

## Impact of Agricultural Output on Standard of Living in Nigeria (1970-2016)

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### Abstract

*This study investigated the impact of agricultural output on standard of living in Nigeria via crops, livestock, forestry and fishery. Agricultural output is expected to be the bane of improved welfare of Nigerians as a result of many resources allocated to the sector through government policies. But despite government efforts in the sector, it is still characterized with low yields and limited areas under cultivation. In view of this, secondary data were obtained from CBN statistical bulletin from 1970-2016 and analyzed using cointegration and error correction model (ECM). It was found that standard of living is elastic with respect to crops, forestry, fishery and livestock output in the short and long run estimates. It suggests that standard of living's response to agricultural output in the short run is higher than the long run. Furthermore, standard of living adjusts towards its long run level with about 26% of the adjustment occurring in the first year. The study recommended, among other things, that more resources be allocated to agricultural sector, expansion be made in agricultural cultivation and training be conducted for farmers so that the impact of the sector can be felt on the living standard in Nigeria.*

**Key words:** Nigeria; Agricultural output; Standard of living and Error correction model.

**JEL Classification:** I31, O13, P32

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### 1. Introduction

The agricultural sector is a section of an economy that is primarily engaged in growing crops, raising animals, and harvesting fish and other animals from a farm, ranch, or their natural habitats for man's use. It has been defined as the production of food, livestock and purposeful tendering of plants and animals (Ahmed, 1993). Agriculture is the mainstay of many economies and it is fundamental to the socio-economic development of a nation. In the same view, Okolo (2004) described agricultural sector as the most important sector of the Nigerian economy which holds lots of potentials for future economic development of the nation as it had done in the past. Notwithstanding the enviable position of the oil sector in the Nigerian economy over the past three decades, the agricultural sector is arguably the most important sector of the economy.

Agriculture's contribution to the Gross Domestic Product (GDP) has remained stable at between 30 and 42 percent, and employs 65 percent, of the labour force in Nigeria (Emeka 2007). Agriculture resource has been an important sector in the Nigerian economy in the past decades, and is still a major sector despite the oil boom; basically it provides

employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy (Oji-Okoro, 2011).

Nigeria is grossly endowed with abundant natural resources including biological and non-biological resources. The pervasive influence of agriculture on Nigeria's economic and social development has also been articulated by Oluwasanmi (1966). A strong and efficient agricultural sector would enable a country to feed its growing population, generate employment, earn foreign exchange and provide raw materials for industries. The agricultural sector has a multiplier effect on any nation's socio-economic and industrial fabric because of the multifunctional nature of agriculture (Ogen, 2007).

The significance of agriculture in bringing about economic growth and sustainable development of a nation cannot be underestimated. Agriculture contributes to the growth of economy, provides employment opportunities for the teeming population, export revenue earnings and eradicates poverty in the economy. Abayomi (1997) stated that stagnation in agriculture is the principal explanation for poor economic performance, while rising agricultural productivity has been the most important concomitant of successful industrialization.

Generally, there are four major ways in which the agricultural sector contributes to development of the economy. These ways are product contribution, factor contribution, market contribution and foreign exchange contribution (Kuznetz 1961; Mackie 1964; Abayomi 1997; Abdullahi 2002; World Bank 2007).

Manyong (2005) noted that various literature have reported that in spite of Nigeria's rich agricultural resource endowment, there has been a gradual decline in contribution of agriculture to the nation's economy. In the 1960s, agriculture accounted for 65% - 70% of total exports; it fell to about 40% in the 1970s, and crashed to less than 2% in late 1990s. The decline in the agricultural sector was largely due to rise in crude oil revenue in the early 1970s.

Funding of agriculture especially in rural areas where the bulk of farmers live have also brought a lacuna in accelerating socio-economic development via agriculture. For instance, in spite of the importance of loan in agricultural production, its acquisition is fraught with a number of problems. The small scale farmers are forced to source for capital from relations, moneylenders and contribution clubs (Izekor & Alufohai, 2010). All of these are known to be ineffective in providing capital for substantial increase in agricultural production.

In addition, a rise in rural purchasing power as a result of the increase in agricultural surplus is a great stimulus to industrial development. The market for manufactured goods is very small in an underdeveloped country like Nigeria.

