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Agricultural output performance, employment generation and per capita income in Nigeria

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Abstract

Agriculture sector in Nigeria has been identified as a vital sector as it offers the teaming population the creation of employment thereby increasing the per capita income of the individuals in the economy. This study focused on the agricultural output performance, employment generation and per capita income in Nigeria from 1981-2016. Per capita income, employment generation proxy as agriculture value added per worker and agricultural output data gotten from CBN bulletin and World Bank data base were used as variables. The unit root test reveals stationary after first differencing. Johansen cointegration indicates no co-integrating equation which implies no stable long run equilibrium among agricultural output, employment generation and per capita income in Nigeria. The VAR using both impulse response and variance decomposition indicates positive dynamic interactions among agricultural output, employment generation and per capita income in Nigeria. More emphases therefore need to be placed on the agricultural sector as its output has the capacity to improve the quality of life of the people and create employment.

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1   Introduction

The greatest problem facing the Nigerian economy today is low per capita income tied with the incapacity of the government to decrease poverty prevalence to the simplest level given the increasing populace growing rates. In relating the role of agriculture to employment generation and per capita income increase, this role can never be over-underscored. Evidence from World Bank (2016), has shown that most of Nigeria's population lives and works in rural areas. Almost 75% of the population is rural particularly in comparison to less than 25% in urban areas. In the same way, more than 58% of the workforce engage in agriculture accounted for almost 55% of the productive employment in the economy, and almost 40% of the GDP segment earlier accounted for oil, while agriculture attributed as much as approximately 75% and 80% of GDP. However, this up-to-date statistic for the ratio of gross domestic products in agricultural production is very significant compared with an average of 27% for low-income countries in sub-Saharan Africa (World Bank, 2016).

Although the agriculture industry has vast prospects, severe low income and middle capita incomes remain in rural areas in Nigeria. Given the huge urban development of the world's largest 1.2 billion poor individuals, 75% resides in rural areas and, for the most part, rely on agricultural production and related survival measures (Anríquez & Stamoulis, 2007; OECD/FAO, 2016). Agricultural production is essential to meeting sustainable reducing poverty goals but remains the most effective values are determined in most low-income nation, mostly in spite of its proportion of national income and almost consistently in relation to the number of employees (IDA, 2009; FAO, IFAD & WFP, 2015).

In the context of Nigeria, the study Arokoyo (2012) portrayed that Nigeria is a vast agrarian economy "bequeathed with substantial environmental assets" which includes: 68 thousand hectares of agricultural land; revitalized water supplies encompassing nearly 12 million hectares; 960 kilometers of shoreline; and a rich biodiversity which enables the nation to offer a large range of livestock, forestry and plantation (Rezende, De Sousa, Segall-Corrêa, Ville & Quiñonez, 2019). Though some research has described the hypothetical impact of agricultural outputs and the raise in per capita income, there is, nevertheless, a differing view, as Timmer (2005) suggested, that part of the disagreement over the fact that agriculture plays an important role in growth reflects the fact that systemic change is a phase of allocative efficiency that cannot be clarified by focusing at agricultural production exclusively. It is in the light of the above potential of agricultural sector in employment generation and per capita income increase that the study investigated the long-term dynamic interactions among agricultural output growth, employment generation and per capita income in Nigeria

from 1980-2016. This article is sub-divided into five parts, following this introduction, literature review in section II, section III theoretical framework and methodology, while sections IV and V are discussion of results, conclusion and recommendation respectively.

2   Theoretical Framework and Review of Literature

2.1   Theoretical framework

The various theories underlying the influence of agricultural output performance and per capita income in Nigeria have shown how the consequence of agricultural output performance on employment creation in Nigeria are beneficial to the people. The theoretical framework is anchored on the linear stages' growth model and the H-O model. The linear stage is theory regarded the procedure of development been a sequence of consecutive phases of economic growth; combination of saving, investment and foreign direct investment are essential for economic development. It stressed the function of augmented capita growth in economic development.

The H-O model on the other hand is a general equilibrium model steaming from the international trade theory formulated by Eli Heckscher & Bertil Ohlin. The theory improves on the comparative model of David Ricardo by predicting trade and development outlines focused on the factor endowments of the trading area. H-O model depicts the differential endowments of the means of production (land, labor and capita) rule the comparative advantage of the country. In those goods for which the requisite production factors are large, nations have such a comparative advantage.

The values of products remain eventually dictated by the value of the inputs. Commodities that include actions and inputs that are available locally are cheap to manufacture than commodities that necessitate inputs that remain rare in the vicinity. Countries whose resources in the form of capita and lands are rich nevertheless labor scarcity can have a comparative advantage in commodities which necessitate great capita, land and small labour. As capita and land remain plentiful, the values should be minimal. Such minimal values should mean that grain prices used to manufacture are also small and therefore desirable for local use as well as exports. Labor-intensive commodities, on either side, may be very expensive to manufacture because labor is limited and has a significant importance. Therefore, having to import these other commodities is best in the nation.

