

## Effectiveness of Agriculture Productivity on Inclusive Growth in Nigeria, 1981-2016

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### Abstract

This study examines the impact of agriculture on inclusive growth in Nigeria. A time series data covering the period, 1981-2016, sourced from the Central Bank of Nigeria amongst others was utilised for the study. Accordingly, three stage least squares technique of analysis was used in evaluating the data. Inequality, poverty and unemployment were used as a proxy for inclusive growth while agriculture output, agricultural value-added, agricultural labour employed, government expenditure in agriculture, gross capital formation as well as bank loan and advances to agriculture were used as indicators of agricultural development. The study finds that agriculture has insignificant impact on inclusive growth in Nigeria. Therefore, the study recommends that it is imperative for the country to develop its agricultural sector through sufficient government spending in order to set-up its inclusive growth.

**Keywords:** agriculture, inclusive growth, inequality, poverty, and unemployment.

### 1. Introduction

Agricultural development is considered to hold the key to the achievement of inclusive growth in most sub-Saharan African (SSA) countries including Nigeria. The Nigerian economy is characterized by five major sectors namely, agriculture, solid mineral, manufacturing, oil and gas and services. According to Adama and Ohwofasa (2015), oil and gas export contribute about 90% of the country's foreign exchange while the non-oil sector which include agriculture, solid mineral, semi-manufacturing and manufacturing account for the balance of 10%. The agricultural sector is made up of crop production, livestock, forestry and fishing. According to Aiyedogbon, Njiforti and Ohwofasa (2016), agriculture exports consist of cash crops made up of cocoa, coffee, cotton, wool, palm oil and rubber. Considering sectorial contribution to gross domestic product (GDP), the agricultural sector contributed an average of 40.1% to the country's GDP between 1981 and 2011. The sector is closely followed by the services sector that contributed an average of 38.1% to the GDP. The much emphasized petroleum sector could only contribute an average of 14.2%, in spite of its dominant share in public revenue and foreign exchange earnings of the country (NBS, 2012). The preceding stylized facts suggest the relatively low linkage of the petroleum sector with other sectors of the economy as well as reveal the important role of agriculture in the economy of Nigeria. It follows therefore, that policies targeted at improving the economy must of necessity focus on revamping meaningfully the agricultural sector.

Agriculture is the cultivation of animals, plants, fungi, and others such as food, fibre, biofuel, medicinal and other products used to sustain and enhance human life (ILO, 2010). Abayomi (1997) stated that stagnation in agriculture is the principal explanation for poor economic performance, while rising agricultural productivity has been noted to be vital in achieving inclusive growth. Oji-Okoro (2011) is of the opinion that agriculture has been an important sector in the Nigerian economy in the past decades, and is still a major sector despite the oil boom as it fosters inclusive growth by providing employment opportunities for the teeming population, eradicates poverty and inequality as well as contributes to the growth of the economy.

In view of the dwindling prices of oil and the increasing clamor for the country to reduce over-dependence on export of petroleum product for its foreign exchange earnings and to promote inclusive growth, it is therefore imperative for the significant growth potentials in agricultural products to be exploited. The potentials include generating growth in export earnings through increased cultivation of crops, generating increased income for labour and entrepreneurs who are engaged in small scale industries as well as large scale agro-based industries that make use of agricultural products as raw materials. In addition, the manufacture of food items like vegetable oil and fats, majority of which are currently imported can be obtained from industrial processing of agricultural commodities. Opportunities also exist to substitute traditional grains with cassava in agro-industry instead of wheat.

Howbeit, to take advantage of these growth potentials in the sector, it is pivotal that those constraints inhibiting the performance of the sector are first identified with a view to unlocking them and creating a conducive investment climate in the sector. The development challenges of Nigeria's agriculture are, therefore,

those of properly identifying and classifying the growth and development constraints of the sector, unlocking them and then evolving appropriate strategies for harnessing the untapped natural, human, and physical resources in the sector such that, in the final analysis, agriculture will become one of the most important growth points in the economy. It is against this backdrop that this paper is germane to investigate the relationship between agriculture and inclusive growth in Nigeria. Expectedly, the sequence of the paper is clear. Following the introduction, section two reviews related literature, section three presents the methodology; section four discusses the results while section five concludes the paper with policy remarks.