Less than 50% of Nigeria's cultivable agricultural land is under cultivated. The peasant, smallholder and traditional farmers who uses undeveloped production techniques, with resultant low yields, cultivate most of this land. These farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services and inability to capture the financial services requirements of farmers

and agribusiness owners who constitute about 70 percent of the population is inclusive (Lawal, 2011).

In an attempt to bridge the gap between the benefits and challenges associated with Nigerian agricultural sector, emphasis will be placed on its impact on standard of living from 1970-2016 and hence, this form the basis for this study. The objective of this study is to analyze the contribution of the agricultural sector to the standard of living in Nigeria between 1970 and 2016. Thus, other specified objectives include to: determine the trends in standard of living in relation to agricultural output; examine the extent to which agricultural output has impacted on the standard of living; assess the distinction between short run and long run relationships of agricultural output and standard of living and identify the challenges of agricultural output and standard of living in Nigeria.

The identified relevance of agricultural resources to national economic growth in the past and the fast-declining contribution of this important sector due to myriads of challenges remain a problem to be solved which therefore calls for further study.

## **2. Literature Review**

This section tries to look at the theoretical framework, empirical review, agricultural output and standard of living

### *2.1 Theoretical Framework*

Todaro and Smith (2003), while looking at Lewis theory of development, assume that the underdeveloped economies consist of two sectors. These sectors are the traditional agricultural sector characterized by zero marginal labour productivity and the modern industrial sector. The primary focus of the model is agricultural production and its influence on economic growth. Todaro and Smith (2003) argued further that, if economic growth is to take place and become self-sustaining, it will have to include the rural area in general and the agricultural sector in particular.

Development economists such as Smith in *The Wealth of Nations* (1776) and Ricardo in *The High Price of Bullion, a Proof of the Depreciation of Bank Notes*, (1810), have focused on how agriculture can best contribute to overall economic growth and modernization.

The physiocrats such as Quesnay and Marx laid more emphasis on agriculture in the growth of an economy. In their views, the development of an economy depends on the growth of the agricultural sector. The source of national wealth is essentially agriculture. They believe that the fate of the economy is regulated by productivity in agriculture and its surplus is diffused throughout the system in a network of transactions. The agricultural sector, to the physiocrats, is the only genuinely productive sector of the economy and the generator of surplus upon which all depends.

Quesnay believed that the wealth of nations was derived solely from the value of agriculture. Quesnay's understanding of value-added was rather primitive—he could not see, for example, how manufacturing could create wealth. Farmers, on the other hand, could. As Karl Marx explains in *"Das Kapital"*, "the Physiocrats insist that only agricultural labour is productive, since that alone, they say, yields a surplus-value". The physiocrats ideology on agriculture formed the basis for the research work

## 2.2 Empirical Review

Rostow (1960) as cited in Oji-okoro (2011) argued that in the process of economic development, nations pass through several stages namely: traditional stage, the precondition for take-off, the take off stage, drive to maturity and the high mass consumption stage. Agriculture plays crucial roles in the first three stages (Traditional society, pre-conditions for take-off and take-off stages). The agricultural sector has the potential to be the industrial and economic springboard from which a country's development can take off. Indeed, more often than not, agricultural activities are usually concentrated in the less- developed rural areas where there is a critical need for rural transformation, redistribution, poverty alleviation and socio-economic development (Gokal & Hanif, 2004).

Tombofa (2004) reported that the state of agriculture is of paramount importance to the development process. He pointed out that agriculture provides the basis for the world's great civilization in the past and increase in agricultural productivity in England laid the basis for, and sustained the first industrial revolution. The agricultural sector is known to employ over 75 percent of the labour force in developing countries and provide the purchasing power over industrial goods.

The Western countries' experiences on economic development were seen as requiring a rapid structural transformation of the economy focused on agricultural activities to a more complex modern industrial and services society. As a result, agriculture's primary role is to provide food and manpower to the expanding industrial economy (Kamil, Sevin, & Festus, 2017)..

Oji-Okoro (2011) employed multiple regression analysis to examine the contribution of agricultural sector on the Nigerian economic development. He found that a positive relationship between Gross Domestic Product (GDP) vis a vis domestic saving, government expenditure on agriculture and foreign direct investment between the period of 1986 - 2007. It was also revealed in the study that 81% of the variation in GDP could be explained by Domestic Savings, Government Expenditure and Foreign Direct Investment.

