AGRICULTURAL PRODUCTIVITY AND POVERTY ALLEVIATION: AN ECONOMETRIC ANALYSIS.

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Abstract

Eradication of poverty and hunger are prominent objectives of the MDGs which entails narrowing of inequality gap, access to food by the undernourished and acceleration of economic growth. The key role of agriculture in achieving the MDGs is unarguably very significant as many a scholar attested that agriculture provides food for the populace; generates employment and is a prerequisite stimulant for inter-sectoral linkages. This study is a bold move to assess the feasibility of agriculture in alleviating poverty using data from Nigeria and adopted an econometric method to test our guiding hypotheses. The findings suggested that growth in agricultural output has strong and significant influence in alleviating poverty (reducing the level of poverty). Therefore there is need to ensure a rapid increase in the output of agriculture like fishery, livestock, crops, forestry, staple, etc. through genuine investment in infrastructure, education, health and R&D to ensure sustainable economic growth and development

Keywords: Poverty, Poverty Alleviation, Agricultural Output, The Poor, Capital, Credit, Modeling, Econometric.

1.1 Introduction

Achieving the Millennium Development Goals (MDGs) of halving the proportion of people living in absolute poverty by 2015 will depend largely on increasing agricultural productivity, which remains perhaps the single most important determinant of economic growth and poverty reduction. This fact is not lost on developing countries or their developmental partners, who are seeking ways to stimulate agricultural development. But serious doubts are emerging as to whether agricultural productivity can be increased where it is needed most, and

what part, if any, small-scale farming will play in the future. Underlying such doubts is a concern that the context in which small-scale agriculture could achieve productivity gains today is very different to that which prevailed in Nigeria during the past regimes. Inherent differences in production capabilities and quite fundamental changes in the international agricultural context are combining to create a set of circumstances that are probably far less conducive to achieving the type of productivity transformation witnessed in Nigeria.

Poverty level can be said to have fallen rapidly over the past 40 years, though at different rates, around the world. Some countries in Asia (particularly China, India and the Asian Tigers) have achieved the most rapid poverty reduction. In contrast, little success has been achieved in sub-Saharan Africa, especially Nigeria, where a number of people live on less than a dollar per day (World Bank, 2004). Rates of poverty reduction have historically been very closely related to agricultural performance – particularly to the rate of growth of agricultural productivity. In simple terms, this indicates that as a country increases her agricultural productivity, the greater her chance of achieving significant reductions in poverty. Despite decades of investment in new agricultural technology and rural development, hunger and poverty continue to plague large areas of the developing countries. The problem is particularly acute where people depend on nature-fed agriculture where the impact of new technologies have been less apparent and agricultural productivities have generally stagnated and even fallen in some areas.

Over the years, there has been a rising increase in the cost of food items. Farmers claim that the low level of farm produce is largely due to lack of investible fund. On the other hand, financial institutions precisely, the development banks, who are inclined with the problem of farmers are not giving enough credit to justify their claims on agricultural financing, hence, the low productivity in the sector. The extent to which the development banks have performed their duties of financing agricultural activities in Nigeria is incredibly vague. Consequently, the actual involvement in funding agriculture calls for an appraisal. In addition, majority of the rural dwellers have no basic amenities such as good roads, water supply, electricity, health-centers etc and generally lack access to productive input and output markets.

The World Bank report (2004) asserts that growth in the agricultural sector may benefit the poor extensively and may thus be associated with declining inequality. It thus recommends removing the remaining biases against agriculture. The *UN World Economic and Social Survey 2000* (UN, 2000) makes agricultural growth a central issue for escaping the poverty trap. It states that agricultural growth can contribute strongly to poverty reduction, mainly because of its

demand linkages, and because agricultural and related activities tend to be more labour intensive and less import intensive than manufacturing activities. In this effect, development experts need greater understanding of the links between agricultural productivity and poverty. They also need to assess just how far they have changed and the extent to which small-scale agriculture can remain a ladder out of poverty for millions of the poor. These important needs form the basis of this research work, which traces the impact of agricultural growth on poverty reduction in Nigeria.