## 2. Review of Related Literature

Agriculture can be defined as the deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock for sustenance or economic gain (Rubenstein, 2003). It encompasses the art and science of growing plants and the raising of animals for the purpose of food production as well as satisfy other human needs. Agriculture can be broadly divided into plant or crop production and animal or livestock production categories. The ultimate purpose of all agricultural activities is to produce food, as well as other human needs such as clothing, medicines, tools, artistic display and dwelling, for economic gain or profit (Ben, 2014).

Akinboyo (2008) defined agriculture as the science of making use of the land to raise plants and animals. It involves the commercialization of nature's food webs and the rechanneling of energy for human planting and animal consumption. Prior to the utilization of oil reserves in the 1980s, the Nigerian economy was largely reliant on agriculture. The wide range of climate variations in Nigeria facilitates the production of variety of food and cash crops.

Ikala (2010) stated that agriculture is the vocation of majority of humans. The United Nations Organization (2008) postulated a broad depiction of the sector. Their finding divulges that over 50% of the world population is engaged in agriculture or dependent on it as a source of livelihood. Oji-Okoro (2011) noted that agriculture is the largest sector in the Nigerian economy due to its dominant share of the GDP, employment of more than 70% of the active labour force and the generation of about 88% of non-oil foreign exchange earnings. The share of agriculture in the country's GDP increased from an annual average of 38% during 1992-1996, to 40% during 1997-2001 in contrast to crude oil whose share of GDP declined from an annual average of 13% to 12% during the same period.

Growth in the Solow sense is an exogenous model of long-run economic growth set within the framework of neoclassical economics. Solow (1956) attempts to explain long-run economic growth by looking at capital accumulation, labour or population growth, and increase in productivity, commonly referred to as technological progress. This was subsequently modified by Mankiw, Romer and Weil (1992) and is termed the "Augmented Solow growth model". Solow (1956) postulated that economic growth results from the accumulation of physical capital and an expansion of the labor force in conjunction with an "exogenous" factor, technological progress that makes physical capital and labor more productive. He posited an aggregative general equilibrium model built around three equations: a constant-returns-to-scale production function with plane substitution and diminishing returns to capital and labour, an equation depicting capital accumulation on the assumption of a constant rate of savings (investment) as a fraction of output, and a labour-supply function in which labour (population) grows at an exogenously given rate (Solow, 1956).

In the case of the term "inclusive" in development literature, it can be traced down to the turn of the century when Kakwani and Pernia (2000) employed it to highlight the contents of pro-poor growth to the situation where the poor will actively participate and benefit from the growth process. Inclusive growth as an approach to economic development attracted much attention due to a rising concern that the benefits of economic growth have not been equitably shared. Growth is inclusive when it creates economic opportunities along with ensuring equal access to them. There is no universally accepted definition of inclusive growth as the term inclusive growth is often interchangeably used with a suite of other terms such as 'broad-based growth', 'shared growth', and 'pro-poor growth'. Inclusive growth basically means making sure everyone is included in growth, regardless of their economic class, gender, sex, disability and religion (Ianchovichina and Lundstrom, 2010). According to World Bank (2005), growth is said to be inclusive when it is sustainable in long run and broad-based across the sectors and inclusive of larger part of a country's labour force. Emphasis on inclusiveness - especially on equality of opportunity in terms of access to markets, resources and unbiased regulatory environment - is an essential ingredient of successful growth.

In line with the World Bank definition, Groepe (2012) referred to inclusive growth as long-term sustained economic growth that is broad-based across sectors and inclusive of a large part of a country's labour force, thereby reducing unemployment significantly. Policies that encourage inclusive growth tend to emphasize removing constraints to growth, creating opportunity and creating a level playing field for investment. According to OECD (2013), inclusive growth is defined as a process that leads to a less pronounced gap between the rich and the poor as a result of fair distribution of growth dividends. The outcome is usually demonstrated in terms of

improved living standards, such as good health, decent jobs and skills, clean environment, community support etc (OECD, 2013). Ianchochina and Lundstrom (2010) defined inclusive growth as that growth which can reduce poverty and allow people to contribute to economic growth and benefit from the growth process. They pointed out that rapid pace of growth is unquestionably necessary for substantial poverty reduction but for growth to be sustainable in the long run it should be broad based across the sectors and inclusive of a large part of a country's labour force.