In any economy, successful economic development depends on open balanced interaction between various sectors over a period of time, often the process of interaction is such that some sector becomes more important than others, depending on the level and the stage of development. In Nigeria, Agriculture is an example of one key sector whose role is, and would remain crucial to development fortunes. Economic history is replete with ample evidence that agricultural revolution is a fundamental pre-condition for economic growth, especially in developing countries (Woolf and Jones, 1969; Oluwasanmi, 1966; Eicher and Witt, 1964).

Izekor and Alufohai (2010) studied public expenditure in agricultural sector using econometric analysis. Based on their report, agricultural financing in Nigeria has a positive relationship between interest rate and loanable funds on the level of Agricultural output. The strong correlation that has been established between Nigerian's total GDP and agriculture suggests that the prospects of the nonoil sub-sector and the overall economy are closely tied to the performance of the agricultural sector. Eze, O. M. (2017) submits that in the 1960's, agriculture contributed up to 64% to the total GDP but gradually declined in the 70's to 48%

and it continued in 1980 to 20% and 19% in 1985, this was as a result of oil glut of the 1980's (Binuyo, 2014).

Iganiga and Unemhilin (2011) studied the effect of federal government agricultural expenditure and other determinants of agricultural output on the value of agricultural output in Nigeria. A Cobb Douglas Growth Model was specified that included commercial credits to agriculture, consumer price index, annual average rainfall, population growth rate, food importation and Gross Domestic Product (GDP) growth rate. The study performed a comprehensive analysis of the data and estimated the Vector Error Correction Model. Their results showed that federal government capital expenditure was found to be positively related to agricultural output.

Using time series data, Lawal (2011) attempted to verify the amount of federal government expenditure on Agriculture in the thirty-year period of 1979 – 2007. Significant statistical evidence obtained from the analysis showed that government spending did not follow a regular pattern and that the contribution of the agricultural sector to the GDP was in a direct relationship with government funding to the sector.

The business cycle theories stress that if there is insufficient consumption and unstable investment, this can bring about fluctuations in output and unemployment; and that in a digressed economy where savings and investment are determined by other factors industry the interest rates, a way out is to stimulate demand. According to Keynes, this could be achieved through government intervention. Agricultural sector is critical for both overall economic growth and reduction of poverty in a typical African country (Omorogbe, Jelena, & Fatima, 2014).

The performance of African agriculture over the last three or four decades has not been particularly robust (Townsend, 1999; FAO, 2003). The sector experienced very low rates of growth in the 1970's, but the growth rates increased somewhat during the 1980s and 1990s. In particular, real annual average agricultural Gross Domestic Product (GDP) growth rose from 1.1% in the 1970s through 2.3% in the 1980s to 2.5% in the 1990s. In spite of this upward trend in the growth of African agriculture, per capita agricultural growth has been low or negative over much of this period (Oluwafemi, Adedokun, Ogunleye, & Oladokun, 2015).

Africa has continued to lag behind other developing-countries/regions and has remained the only region with agriculture growing at a rate that is below the overall population growth rate. There is evidence of steady, although gradual, improvement in the domestic policy environment of agriculture in Africa, with particular relevance to the export crop sub sector, since the mid 1980s (Oyejide, 1993; World Bank, 1994; Townsend, 1999; FAO, 2003).

Essien (2005) in his studies also stressed the point that more countries of the world have undertaken one form of economic reform or another at a time in their history. The goals of these reforms may differ from country to country; nevertheless, they are all closely aligned towards putting their economies on a path of sustainable growth and development. In developing economies such as Nigeria, such reforms have characterized the development strategy. In recent times and in virtually all cases, structural weaknesses in the economy,

high debt service burden, spatial and sectoral unevenness and poor growth performance have been some of the most compelling reasons for their implementation.

The recent reform by the Nigeria government is the (NEEDS). In this new reform there is strong emphasis on the agricultural development. The emphasis on agriculture is predicated on the fact that before the advent of crude oil, agricultural production was the mainstay of the Nigerian economy and about 70 per cent of the working population made their living from agriculture. It has also accounted for 35 per cent of the country's Gross Domestic Product (GDP) in the last 5 years. Consequently, increasing agricultural output is necessary if Nigeria is to attain the Millennium Development Goals (MDGS) of eradicating extreme poverty.

