Conclusion
LRGDP	-0.919945	-2.941145	-3.987404	-2.938987	I(1)
LCRP	-0.313526	-2.973898	-5.997418	-2.941145	I(1)
LFOR	0.555181	-2.941145	-6.438296	-2.938987	I(1)
LFSH	-0.424424	-2.945842	-9.397758	-2.945842	I(1)
LLIVS	-0.181960	-2.938987	-4.071430	-2.938987	I(1)

Source: *Author's extraction from Eviews12*

Using Augmented Dickey-Fuller (ADF), the stationarity test results in Table 1 show that all the variables; LRGDP, LCRP, LLIVS, LFOR and LFSH were not stationary at levels I(0) but at first differencing I(1). In this model, since the five variables are non-stationary at levels there is a need to test for co-integration. The Engel–Granger residual-based co-integration technique which tests residuals of the model for unit roots is adopted in this study. With this technique, co-integration exists among the variables if all the variables in the model are integrated at the same order I(1) and the residuals are I(0).

Table 2: Abridged Co-integration Result

Engel-Granger Co-integration test result Null Hypothesis: ECM has a unit root Exogenous: Constant			
		t-statistic	**Prob***
Augmented Dickey-Fuller test Statistic		-3.879827	0.0054
Test critical values	1% level	-3.639407	
	5% level	-2.951125	

	10% level	-2.614300	

The null hypothesis that residuals of this model have unit roots is rejected at a 5% level of significance since ADF statistic 3.879827 is greater than the critical value. The conditions that all variables must be 1(1) and the error term be I(0) are met hence there is co-integration between LRGDP and LCRP, LFOR, LFSH and LLVIS. This implies that the linear combination of RGDP with other independent variables is stationary, consequently, the long-run model specified below is not spurious. A long-run relationship exists between the variables in the model.

Table 3: Long and short-run estimation of the model

Long Run Result **Dependent Variable is LRGDP**				
Variable	**Coefficient**	**Std error**	**t-stat**	**prob**
LCRP	0.340287	0. 063718	5.340553	0.0000
LFOR	0.467352	0.103414	4.519249	0.0001
LFSH	0.189541	0.034189	5.543996	0.000
LLVIS	-0.002814	0.174095	-0.016162	0.9872
C	4.367108	0.283293	15.41551	0.0000
R.SQ	0.992780	ADJ. R-SQ	0.991955	

Short Run Result **Dependent Variable is D(LRGDP)**				
Variable	**Coefficient**	**Std error**	**t-stat**	**prob**
D(LCRP)	0.270273	0.068497	3.945754	0.0000
D(LFOR)	0.317080	0.110204	2.877207	0.0070
D(LFSH)	0.088468	0.038022	2.326771	0.0263
D(LLVIS)	0.061370	0.216873	0.282978	0.7790
C	0.005749	0.009749	0.689680	0.5504
ECM(-1)	-0.440936	0.133817	-3.295075	0.0024
R.SQ	0.530491	ADJ. R-SQ	0.459353	

Source: *Author's extraction from E-views 12*

The long-run result in Table 3, shows that the LCRP, LFOR, and LFSH are positive and statistically significant at the 5% level of significance. This is in line with apriori expectations and the studies of Agboola et al. (2020) and Akpan (2021). A 1% change in LCRP will

positively change RGDP by about 34%. In the same vein, a 1% change in LFOR positively influences LRGDP by 46.7%. Furthermore, a 1% change in LFSH, impacts LRGDP by 18.95%. Contrastingly, LLVIS impacts LRGDP negatively and is insignificant at .05 level. This outcome however differs from the findings of Akpan (2021) which was positive and significant. Nevertheless, the overall result revealed about 99% variation in the dependent variable was explained by the independent variables.

In the short-run analysis, the same explanatory variables are also positive and statistically significant at the 5% level of significance, the constant term is not statistically significant at the .05 level while a 1% change in short-run LCRP impacts LRGDP by 27.02%. A 1% change in short-run LFOR impacts LRGDP by 31.71%. while LFSH impacts LRGDP by 8.8%. The value of the error correction term is also negative and statistically significant at the 5% level of significance. This means that after any shocks, the dependent variable returns to equilibrium at a speed of adjustment of 44.09%. The overall result also revealed that the explanatory variables were able to explain about 46% of the variation in the dependent variable in the short run.

Conclusion

The findings show that in the long and short run periods, crop production, fishery and forestry are strong and significant drivers of economic growth in Nigeria while livestock had an insignificant impact. Furthermore, of all the sectors, forestry has the greatest impact on GDP. This implies that promoting agricultural sub-sectors' growth sustainably will boost the aggregate sectorial performance and gross domestic product tremendously in Nigeria.

Recommendations

a) Proactive measures should be put in place by the government to improve the value chains associated with each of these sub-sectors
b) Periodic workshops should be organized by the Ministry of Agriculture to disseminate information as well as promote government policies, grants and initiatives that positively impact the sub-sectors
c) The Ministry of Agriculture should create feedback mechanisms or indices to measure the impact of its policies on the subsectors
d) Further research should be done in the sub-sectors to find out and address the lingering challenges that hinder the optimal performance of the sub-sectors.

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