Growth Report (2010) notes that inclusiveness is a concept that encompasses equity, equality of opportunity and protection in market and employment transitions. Growth is inclusive if it supports high levels of employment and rising wages (Khan, 2011). Swamy (2010) opines that if economic growth is not shared throughout society, then development has failed. Inclusive growth in the economy can only be achieved when all the weaker sectors of the society, including agriculture and small scale industries, are nurtured and brought on par with other sections of the society in terms of economic development. This necessitated the need for broad based inclusive growth. Inclusive growth is broad-based when the poor not only benefits from but also participate in the growth process. It does not only create new economic opportunities but also ensures equal access to them by all, particularly the poor.

From the empirical corridor, there is consistent evidence in the literature that agriculture-induced growth has the potential to deliver poverty reduction and inclusive growth. In their study of the impact of agricultural productivity growth on poverty reduction, Gallup (1998) revealed that a one percent growth in per capita agricultural GDP resulted in 1.61% poverty reduction. He asserted that similar improvements in manufacturing or services sectors contributed less impact on poverty reduction. Dev (1998) reported an increase of about 90% in farmers' income under a conducive agricultural setting in India. Using a cross-country data, Irz, Lin, Thirtle and Wiggins (2001) found that agriculture directly increased farmers' income in rural Ethiopia resulting in reduced poverty. A similar study by Bravo-Ortega and Lederman (2005) revealed that agricultural productivity per worker significantly impact on the average income of the poorest quintile compare with nonagricultural productivity as income increases. Cervantes-Godoy and Dewbre (2010) using a sample of 25 countries to assess impact of agricultural growth on poverty reduction found that agriculture is more effective in lifting the poorer groups out of poverty.

In Nigeria, Kolawole and Omobitan (2014) using error correction model found a negative relationship between poverty and agricultural output, suggesting that increasing food production could lead to a drop in poverty level. Oni (2014) on the other hand, found that agricultural output positively relate with poverty. Adama and Ohwofasa (2015) examine the determinants of agricultural export earnings in Nigeria for the period 1980-2011. Employing VAR model, the study found that agriculture export earning was positively and significantly responsive to changes world income, openness (lag 2) and exchange rate (lag 1). The study also found that agriculture export earning had significant and negative response to change in openness (lag 1), exchange rate (lag 2) and annual rainfall. In a similar study, Aiyedogbon et al, (2016) assess the determinants of agriculture export price in Nigeria and found among things that agricultural export prices had a positive and significant response to changes in world income (0.20%) and annual rainfall (1.01%) contrary to its 2.74% response to exchange rate, a development partly responsible for unstable farmers' income and increased unemployment in Nigeria. The study which employed autoregressive distributed lag (ARDL) model covered the period, 1980-2013.

In their study, Oboh and Adeleke (2016) found that agriculture has a significant contribution to economic growth. In terms of contribution to employment, the study found that agriculture led other sectors by 1.88% followed by services sector 1.18% and industry 0.33%. The study covered the period, 1981-2015. Ogodipe, Oduntan, Ogunniyi and Olagunju (2016) argue that about 75% of the poor population lives in rural areas in Africa who draw their livelihood from agriculture. Utilizing System-GMM technique for the period 1991-2015 on the effect of agricultural productivity on poverty reduction in Africa, the study found that agricultural value added per worker contributes significantly to reducing urban poverty in Africa. It also found that food production index and GDP per capita were more important factors in curbing urban and dollar poverty implying that non-farm poor tends to have a large food marginal propensity to consume (MPC). Further it found that the insignificance of GDP per capita in dwindling rural poverty reflects the reality that growth in other sector does not influence the livelihood of the rural poor farmers due to its subsistence nature. Likewise, domestic credit to private sectors and institutions were significant in reducing all categories of poverty with largest impact on rural poverty.