Omanukwe (2005) pointed out that agriculture has become a complex activity, more so in the light of dynamic changes and innovations that have pervaded the global economy. In a developing economy like Nigeria, this becomes much more challenging given the desire and need to compete both domestically and internationally (Abolagba et al., 2010)

Studies from empirical literature from the works of Oji-Okoro (2011), Ogwuma (1981), Iganiga and Unemhilin (2011), Lawal (2011), Essien (2005) and Olutoye and Olutoye (2014) tried to establish a relationship between agricultural output and economic development or growth in Nigeria, but none of these studies to best of the literature reviewed had carried out an investigation on the relationship between agricultural output and standard of living. For instance, the work of Olutoye and Olutoye (2014) which was similar to this study tried to assess the relationship between agricultural output (Crop Production Output, Livestock Output, Forestry Output and Fishery Output) and economic growth in Nigeria (1990-2013), but differ as this study investigates the relationship between standard of living and agricultural output (from 1970-2016); Olutoye and Olutoye (2014) utilized a simple linear regression model, while this study adopted cointegration and error correction model.

### *2.3 Output*

Agricultural output: According to the Organisation for Economic Co-operation and Development (OECD) (2017), agricultural output entails the total output from livestock; forestry, fishery and crop production. It is derived from the basic definition of agriculture as the cultivation and breeding of animals, plants and fungi for food, fiber, bio-fuel, medicinal plants and other products used to sustain and enhance human life. Agricultural output comprises of output sold (including trade between agricultural holdings); changes in stocks; output for own final consumption; output produced for further processing by agricultural producers; and intra-unit consumption of livestock feed products.

Agriculture is defined as the production of food, feed, fiber and other goods by the systematic growing and harvesting of plants and animals for human use. Akinboyo (2008) defines agriculture as the science of making use of land to raise plants and animals. It is the simplification of nature's food webs and rechanneling of energy for human, plant and animal consumption.

Agricultural output in this study is defined as total output from crop production, forestry, fisheries and livestock.

#### 2.4 Standard of living

Kalra (2006) defines standard of living as the sum of necessities, comfort and luxuries that an individual enjoys at a particular time. It depends primarily on income. People and nations with high income enjoy high level of standard of living. It is generally measured by standards such as real income per person, poverty rate, access to quality healthcare, income growth, inequality and education standards. It is the ease by which people living in a place at a particular time are able to satisfy their wants.

Zapf (2002) conceptualized standard of living as the sum (total) of individual, household and societal welfare. However, his notion of welfare is synonymous to material level of living (or wealth) and rates of economic growth as measured by GDP or GNP per capita. The idea of wealth as a primary goal of societal development was eventually broadened to include qualitative aspect of welfare development and quality of life become the leading welfare paradigm and societal goal (Berger-Schmitt & Noll, 2000).

In addition, a helpful taxonomy of welfare concepts was provided by Zapf (2002). It combined both objective and subjective measures at individual and societal level. Thus, the taxonomy is given below:

Table 2.1 Taxonomy of welfare concepts

Items	Objective indicators	Subjective indicators
Individual level	Objective living condition (e.g. income)	Subjective wellbeing (income satisfaction)
Societal level	Quality of society (income distribution)	Perceived quality of society (can that between rich and poor)

Source: Zapf (2002)

The taxonomy above provides three approaches to measuring welfare namely: the objective level of living, the American subjective well-being and the combined approach (the objective and subjective measures)

Investopedia LLC (2014) describes standard of living as the level of wealth, comfort, material goods and necessities available to a certain socio-economic class in a certain geographical area. It includes factors such as income, quality and availability of employment, class disparity, poverty rate, quality and affordability of housing, hours of work required to purchase necessities, gross domestic product, inflation rate, number of vacation days per year, affordable (or free) access to quality healthcare, quality and availability of education, life expectancy, incidence of diseases, cost of goods and services, infrastructure, national economic growth, economic and political stability, political and religious freedom, environmental quality, climate and safety.

In addition, standard of living is often used to compare geographical areas or a particular area in a distinct point in time. The gross national income per capital is commonly used in measuring standard of living. One limitation of measuring standard of living is that it does not take into account some factors such as crime rate or environmental impact.