2.1 Theoretical Review

Poverty is not easily defined due to the varying degrees of the ugly phenomenon. However, many literatures see poverty as a situation of absence of basic needs. Poverty is lack of means to satisfy one's basic needs (Encyclopedia Britannica, 1981: 165). It is the insufficiency of means relative to human needs; it is a chronic inadequacy of resources of all types to satisfy such basic needs of man as nutrition, rest, warmth and bodily care (Americana Encyclopedia, 1985: 495). According Seligman and Johnson (1933:47), poverty expresses a negative term denoting absence or lack of material wealth. However, it is seldom absolute and the term is usually employed to describe the much more frequent situation of insufficiency either in the possession of wealth or in the flow of income.

Furthermore, Aboyade (1987: 9), in his analysis viewed poverty from two perspectives namely: Absolute and Relative Poverty. According to him, absolute poverty suggests a state of insufficiency or lack of necessities and facilities. Its indicators are apparent and handy. They include lack of food, medical care, education, shelter, transport facilities and the likes, while relative poverty borders on a situation when people's level of income is adequate for survival but fall behind the community average, they cannot have what the larger community regard as the minimum necessary for decency, and they cannot wholly escape. Therefore the judgment of the larger community is that they are indigents. This connects to what McNamara (1998: 120) depicts as a condition of life so degrading as to insult human dignity.

2.2 Poverty and Agriculture

According to National Bureau of Statistics (2006), poverty in Nigeria is a rural phenomenon where agricultural activities are most predominant. More than four-fifths (86.5 per cent) of the households participated in agriculture in the rural areas compared with only 14.0 per cent in the urban areas. The poor participated more in agriculture than non-agriculture. Twenty-five per cent of the core poor households were in agriculture, while 20.0 per cent were in non-

agricultural activities. A similar pattern was revealed among the moderately poor households. More than four-fifth (81.0 per cent) of the livestock were owned by rural households, while 91.1 per cent of the ownership was the male-headed households. This is an indication of *feminization* of poverty, and a review that agricultural sector is a major sector of the economic that will help in fighting poverty in Nigeria.

The 1996 UNDP *Human Development Report* showed clearly that economic growth, as measured by growth in per capita GDP, is associated with better human development. The relationship is quite strong: countries that achieved higher per capita GDP growth rates over the period from 1960 to 1992 also generally achieved higher values of the Human Development Index (HDI), restricted to those components that do not rise automatically with income. The answer lies in the fact that economic growth, reduction in poverty and inequality reduction are all outcomes of the same deeper processes (Srinivasan, 2000). If these are such as to increase the returns to the assets possessed by the poor then economic growth and poverty reduction will be seen to go together. On the other hand if the process favours assets possessed by the wealthy then they will not. Hence the sectoral composition of growth is important; it matters greatly for poverty and hunger alleviation, in which sector overall economic growth originates. Timmer (1997) found that in countries with highly skewed income distribution, growth reaches the poor with difficulty, whether it originates from increases in agricultural or nonagricultural productivity. According to some estimates, high-inequality countries would need twice as much growth as low-inequality countries to achieve the same reduction in poverty levels (Hammer, Healey and Naschold, 2000).

The combined effect of these patterns of rural spending can be large. Using household consumption data from 1980s surveys in Burkina Faso, Nigeria, Senegal and Zambia (with additional data from Zimbabwe), Delgado, Hopkins and Kelly (1998) showed that the share of additional income spent on non-tradable ranges from 32 percent in Senegal to 67 percent in Burkina Faso and Zambia. This spending had multiplier effects that were also calculated. The combined impact on household incomes turns out to be surprisingly large. For example, in Burkina Faso, a US$1 increase in income from farm tradable led to an increase of US$1.88 in income from non-tradable, while in Zambia a US$1 increase led to an increase of US$1.57 in income from non-tradable. All this measures were seen when some scholars profound what agriculture mean to them.