### 3. Model Specification

The study adopts a variant of Mankiw, Romer and Weil (1992) Augmented Solow growth model on Three Stage Least Square (2SLS). Accordingly, the model shows how the current level of the capital-labor ratio in agriculture and two parameters (the savings rate and the rate of population growth) determine the rate of growth of an economy. This means that equilibrium can only be attained in an economy where the level of investment, say the agricultural sector, is commensurate with the level of output. By extending the model to incorporate agriculture,

the model indicates that increase in agricultural output is pivotal for inclusive growth in Nigeria. The study utilizes a nine-variable model which covers inequality, poverty, and unemployment as the dependent variable to capture inclusive growth while agriculture output, agriculture value added, agriculture labour employed, government expenditure in agriculture, gross capital formation, and bank loan and advances to agriculture were the independent variables to capture the overall development of agriculture in Nigeria. The data employed in this study were culled from Central Bank of Nigeria (CBN), Nigeria Bureau of Statistics (NBS) as well as World Bank data base. The model is specified as follows.

$$INQ = f(AGO, AVA, AGL, GEA, GCF, BLA) \dots \dots \dots (1)$$

$$POV = f(AGO, AVA, AGL, GEA, GCF, BLA) \dots \dots \dots (2)$$

$$UNM = f(AGO, AVA, AGL, GEA, GCF, BLA) \dots \dots \dots (3)$$

Where:

INQ = Inequality; POV = Poverty; UNM = Unemployment; AGO = Agricultural output; AVA = Agric value added; AGL = Agricultural labour employed; GEA = Government expenditure in agriculture; GCF = Gross capital formation and BLA = Bank loan and advances to agriculture.

The model is implemented within the unit root and co-integration tests to overcome the problems of spurious regressions and to also provide information on long-run relationships among the variables. All tests were at 5% level of significance.

**Unit Root Test**

The Augmented Dickey Fuller test utilized to check the stochastic properties of the variables. The ADF test statistic is stated as follows:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \sum_{i=1}^m \delta_i \Delta Y_{t-1} + U_t \dots \dots \dots (.4)$$

Where  $\Delta Y_{t-1}$  equals  $Y_{t-1} - Y_{t-2}$ ,  $\Delta Y_{t-2}$  equals  $Y_{t-2} - Y_{t-3}$  and so on, and m is the maximum lag length on the dependent variable to ensure that  $U_t$  is the stationary random error. The null hypothesis of a unit root is rejected if the t-statistic associated with the estimated coefficient exceeds the critical values of the test.

**Co-integration Test**

In line with objective two, the purpose of this test is to establish if the variable has long run relationship. Johansen and Juselius (1990) test proposes the use of two likelihood ratio tests namely, the trace test and the maximum eigenvalues test. The trace statistic for the null hypothesis of co-integrating relations is computed as follows:

$$\Gamma trace(r) = -\tau \sum_{i=1}^m \log[1 - \lambda t] \dots \dots \dots (5a)$$

On the other hand, maximum eigenvalue static tests the null hypothesis of r co-integrating relation against r + 1 co-integrating relations and is computed as follows:

$$\Gamma \max(r, r + 1) = -\tau \log(1 - \lambda r + 1) \dots \dots \dots (5b)$$

**4. Presentation of Results**

This section presents the results of unit root, co-integration as well as the 3SLS. Also, implications of the findings were discussed.

**Table 4.1: ADF unit root test results**

Variables	level	1 <sup>st</sup> Diff	2 <sup>nd</sup> Diff	Order of Integration
INQ	-1.57	-5.46	-5.73	I(1)
POV	-1.27	-5.57	-6.15	I(1)
UNM	-1.70	-5.46	-6.97	I(1)
AGO	-3.78	-4.31	-10.3	I(0)
AVA	-2.78	-6.18	-3.67	I(1)
AGL	-2.44	-6.86	-6.64	I(1)
GEA	-1.01	-4.78	-5.31	I(1)
GCF	-2.20	-6.71	-10.90	I(1)
BLA	-2.00	-4.38	-5.27	I(1)
C.V. = 5%	<b>-3.76</b>	<b>-3.79</b>	<b>-3.83</b>	

Source: Author's computation with Eviews 7.0

Table 4.1 depicts Augmented Dickey- Fuller (ADF) test for stationarity where only AGO was stationary at level while other variables were non stationary. However, stationarity was achieved at first differencing. In what

follows we proceed to test for co-integration in order to ascertain the long-run relationship between the variables.