Standard of living is a core concept defined as the advancement in human well-being and the success or failure of nations. Standard of living itself is usually treated as synonymous with officially measured real GDP (or real consumer spending) per capita (Johansson, 1973)

Kuznets (1941) defined standard of living as it is measured by GDP per capita, life expectancy at birth, and a composite measure of education based on literacy and school enrollment. It also includes human rights in broad measurement of human development.

This study defines standard of living as the sum or total of necessities and comfort individual or group of individuals enjoys from a nations income (GDP per capita). It is measured by the rate of goods and services produced in a country.

### 3. Methodology and Model Specification

This study used time series data to analyze the relationship between standard of living and agricultural output. The econometric techniques include: Augmented Dickey–Fuller (ADF) to test for a unit root in the individual data series (Dickey & Fuller, 1981); a Regression Analysis to establish a long run relationship between dependent and independent variables; Cointegration test to determine whether the variables enter into a long term relationship. The technique is adopted to find out the cointegration in error term; and ECM estimate of the model is to establish a short run relationship between dependent, independent variables and error term (residual) (Engel & Granger, 1987). The major source of data to this study was secondary source, that is, data on agricultural output (Crop Production Output, Livestock Output, Forestry Output and Fishery Output) and GDP per capita would be obtained for a period of forty-six years (1970-2016) from Central Bank of Nigeria statistical bulletin and periodicals. Thus, the basic model for this study is:

$$\text{LNSOL} = f(\text{OCP}, \text{OFS}, \text{LNOFSH}, \text{LNLOS}) \dots\dots\dots 1$$

Where:

SOL = Natural log of Standard of Living (proxied by GDP per capita)

$f$  = Function

OCP = Crops Output

OFS = Forestry Output

OFSH = Natural log of Fishery Output

LOS = Natural log of Livestock Output

Rewriting the model from equation (1) above in a linear form, we obtain:

$$\text{LNSOL}_t = \beta_0 + \beta_1 \text{OCP}_1 + \beta_2 \text{OFS}_2 + \beta_3 \text{LNOFSH}_3 + \beta_4 \text{LNLOS}_4 + \varepsilon_t \dots\dots\dots 2$$

Where:

$\beta_1$  to  $\beta_4$  = Slope Coefficient

$\beta_0$  = Intercept

$\varepsilon_t$  = Stochastic or Error Term in Time t.

A priori expectation

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0$

That is, if OCP, OFS, LNOFSH and LNLOS increases SOL will also increase.



### 3.1 Test for Stationarity

The mathematical expression of ADF test amongst the series is given as:

$$\Delta X_t = \alpha_0 + \alpha_1 X_{t-1} + \sum_{i=1}^n \alpha_i \Delta X_{t-i} + \varepsilon_t \dots\dots\dots 3$$

Where:

$\Delta X_t$  = The first differenced value of a measure of the series.

$\alpha_0$  = Estimated constant parameter or intercept.

$\alpha_1$  = Estimated parameter of the first level lag value of series

$X_{t-1}$  = First level lag value of series

$\alpha_i$  = Vector of the estimated parameters of the lagged values of the differenced value of series.

$\Delta X_{t-1}$  = Vector of the lagged values of the differenced value of a series.

$\varepsilon_t$  = Error term.

The ADF test is conducted to test the order of integration of each variable and to establish whether they are non-stationary and how many times the variables need to be differentiated to get a stationary series before running the regression. In time series analysis, unit root test helps in determining the stationary of a series and one of the most commonly used test in the literature to ascertain the stationarity level of series are the ADF test developed by Dickey and Fuller (1979) which is an improvement of the original ADF test.

### 3.2 Regression Model

$$\text{LNSOL}_t = \beta_0 + \beta_1 \text{OCP}_1 + \beta_2 \text{OFS}_2 + \beta_3 \text{LNOFSH}_3 + \beta_4 \text{LNLOS}_4 + \varepsilon_t \dots\dots\dots 4$$

The regression model above is to establish a long run relationship between the dependent and independent variables.