A cursory look at the economy reveals that beyond the supply of food and fiber, agriculture has provided important market-mediated linkages by providing labour for an urbanized industrial workforce, enlarging markets for industrial output and providing export earnings to pay for imported capital goods. There is also a lot of evidence to buttress fact that apart from being a major contributor to the GDP in the sixties the sector has facilitated the growth of the Nigerian economy by enhancing poverty alleviation, employment and income generation, as well as a reduction in rural-urban migration.

Factors Militating Against Agricultural Output in LDCs

There are many challenges militating against growth in agricultural sector especially in the less developed economies. According to Uguru (1981:20), the factors ascribed to the problems of agriculture in a growing economy are:

Local customs- For a change in the present system, it is important to know that the traditions of the local people, if they will have strong views and attitudes on land ownership, system of cropping and rearing of livestock.

Communication, transport and marketing- most of the existing lands suitable for agricultural activities are located in the rural areas. Such areas lack access roads that necessitate transportation of the produce. Therefore farmers depend only on the local markets which mean that whatever products they were unable to sell at the local market or export through local middlemen are usually left to waste due to lack of storage facilities, incentive to boost production; and poor prices for their goods and services.

Education: the level of education among most farmers is low, there is great need of knowledge for the farmers in the rural areas to know the periods they will farm and the right species of crops and breed of animal to rear to make higher yield. Therefore, agricultural extension workers should help the people to understand the best way to raise crops and animal productivities.

Health and medical services: people are weak due to lack of efficient medical services, diseases like malaria, typhoid fever, etc., these weakens people thus affecting their agricultural productivities. Malnutrition also contributes to low output.

Capital/Credit: the production of food for an ever increasing population means that uncultivated land must be improved and increase in production involves the use of improved varieties of

plants and animals, fertilizers, pesticides and farm mechanization. For a farmer to embark on large scale agricultural project he needs adequate finance and credit facilities, which may be available for large scale commercial and estate farming.

Risks: due to the risk involved in agriculture, the commercial banks find it difficult to engage in the provision of agricultural credits. Example, unfavorable climate or soil condition, inadequate technological experience, lack of improved varieties, insects and disease may ruin the farmers' enterprises which may limit the farmers' abilities to meet debt obligations.

Jaja (1995) in his contribution to the problems of agriculture attribute low use of technology as the cause of low output and farm income which culminate in poor savings and investment. There is also the problem of crop failure which is as a result of weather, lack of storage facility and modern method of preserving the surplus farm produce during harvesting period. Many beneficiaries of agricultural loan have the impression that money lent to them constitutes part of their own share of the national cake, therefore there is no need for repayment.

2.3 Empirical Literature

Some of the empirical work reviewed claimed that the relative contribution of agricultural sector to poverty reduction is proven to be depending on its direct and indirect growth effects as well as its participation effect. The direct growth effect of agriculture on poverty reduction is likely to be smaller than that of non-agriculture (though not because of inherently inferior productivity growth), the indirect growth effect of agriculture (through its linkages with non-agriculture) appears substantial and at least as large as the reverse feedback effect. The poor participate much more in growth in the agricultural sector, especially in low-income countries, resulting in much larger poverty reduction impact. Together, these findings support the overall premise that enhancing agricultural productivity is the critical entry-point in designing effective poverty reduction strategies, including in Sub-Saharan Africa. Yet, to maximize the poverty reducing effects, the right agricultural technology and investments must be pursued, underscoring the need for much more country specific analysis of the structure and institutional organization of the rural economy in designing poverty reduction strategies.

Many studies have also shown the strength of the growth linkages or multipliers between agriculture and the wider economy. Estimates show that on average in Asia, every $1 of additional farm income created a further $0.80 in non-farm income (Bell et al 1982; Hazell and Ramaswamy, 1991). Estimates from Africa show that every additional $1 of farm income leads to a further income of between $0.96 in Niger and $1.88 in Burkina Faso elsewhere in the