The theory reviewed under this section of the study is relevant to the agricultural output performance, employment generation and per capita income in Nigeria due to the fact that it provides the theoretical justification for the need to re-evaluate the influence of agrarian segment on the economy

of Nigeria whether agricultural output performance can translate to increase in employment generation as well as in the increase in per capita income.

2.2   Literature

Thriving economic progress relied heavily on fully accessible stable interactions between a number of economic sectors over time; often, the procedure of interconnectivity is such that a few other industries are becoming more important than others, based on the scale and phase of growth. The recent research (Sunday, Samuel, & Inimfon, 2015) looked at the trend in Nigeria's agricultural long-term growth index from 1960 to 2014. Augmented Dickey-Fuller-GLS unit root test demonstrated cointegrating formulae and integrated sequence one. Trend analysis showed that Nigeria experienced a substantial effect on agricultural sustainability with an average incremental rate of growth of 0.3%, 0.5% and 2.3% in the Entropy Diversification Index, the Herfindhal Diversification Index and the Ogive Diversification Index. The ECM analysis demonstrates the long-term stability of the Nigerian agricultural diversification index. Results indicate that long-term inflation, a sustainable manufacturing industry, agricultural credit, foreign reserves, per capita income, unemployment and energy consumption remain significant factors of sustainable agriculture.

Although oil prices, commercial bank lending capacity, foreign direct investment in agriculture and non-oil imports are long-term negative factors of sustainable agriculture in Nigeria. Although inflation, external reserves and non-oil imports are encouraging agricultural diversification in the short run, energy consumption and manufacturing capacity are slowing down agriculture sector diversification in the nation.

Employing Johansen cointegration and full-modified ordinary least square, Agene, Adediran, & Olaifa (2017) studied the influence of agricultural performance on inclusive growth in Nigeria, the results revealed that there is a long-term association among interest factors, while agricultural financing has a long-term influence on per capita income. Inferences were drawn and concluded that the government needs to finance more on schedules that boost agricultural improvement and increase growth, and in the same way, align agricultural expenditure in order to promote the qualitative growth of the segment by providing steady financial provision. This type of funding though, could be supervised and intermittently revise to allow its efficiency and avert misallocation of resources. Okezie, Nwosu and Njoku (2011) analyzed the correlation among Nigerian public spending on the agriculture industry and their effect on the economy utilizing data from 1980-2011. As a consequence, GDP and overall public spending on agriculture have been combined, which means a long-term nexus. The analysis revealed that there is a weak causality seen between total

agricultural output to GDP and total public spending on agricultural production.

In Abula & Ben (2016), the effect of agricultural production on Nigeria economy was ascertained utilizing time series data from 1986 to 2014. Growth has already been a proxy for per capita income (PCI), agricultural production (AOUT) for output from the agricultural governments and financial agricultural investment (PXA) for government investment in the farming production. The analysis employed the Augmented Dickey-Fuller root test unit and the Vector Autoregressive model. The outcome   of the results of the VAR model revealed that more time-varying lags were insignificant. Nonetheless, the significant concentration of R^2 and F-test in the VAR regression forecasts for PCI presented unquestionable results that, together, all the tends to lag conditions are essential, insinuating that agricultural production plays a significant role in Nigeria's economic improvement. The variance decomposition research reveals that the better compared influence of shocks in economic growth, apart from the response fluctuations to agricultural shocks, remained identified. The results of the interaction term in the provision of variance decomposition have shown that PCI has responded positively to fluctuations in agricultural production over a ten-year period. Despite the fact that PCI's reaction to PXA fluctuations was negative in the first two-year period, it has been positive throughout the last eight-time frames. It was submitted that agricultural production is beneficial and continues to play a vital part in the growth of the Nigerian economy. The nation needs to increase its industry investment continuously and ensure that the Nigerian economy is differentiated, in other words, oil production would not be the backbone of the Nigerian economy. The federal government of Nigeria ought to reassure commercial banks that a positive percentage of their total credit providers are available to the agricultural sector to improve food supply and creating jobs.

This study therefore is an improvement to other related studies done in this field in Nigeria by extending the scope of the study to recent, augmenting the study with other key variables which were not captured in the previous studies done as well as using dynamic approach in finding the dynamic interaction existing between agricultural productivity, employment generation and per capita income in Nigeria from 1981-2016.