### 3.3 Cointegration Test

$$\varepsilon_{t-1} = \text{LNSOL}_t - \beta_1 \text{OCP}_1 - \beta_2 \text{OFS}_2 - \beta_3 \text{LNOFSH}_3 - \beta_4 \text{LNLOS}_4 - \beta_0 \dots\dots\dots 5$$

The study employed cointegration test to determine whether the variables enter into a long term relationship. The technique is adopted to find out the cointegration in error term. Cointegration among variables is very important, especially when each variable taken separately is non-stationary but some linear combination of the variables are stationary (Engel & Granger, 1987). Where:  $\varepsilon_{t-1}$  = error term

### 3.4 Error Correction Model

$$\Delta \text{LNSOL}_t = \beta_0 + \beta_1 \Delta \text{OCP}_{t-1} + \beta_2 \Delta \text{OFS}_{t-1} + \beta_3 \Delta \text{LNOFSH}_{t-1} + \beta_4 \Delta \text{LNLOS}_{t-1} + \beta_5 \text{EC}_{t-1} + \varepsilon_t \dots\dots\dots 6$$

Where:

$\Delta$  = Is the first difference operator

$\alpha_5 \text{EC}_{t-1}$  = Error correction model. It reflects the short run dynamics of the model. It measures the speed with which short run equilibrium adjust to the long run equilibrium. However, it is expected to have a negative sign.

The error correction model (ECM) is adopted to establish a short run relationship between the dependent, independent variables and error term (residual). The justification for ECM is that, it distinguishes between short run and long run responses and it allows direct estimation of the speed adjustment towards long run.

#### 4. Results and Discussion

Table 4.1: Augmented Dickey–Fuller Stationarity Test Results

Variables	At levels		At First Differences		Remarks
	ADF test Stat	Order of integration	ADF test Stat	Order of integration	
LNSOL	5.333290	I(0)	-2.602429	I(1)	Stationary*
OCP	3.815360	I(0)	-4.515027	I(1)	Stationary*
OFS	3.032594	I(0)	-4.874361	I(1)	Stationary*
LNOFSH	1.527812	I(0)	-5.138322	I(1)	Stationary*
LNLOS	4.451680	I(0)	-2.198429	I(1)	Stationary*
Note	Critical Value		Critical Value		
	1% = -2.616203		1% = -2.617364		
	5% = -1.948140		5% = -1.948313		
	10% = -1.612320		10% = -1.612229		

Source: Researchers' estimation using E-Views software

Note: \* indicates 5% level of Significance

Table 4.1 shows the result of the stationarity test for each of the variables modeled in the equation. It can be observed that the presence of a unit root was sustained at first difference from the values of ADF statistics, since in absolute values are greater than the critical value 5% levels of significance. Thus, the ADF was tested without trend and intercept and the result showed that all the variables were stationary at first difference. The unit root test showed that the variables are integrated in the order of one, I(1). Thus, the combination of series integrated of the same order are said to be cointegrated and therefore, the null hypotheses were rejected.

Table 4.2: Regression Result of the Model

Dependent Variable: LNSOL				
Variable	Coefficient	Std Error	T-Stat	Prob
C	-13.97194	1.619161	-8.629124	0.0000
OCP	-0.000408	3.59E-05	-11.36773	0.0000
OFS	0.007666	0.003191	2.402653	0.0208
LNOFSH	1.238975	0.264873	4.677615	0.0000
LNLOS	3.348721	0.158233	21.16322	0.0000

$R^2 = 0.98$ ; F-Stat = 449.03; DW = 0.95

Source: Researchers' estimation using E-Views software

The long run estimate of the variables in Table 4.2 is statistically significant with positive signs except OCP. The coefficient of the constant has a negative sign with a value of -13.97194. The estimate also shows that OCP, OFS, LNOFSH and LNLOS are statistically significant. From the estimates, a unit change in OCP reduce standard of living by approximately -0.000408 values. The result also indicates that OFS is statistically significant and has a positive sign, suggesting positive relationships between OFS and standard of living. A percentage increase in OFS leads to approximately 8 percent increase in standard of living. Furthermore, the estimation revealed that LNOFSH is statistically significant. A percentage increase in LNOFSH causes the standard of living to rise by approximately 123

percent. Finally, the value of LNLOS has a significant positive influence on standard of living. A percentage increase in LNLOS leads to an increase in standard of living by approximately 343 percent.