economy (Delgado et al, 1998). Models of the Kenyan economy show these multipliers from agricultural growth are three times as large as those for non-agricultural growth (Block and Timmer, 1994). In Zambia, estimates suggest that every $1 of additional farm income creates a further $1.50 of income outside agriculture (Hazell and Hojjati, 1995). Datt and Ravallion (1998) showed that good econometric evidence of a positive relationship between agricultural growth and poverty alleviation is available from India, which has had a long period of sustained agricultural growth starting from the early 1970s. They relate differences in poverty reduction to differences in agricultural growth rates for different Indian states. Evidence consistently shows that agricultural growth is highly effective in reducing poverty. Gallup et al (1997) reported that every 1% increase in per capita agricultural output led to a 1.61% increase in the incomes of the poorest 20% of the population. Thirtle et al (2001) concluded from a major cross-country analysis that, on average, every 1% increase in agricultural yields reduced the number of people living on less than US$1 a day by 0.83%. Sarris and Alexander (2001) reviewed the issues concerning the role of agriculture in promoting overall growth and poverty reduction. They found that the basic ingredients for faster agricultural growth are known, such as agricultural research and development, extension, rural infrastructure, education, etc.

Okpara (2004) conducted a study to evaluate the role of agriculture in poverty alleviation among farming households in Izzi Local Government Area of Ebonyi State, Nigeria where he revealed that farming in the study area did not positively influence the standard of living of the rural households. He added that the majority of the farming households were poor with large family size having high dependency ratio. Part of the problems he identified to affect farmers are the land tenure system, poor transportation and communication network, lack of improved storage facilities, post harvest pest and diseases, and high cost of processing facilities.

Hussain and Hanjra (2004) on Irrigation and poverty alleviation have the key questions addressed herein as: (1) what is the role of irrigation development and management in poverty alleviation? (2) What are the linkages and pathways through which irrigation contributes to poverty alleviation? (3) What is the magnitude of anti-poverty impacts of irrigation? And (4) what are key determinants of anti-poverty impacts of irrigation? At the end of their work, they found that there are strong linkages between irrigation and poverty. These linkages are both direct and indirect. Direct linkages operate via localized and household-level effects, and indirect linkages operate via aggregate or sub-national and national level impacts. Irrigation benefits the poor though higher production, higher yield, lower risk of crop failure, and higher and year-round farm. Irrigation enables smallholders to adopt more diversified cropping patterns, and to

switch from low-value subsistence production to high-value market-oriented production. And also increases production which makes food available and affordable.

Fan (2005), studied on the role of agriculture in poverty reduction an evidence from Asia, where he discovered that the effects of agriculture on rural in poverty reduction are larger than those of urban/overall growth. Considering the higher proportion of poor in rural areas, number of poor reduced from agricultural growth is potentially large. He asserted that the role of agriculture is dynamic and it changes over time. Rapid growth in agriculture is a precondition for the country to take off. He added that even if the country has entered to a more advanced stage, agriculture is still important in poverty reduction. Luc Christiaensen, Lionel Demery and Jesper Kuhl (2006) in *World Bank Policy Research Working Paper No. 4013*, proved that the relative contribution of agricultural sector to poverty reduction is shown to depend on its direct and indirect growth effects as well as its participation effect. They carried out an assessment on how these effects compare between agriculture and non-agriculture by reviewing the literature and by analyzing cross-country national accounts and poverty data from household surveys. Special attention was given to Sub-Saharan Africa. While the direct growth effect of agriculture on poverty reduction is likely to be smaller than that of non-agriculture (though not because of inherently inferior productivity growth), the indirect growth effect of agriculture (through its linkages with non-agriculture) appears substantial and at least as large as the reverse feedback effect. The poor participate much more in growth in the agricultural sector, especially in low-income countries, resulting in much larger poverty reduction impact. Together, these findings support the overall premise that enhancing agricultural productivity is the critical entry-point in designing effective poverty reduction strategies, including in Sub-Saharan Africa. Yet, to maximize the poverty reducing effects, the right agricultural technology and investments must be pursued, underscoring the need for much more country specific analysis of the structure and institutional organization of the rural economy in designing poverty reduction strategies.