**Table 4.2: Result of co-integration test**

Null Hypothesis	Alternative Hypothesis	Statistical Value	5% C.V	1% C.V	Eigen value
Trace Statistics					
$r = 0$	$r \geq 0$	341.2	58.4	197.4	0.92
$r \geq 1$	$r \geq 1$	240.6	52.3	159.5	0.75
$r \geq 2$	$r \geq 2$	166.2	46.2	125.0	0.53
Max-Eigen Statistics					
$r = 0$	$r = 0$	101.1	27.1	32.2	0.92
$r \leq 1$	$r = 1$	74.5	21.0	25.5	0.75
$r \leq 2$	$r = 2$	48.4	14.1	18.6	0.53

Source: Extracted from Eview 7.0

Table 4.2 shows that both the trace and the max-eigen statistics have at least a co-integrating equation which means long run relationship exist between agricultural output and inclusive growth.

Table 4.3 is the result 3SLS which shows that the coefficient of agricultural output and agricultural labour employed have a positive impact on inclusive growth (proxied by inequality, poverty, and unemployment). This implies that given a positive increase of the variables concern, the resultant effect will be an increase in growth inclusiveness. This may be attributed to the large mass of labour that exists in the sector, given that over 70% of rural labour force depends on agriculture.

**Table 4.3: Impact of Agriculture on Inclusive growth in Nigeria**

Dependent Variables: INQ, POV, and UNM

Method: 3SLS

Variable	INQ	POV	UNM
	Coefficient	Standard error	t-value
AGO	0.052	0.024	2.209
AVA	-0.035	0.092	-0.382
AGL	0.369	0.466	0.792
GEA	-0.005	0.007	-0.622
GCF	-0.036	0.043	-0.851
BLA	-0.004	0.034	-0.124
R-squared	-1.614	-0.766	0.533
Adj. R-squared	-2.195	-1.158	0.429

Source: Author's computation using E-views 7.0

Furthermore, only agricultural output had significant effect on inclusive growth as unit increase in agricultural output led to 0.05% increase in inclusive growth. In other words, an increase in the output of agriculture productivity will bring about a decrease in the level of inequality, poverty and unemployment. On the contrary, other variables had negative coefficients and statistically insignificant. However, in consideration of all the variables in the model, agriculture does not have a significant effect on inclusive growth as the t-value of the other variables is insignificant.

The coefficient of determination R-square validates the insignificant effect of agriculture on inclusive growth as it reveals a fairly systematic variation on inclusive growth as explained by all the independent variables. This implies that while agriculture alone may be seen to have been significant, but when considered alongside other variables it contributed minimally to inclusive growth (i.e insignificant effect on inclusive growth) over the period of the study. However, it is a viable strategy to achieve inclusive growth in Nigeria given the positive sign of the coefficient of agricultural output.

## 5. Conclusion and Recommendation

The results have shown the influence of agriculture on inclusive growth in Nigeria. The result does not contradict (Ugwu and Kanu, 2012) who pointed out that agriculture contributes minimally during the period of study in terms of output, market, foreign exchange and capital formation or transfer as a result of policy instability, poor coordination of policies, poor implementation and mismanagement of policy instruments and lack of transparency. It further depicts that practical approach has not been given to the various policies, programmes and political promises of various leaders. The result shows that, there is an insignificant relationship between the exogenous and endogenous variables. Thus it is recommended that government should improve and encourage agricultural output and improve its expenditure in the agricultural sector in order to achieve inclusive growth in Nigeria.

In view of the concentration of the poor and vulnerable populations in the sector, the positive relationship agricultural output has with inclusive growth, as well as the growth potentials that exist in the sector; this study

concludes that inclusive growth cannot be realized in Nigeria without a rethink on approaches to develop the agricultural sector.

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