The results also show that the explanatory variables account for approximately 98 percent variation (given by the value of  $R^2 = 0.98$ ) in standard of living in Chanchaga Local Government Area of Niger State. The F-statistics of 449.03 is significant at 1% probability level. The Durbin-Watson value of 0.95

Table 4.3: Result of Cointegration Regression

Variable	Coefficient	Std Error	T-Stat	Critical Value (0.05)
$\epsilon_{t-1}$	-1.151053	0.150316	-7.657551	-1.948313

Source: Researchers' estimation using E-Views software

Results of cointegration regression in Table 4.3 indicate a rejection of the null hypothesis which states there is no cointegration in residual. This suggests the acceptance of alternative hypothesis, that there exists cointegration in the long run relationships among the series as captured by the significance of the residual regression. The value of the t-statistic -7.657551 is greater than its critical value -1.948313 at 5% level of significance in absolute terms. This implies that there is evidence of cointegration among the variables in our model and that long run relationships exist between the dependent and independent variables. In addition, the explanatory variables can adequately capture all the permanent innovations in the development of agricultural output over our sampled period.

The diagnostic tests in Tables 4.4 suggest that the data fits the model very well. This is because there is no evidence of any diagnostic problem; like serial correlation, non-normality and heteroscedasticity. This therefore suggests that the statistical properties of the model are generally satisfactory. From the dynamic model, the estimated error correction term is indicating an averagely high annual speed of adjustment of about 26% per annum.

In summary, the variables of this study, that is, LNSOL, OCP, OFS, LNOFSH and LNLOS have a long-run relationship amongst them for the period 1970 to 2016 in Nigeria. This is consistent with the study of Oji-Okoro (2011). OCP, OFS, LNOFSH and LNLOS have a positive relationship with LNSOL and significantly influence LNSOL in Nigeria.

Table 4.4: Error Correction Model Result

Dependent Variable: $\Delta$ LNSOL				
Variable	Coefficient	Std Error	T-Stat	Prob
EC <sub>t-1</sub>	-0.257548	0.082353	-3.127356	0.0033
$\Delta$ OCP	-3.72E-05	5.27E-05	-0.705846	0.4844
$\Delta$ OFS	-0.000600	0.003729	-0.160959	0.8729
$\Delta$ LNOFSH	0.240219	0.246002	0.976494	0.3347
$\Delta$ LNLOS	0.105565	0.421641	0.250366	0.8036
Constant	0.187819	0.043124	4.355316	0.0001
Diagnostic Tests				

Dependent Variable: $\Delta$ LN SOL				
Variable	Coefficient	Std Error	T-Stat	Prob
Tests	Statistics			Prob.
R-Square	0.209525			
DW-stat	1.909277			
LM test	0.9424			0.8734
ARCH test	1.434982			0.9204
Jacque-Bera	7.053769			0.029396

The findings of this study gain support from the studies of Ogwuma (1981), Iganiga and Unemhilin (2011), Lawal (2011) and Omanukwe (2005).

### 5. Conclusion and Recommendations

The findings of this study concluded that agricultural output (crops, livestock, fishery and forestry) have an effect on the standard of living in Nigeria with crops having a negative significance (-13.97) in the long run and short run and forestry having a negative impact in the short run. Both Fishery and livestock output have a positive impact in the long run and short run. The error correction term (ECM) was found significant with an adjustment coefficient of 0.26. as a conclusive result that reveals a long-run relationship amongst the variables of the study. The study therefore recommends the following:

Government should improve its budgetary allocation on agriculture in order to boost output in crop production. This will improve crop productivity thereby improving its negative impact to positive. Government is also advised to avoid inconsistencies in its agricultural policies and programmes; rather it should embrace stable, consistent and sustainable crop production policies as that would help to improve standard of living in the country. Appropriate incentives (such as improved seedlings) should be provided to farmers and ensure that there are conditions that permit them to respond to the incentives. This implies that there must be sound macro-economic policies that allow both trade in crop products and their supply to domestic market and an institutional and physical infrastructure that support broad-based change by facilitating access to land, rural finance and technical knowledge.

Government should provide funds to acquire sophisticated farm tools to sustain output from livestock, fisheries and forestry productions in a consistent manner. This will also help in sustaining living standard and as well improve national economy. Proper monitoring of fund should be made to these outputs so as to contribute significantly on living standard. There should also be provision and development of storage and marketing facilities to curtail wastage during glut and harvest period. Peasant farmers who live in rural areas and are major providers of food crops for the nation should adequately be catered for by making rural areas more conducive and habitable by provision of adequate infrastructural facilities such as good roads, drinkable water and electricity. Provision of these facilities will no doubt impact positively on crop productivity.

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