3.1 Model Specification

Economic theories have attempted defining the relationship between the index of agricultural productivity and poverty alleviation as a means of promoting economic growth. However, to link agricultural productivity to poverty alleviation has posed a serious research questions, (how to capture this link). This has driven many researchers to ask, ‘how does agricultural productivity influence poverty alleviation’?

The answer to this question lies in the fact that economic growth, reduction in poverty and inequality reduction are all outcomes of the same deeper processes (Srinivasan, 2000). Srinivasan (2000) further added that if these are such as to increase the returns to the assets possessed by the poor then economic growth and poverty reduction will be seen to go together. On the other hand if the process favors the assets possessed by the wealthy then they will not. Hence the sectoral composition of growth is important; it matters greatly for poverty and hunger alleviation, in which sector overall economic growth originates. On this ground, economic growth here will be use as a proxy for poverty reduction.

However, the growth in the productivity of most agricultural components will be linked to economic growth measured to see the significant impact within the period under investigation. The prominent among them are grouped as: crops, staples, livestock, fishery, forestry and other crops. On this ground, the first model is specified as: gross domestic product as a proxy for poverty alleviation is a function of crops production, staples production, livestock, fishery forestry and others, while the second model is specified as contribution of agricultural product to gross domestic product as a function of the contributions of oil exploration, consumer price index, agricultural budget allocations, agricultural credit guarantee scheme fund as a proxy for poor credit scheme, and a dummy variable for poor farm practice.
Functionally, these models can be specified as:

GDP = f(CRP, STPL, LSK, FSH, FRTY) …… (1)

RAGDP = f(OEX, CPI, BAA, ACF) ……(2)

We therefore transform the equations into linear functions as:

$GDP = \beta_0 + \beta_1 CRP + \beta_2 STPL + \beta_3 LSK + \beta_4 FSH + \beta_5 FRTY + U_t$…… (3)

$RAGDP = \alpha_0 + \alpha_1 OEX + \alpha_2 CPI + \alpha_3 BAA + \alpha_4 ACF + \varepsilon_t$…… (4)

Where:

GDP = Gross Domestic Product

CRP = Index of Crops production

STPL = Index of Staples production

LSK = Index of Livestock production

FSH = Index of Fishery production

FRTY = Index of Forestry

RAGDP = Ratio of Agricultural Contribution to GDP

OEX = Index of Oil Exploration in the country

CPI = Consumer Price Index

BAA = Budget Allocation to Agriculture

ACF = Agricultural Credit Guarantee Scheme Fund

β_0 & α_0 are the intercepts,

The rest of the βs and αs are the parameters in the two models.

U_t & ε_t are the stochastic error terms

We transform (3) and (4) as log linear models thus:

$$\text{Log(GDP)} = \beta_0 + \beta_1\text{Log(CRP)} + \beta_2\,\text{Log(STPL)} + \beta_3\,\text{Log(LSK)} + \beta_4\,\text{Log(FSH)} + \beta_5\,\text{Log(FRTY)} + U_t \quad (5)$$

$$\text{Log(RAGDP)} = \alpha_0 + \alpha_1\text{Log(OEX)} + \alpha_2\text{Log(CPI)} + \alpha_3\,\text{Log(BAA)} + \alpha_4\,\text{Log(ACF)} + \varepsilon_t \quad (6)$$

However, PC-GIVE statistical package will be used for this analysis.

3.2 Data Source

The data for this study are time series data from 1975 to 2011, from the Central Bank of Nigeria Statistical bulletin.

4.1 Result Presentation

Table 4.1: Unit Root Statistics

Variable	ADF	5%	1%	Lag	Order of stationarity
DDLGDP	-6.7887**	-1.957	-2.67	0	2
DLCPI	-7.5609**	-1.956	-2.665	0	1
DLSTPL	-4.1440**	-1.956	-2.665	0	1
DLLSK	-4.0157**	-1.956	-2.665	0	1
DLFSR	-6.1999**	-1.956	-2.665	0	1
DLFTR	-3.6235**	-1.956	-2.665		1
DDLRAGDP	-5.6993**	-1.957	-2.67		2
DLCRP	-4.5983**	-1.956	-2.665		1
DLBAA	-6.0900**	-1.956	-2.665		1
DDLACF	-5.9541**	-1.957	-2.67		2