3 Data and Methodology

3.1 Model Specification

The model specification was adapted from the work of (Enoma, 2010; Brorsen, 2001; Oyinbo & Rekwot, 2014). What makes this study unique is in bringing new variables that were not captured in his model and extending the scope of this study to from 1981- 2016. Likewise, it is exceptional because it uses dynamic analysis to test dynamic interaction of agricultural output growth, employment generation and per capita income in Nigeria. To capture the objectives of this study therefore, agricultural output performance is represented by (AGR) in billons, per capita income represented as PCI and employment generation as proxy by agriculture value added per worker (constant 2005 US$) represented by EMPT in thousands. To examine the dynamic interaction of agricultural output, employment generation and per capita income in Nigeria, the VAR model is stated as:

$$InPCI = f(InAGR, InEMPT) \qquad\qquad 1$$

Econometrical, the functional relationship of the VAR Models above can be written in the equation form as:

$$InPCI = \beta_0 + \beta_1\ InAGR + \beta_2\ InEMPT + \mu \qquad\qquad 2$$
$$InAGR = \beta_0 + \beta_1 InEMPT + \beta_2\ InPCI + \mu \qquad\qquad 3$$
$$InAGR = \beta_0 + \beta_1\ InEMPT + \beta_2\ InPCI + \mu \qquad\qquad 4$$
$$InEMPT = \beta_0 + \beta_1\ InAGR + \beta_2\ InPCI + \mu \qquad\qquad 5$$

Where:

β_0 = Constant term or intercept
β_1 = Coefficient of per capita income
β_2 = Coefficient of total employment
μ = Error term of Stochastic term
In = log of variable

The a-priori expectation is the expected signs and magnitude of an economic variable relation to economic theory. The expected signs and magnitude of the model specified from above is positive that is: $\beta_0, \beta_1, \beta_2, \beta_3 > 0$.

3.2 Data

The secondary times series data sourced from World Bank data base and CBN bulletin are utilized to analyzed the agricultural output, employment generation and per capita income in Nigeria base on the model specification from above.

3.3 Techniques of Data Analysis

The research paper uses the Johansen cointegration test and the vector auto-regression (VAR) model to analyze the long run nexus and the dynamic interaction between agricultural output, employment generation and per capita income in Nigeria.

4   Discussion of Results

The descriptive statistics shows the mean and median values of log of per capita income, employment generation and agricultural output (Table 1). From the table, the variables used have a rising trend, this also entails that while the agricultural output performance and employment generation over the years increases, the effect on per capita income also increases which also bring about a reduction in the poverty level in Nigeria.

The maximum and minimum values indicated the maximum points and lowermost points of per capita income (InPCI), employment generation (InEMPT) and agricultural output (InAGR). The level of instability calculated by standard deviation shows that the rate of per capita income, employment generation and agricultural output have propensity to vary. The skewness the value of agricultural output with -0.30 is negatively skewed away the normal distribution though per capita income with   0.67 skewness and employment generation with 0.22

Table 1 Descriptive Analysis of Variables

	INPCI	INAGR	INEMPT
Mean	2.759033	2.985713	3.243632
Median	2.612468	3.140928	3.147516
Maximum	3.505598	4.332913	3.677635
Minimum	2.184918	1.231724	2.835947
Std. Dev.	0.388265	1.047227	0.292466
Skewness	0.670253	-0.2958	0.220877
Kurtosis	2.235423	1.635252	1.511897
Jarque-Bera	3.572301	3.318780	3.614396
Probability	0.167604	0.190255	0.164113
Sum	99.32521	107.4857	116.7708
Sum Sq. Dev.	5.276239	38.38399	2.993770
Observations	36	36	36

Source: Authors Computation, 2020

Skewness positively skewed away the normal distribution point.   The kurtosis value of per capita income, employment generation and agricultural output that are less than the significant mark of 3 indicates that per capita income and employment generation and agricultural output are mostly not grouped around their mean. The Jarque-Bera probability of employment generation and probability values, per capita income and agricultural output and its respective probability are larger than the 5% level of significance ($P < 0.05$) means insignificant deviation away the normal distribution.

Table 2 shows the analysis of the econometric properties of the variables. The Augmented Dicky-Fuller test statistics shows the statistics of the respective variables were all greater than the critical values in their first difference at intercept, this means that the time series data sets such as InPCI, InAGR and InEMPT are stationary. The results of the Augmented Dicky-Fuller test

statistics means that InPCI, InAGR and InEMPT are integrated of order 1(1). The rate of their combinations demonstrates the sum of periods the series needed to be differenced prior to stationarity is made. It therefore recommends that the variables ought to be established for the existence of co-integration as identified by (Johansen and Juselius, 1990).

Table 2 Unit Root Test

Variables	Test for Unit Root	ADF Test Stat	Critical Values for ADF Test Stat		
			1%	5%	10%
InPCI	1st Difference	-5.338	-3.639	-2.951	-2.951
InAGR	1st Difference	-3.795	-3.639	-2.951	-2.614
InEMPT	1st Difference	-5.521	-3.639	-2.951	-2.614

Source: Authors' Computation, 2020.