* ADF stationary at 5% critical value ** ADF stationary at 5% and 1% critical values.
Source: Computed by the authors

4.2 Co-integration Analysis

The unit root results conducted above have significant implications for the co integration analysis. The residual co-integration approach, which requires the variables to be integrated of order one, can be implemented. Therefore, in the event that GDP has an identical order of integration with any of the explanatory variables, we suspect co-integration. We thus run a linear combination of these variables in their level form without the intercept and then test their

residual for unit roots. If the residual is integrated, co-integration is established and the model estimated using the ECM given by:

Table 4.2 Co-Integration Result

	t-ADF	5% critical value	1% critical value
Residual	-1.6952	-1.955	-2.66
Residual	-1.6332	-1.955	-2.66
Residual	-1.1086	-1.955	-2.66

Source: Computed by the authors

From the table above we observed that the values of t-ADF is lesser than the two critical values (5% and 1%), and this therefore, show no presence of co integration, because the residual obtain from the linear combination of the variable in question was not stationary while the series that generates the residual were stationary.

The implication of the above result is that we can conduct estimate of original model without fear of co-integration.

Table 4.3: Modelling Log of GDP by OLS

Variable	**Coefficient**	**Std. Error**	**t-value**	**t-prob**	**PartR^2**
Constant	-22.438	5.1194	-4.383	0.0002	0.4661
LCRP	1.1370	1.8763	0.606	0.5508	0.0164
LSTPL	-0.48001	1.6400	-0.293	0.7725	0.0039
LLSK	1.8001	0.66211	2.719	0.0125	0.2515
LFSR	0.76258	0.23078	3.304	0.0032	0.3317
LFTR	4.4435	1.7222	2.580	0.0171	0.2323

Source: Computed by the authors

R^2 = 0.976535; F(5,22) = 183.11 [0.0000]; σ = 0.360288; DW = 0.739.

Table 4.4: Modelling Log of RAGDP by OLS

Variable	Coefficient	Std. Error	t-value	t-prob	PartR^2
Constant	7.0964	1.0287	6.898	0.0000	0.6647
LCPI	0.12773	0.095921	1.332	0.1955	0.0688
LBAA	0.75478	0.063968	11.799	0.0000	0.8530
LACF	0.023130	0.14433	0.160	0.8740	0.0011

Source: Computed by the authors

R^2 = 0.937476; F(3,24) = 119.95 [0.0000]; σ = 0.56691;

4.3 Interpretation of Regression Result

In this section, our analysis is centered on three criteria mentioned in chapter three; namely Economic, Statistical and Econometric criteria.

Before we interpret the three criteria mentioned above, we first of all interpret the coefficient of each of the parameters. The first coefficient is that of constant effect which is -22.438, showing that there are some other factors outside the model that contributes about 22 percent in the changes to GDP. In other words, 1% increase in constant term will bring 22% decrease to GDP, all things being equal. The coefficient of crops here is 1.1370, showing that any unit change in crops production will on average, cause the GDP to change at 1.14 percent. However, the coefficients of staple, livestock, fishery and forestry has the values of -0.48001, 1.8001, 0.76258, and 4.4435 respectively, showing that every unit change in staple, livestock, fishery and forestry will on average cause the Gross Domestic Product to change at 0.48, -1.8, 76 and -4 percent respectively.

The table below summarized the result.

Table 4.5: Summary of Result

Variable	t-value	Critical value	t-prob	remark
Constant	-4.383	1.697	0.0002	Significant
LCRP	0.606	1.697	0.5508	Not Significant
LSTPL	-0.293	1.697	0.7725	Not Significant
LLSK	2.719	1.697	0.0125	Significant
LFSR	3.304	1.697	0.0032	Significant
LFTR	2.580	1.697	0.0171	Significant

Source: Computed by the authors

The F – Test

The tabulated $F_{0.05}$ is 2.66. Since our calculated F^* (183.11) exceeds our tabulated $F_{0.05}$ (2.66). That is, 183.11 > 2.66, we reject the null hypothesis and conclude that the model has a good fit.

4.4 Econometric Criteria (Second Order Test)

These tests are based on econometric theory and are aimed at finding out whether the econometric assumptions are satisfied.

Jacque-Bera Residual Normality Test

From the result obtained from Jarque-Bera (JB) Test of Normality, JB = 1.6919; and from chi-square table χ^2_{tab} = 5.99147. Therefore, since χ^2_{cal} = 1.6919 < $\chi^{2(0.05)}_{tab}$ = 5.99147 at 5% level of significance, and for this reason, we accept H_0 and conclude that the error terms followed a normal distribution.

Test for Auto-Correlation

Since our D-W statistics from the above table is 1.739, we conclude that there is no positive autocorrelation.

Test for Heteroskedasticity

Since our estimated χ^2 = 12.109 > $\chi^2_{0.05}$ = 3.64, we reject H_0 of heteroskedasticity and conclude that the residuals are homoskedasticity.

Test for Multicollinearity

This test is carried out using partial coefficient of determination (Partial R^2). When the partial R^2 is > R^2; that is, coefficient of determination, we say that there is presence of multicollinearity, otherwise there is no presence of multicollinearity.

Table 4.6: Multicollinearity Test

Variable	R^2	PartR^2	Remark
Constant	0.976535	0.4661	No perfect multicollinearity
LCRP	0.976535	0.0164	No perfect multicollinearity
LSTPL	0.976535	0.0039	No perfect multicollinearity
LLSK	0.976535	0.2515	No perfect multicollinearity
LFSR	0.976535	0.3317	No perfect multicollinearity
LFTR	0.976535	0.2323	No perfect multicollinearity

Source: Computed by the authors

From the table above, the partialR^2 is < R^2; that is the coefficient of determination. Thus, we conclude that there is no presence of multicollinearity as has been remarked in the table above.

Test for Adequacy of the Model

This test was conducted to test whether the model was well specified. In this test, the RESET TEST was adopted. The test follows t–distribution at a level of significance of 0.05. Since F^* = 4.2191 is < F – tab = 4.32, we accept the null hypothesis and conclude that the model used is well specified.

4.5 Evaluation of the hypothesis

Going strictly by the results presented above, one can find that all the variables conform to the "a priori" expectations, and all the components of agricultural productivity included in the model proved statistically significant except crops and staple. The second model showing the contribution of agricultural funding to the ratio of agriculture to GDP showed a significant variation. It shows that 94% variation in approximation exist in the ratio of agriculture to GDP as caused by the variations in agricultural credit, budget to agriculture and the general price level in the Nigerian economy. Furthermore, the t–test shows that the regression is significant and the adjusted R^2 showed a good fit. The result is also shown to be robust to possible sources of specification test, with heteroskedasticity test showing that the error term has equal variance. From the observation above, we noted that all of the variables helped in explaining the impact of agriculture to poverty reduction in Nigeria.

Nevertheless, going strictly to the claims of (Srinivasan, 2000), that economic growth, reduction in poverty and inequality reduction are all outcomes of the same deeper processes. He added that if these are such as to increase the returns to the assets possessed by the poor then economic growth and poverty reduction will be seen to go together. On the other hand if the process favors the assets possessed by the wealthy then they will not. Hence the sectoral composition of growth is important; it matters greatly for poverty and hunger alleviation, in which sector overall economic growth originates.

5.1 Conclusions

From the findings of the work, agricultural growth provides opportunities for the poor to increase their incomes. Whether the poor can seize these opportunities depends on their education and health, on their access to credit and savings services, and on whether they are excluded by social custom or government fiat from income-earning activities (such as women shut out from credit markets). Measures to increase the capital available to the poor (human, financial, physical, natural and social) are therefore likely to pay big dividends in terms of their ability to lift themselves out of poverty.

To conclude, the key point is that growth in agricultural incomes, by creating demand for the output of the non-tradable sector, makes it possible for that sector to grow. Since the capital and skill requirements of the sector are well suited to the capabilities of the poor, its rapid growth can help eliminate poverty. Thus agricultural growth ultimately reduces poverty and does so with a lag. But this benign process cannot work if there are marked initial inequalities in the agricultural sector since these act to prevent agricultural incomes from being spent locally and therefore do not create the multipliers needed.

5.2 Policy Implications and Recommendations

This analysis of the impacts of agricultural growth on poverty reduction has highlighted many uncertainties about what will happen to the developmental plan and the opportunities that this may offer for poverty reduction in Nigeria. Sequel to the findings and careful investigation of the contribution of agricultural activities toward poverty alleviation, it is therefore pertinent to make the following policy implications to the government and all the agencies in charge of poverty reduction in Nigeria, that;

- Urgent attention should be given towards addressing critical constraints/challenges to current agricultural production and agricultural growth.

- Particular attention will need to be given to improving the productivity of staple food crops that are not internationally traded, but consumed by the poor and traded locally. As research into these crops attracts little private sector attention, there will be a need for public funding with international assistance. In addition, research must take greater account of differing natural resource environments, in particular water management and soil degradation, and become more focused and more region specific. In

the future, labour intensive approaches may not be the most suitable as HIV/AIDS reduces labour availability in some African countries in particular.

- As far as agriculture is concerned, efforts should be focused on encouraging commercial production of non-staple cash crops, particularly those that result in robust links to the non-farm sector, as this will be the major provider of employment for the rural poor. Influencing international policy processes will be important, but primarily to ensure access to developed country markets for more processed and high quality products from developing countries.

- The rural poor will be best assisted by improving their access to health and education services to improve their human capital and through measures that increase their mobility so that they can move to take up opportunities in growth areas as they occur.

- On plantations and in processing mills identify additional non-seasonal sources of work to avoid highly seasonal employment in agriculture.
- Improve storage infrastructure to lengthen the processing season.

- Invest in feedstocks that reflect existing domestic production patterns and thereby reduce costs.

- Decentralise processing capabilities to have the greatest impact on rural employment, incomes and economic diversification.

- Centralise processing capabilities to achieve cost-effectiveness through economies of scale.

- Set quotas for feedstock procurement to ensure small producers have access to supply chains.
- Provide support for small farmers to increase productivity to cope with downward pressure and producer prices – for example through improved varieties.

- Ensure enforcement of regulations, standards and appropriate technologies to improve the contribution of agricultural production to climate change mitigation.

However, the need for clarification of the roles of the three tiers of government in agricultural services delivery can not be overemphasized. With its federal system of government, Nigeria faces the same challenge faced by other developing countries with decentralized and federal systems: defining the roles and responsibilities of each tier of government with respect to public services and public investments. Government must clarify the roles and responsibilities of each tier of government. This is important to reduce overlaps and gaps in agricultural interventions and improve efficiency and effectiveness of public investments and service delivery in the sector.

In agriculture, as in other sectors, the distribution of responsibilities to the federal, state, and local governments should take into account the following factors: (i) Subsidiarity: Responsibilities should be assigned to the lowest level of government that can effectively carry out the function. (ii) Externalities: Assignment of responsibility should be at a jurisdictional level at which most of the impact of intervention is subsumed. (iii) Economies of scale: When possible, the provision of a service should be undertaken by a higher tier of government where it is potentially more efficient to do so. (iv) Expertise and capacity: Differing levels of technical expertise and capacity should be taken into account in the distribution of responsibilities.

Two more critical issues to consider in designing a decentralization strategy concern (i) state and local level access to and control over resources in accordance with expenditure assignments, and (ii) state and local government accountability. If sub-national governments do not have discretionary power over their budgets, key benefits of decentralization—e.g. the ability of these governments to tap into local knowledge—may be undermined. And when local leaders are held accountable for their performance, decentralized management can ensure better quality service provision.

Finally, Nigeria faces a challenge more important than the depth of administrative decentralization. The legacy of endemic systemic corruption in administration at all three tiers of government is needed to be tackled, but corruption continues to undermine the efficiency and effectiveness of service delivery in agriculture, along with that of other sectors.

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