Table 3 presents the Johnsen cointegration test to ascertain the long-term nexus among agricultural output, employment generation and per capita income in Nigeria. The rule or decision for either accepting or reject the null hypothesis according to MacKinnon-Haug-Michelis (1999) p-values is rejected null hypothesis if the prob-value is lesser than 5% otherwise, it should be accepted if probability rate is greater than 5%, similarly, the alternative hypothesis should be accepted if the trace value and maximum Eigen value remain superior than the test statistics. Subsequently maximum Eigen value and trace statistics with their respective prob- value confirms that there is no co- integrating equation which implies no long run relationship among agricultural output performance, employment generation and per capita income in Nigeria, the null hypothesis that there is no co-integrating equation is accepted and reject the alternate hypothesis that a stable long run equilibrium between agricultural output, employment generation and per capita income in Nigeria. Since the variables show no co-integrating, the vector auto- regression model using impulse response and variance decomposition approach is therefore applied in the research paper to investigate the short run and long run shocks among per capita income, agricultural output and employment generation in Nigeria.

From the impulse response in Figure 1, as the shock in or innovation rose over time, the response of per capita income to per capita income using the Cholesky decomposing was a negative or inverse interaction between the responses of per capita income against itself data decreasing rate, In the response of shocks of per capita income to agricultural output the response as seen from the impulse response graph above is a positive response at a creasing rate. Also, the response of poverty reduction proxy by per capita income and employment generation as seen from above is a positive response at a constant rate.

Table 3 Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Series: INPCI INAGR INEMPT

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.438958	27.98269	29.79707	0.0798
At most 1	0.153569	8.332070	15.49471	0.4306
At most 2	0.075345	2.663360	3.841466	0.1027

 Trace test indicates no cointegration at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

*Unrestricted Cointegration Rank Test (Maximum Eigenvalue)*

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.438958	19.65062	21.13162	0.0795
At most 1	0.153569	5.668710	14.26460	0.6560
At most 2	0.075345	2.663360	3.841466	0.1027

 Max-eigenvalue test indicates no cointegration at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' Computation, 2020.

Furthermore, the response of agricultural output to poverty reduction (per capita income) is also positive but at a constant rate. Agricultural output to itself is positive at an increasing rate, the shocks of agricultural output to employment generation is positive but at a constant rate. The shocks response of employment generation to per capita income negative shocks response, employment to agricultural output reveals positive shocks response.

Figure 1 Presentation and of vector auto-regression model (Impulse Response)
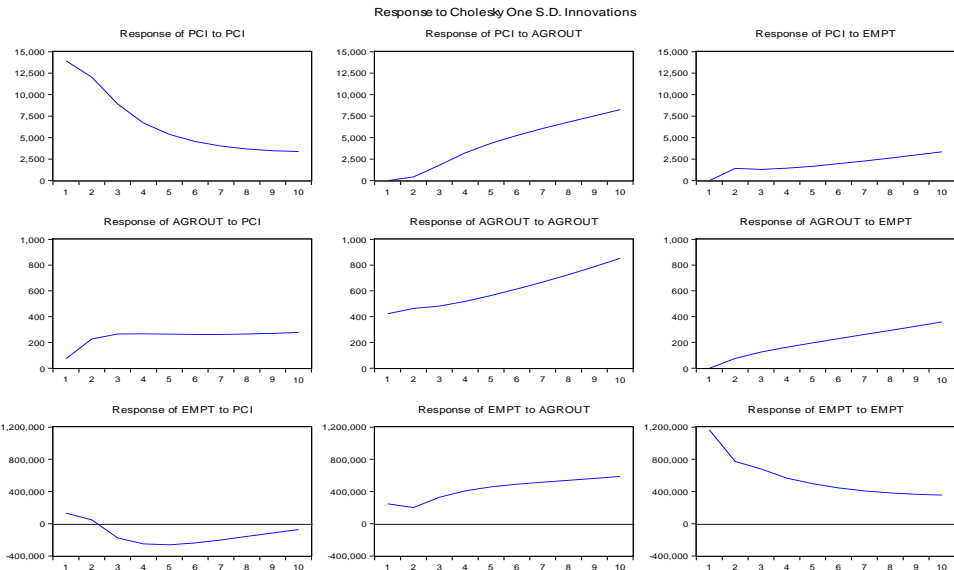
Source: Authors Computation, 2020

Table 4 presents the Cholesky variance decomposition of the ten decades interval in long run. In the short run say 3 years interval, from 1981- 1983, that is impulse or innovations or shocks to the logged value of per capita income account for 85.56% of variation of fluctuations in logged of per capita income (own shock) in short run. Shock to agricultural output can cause per capita income to increase by 1.36% in the short run. Furthermore, in short run, an impulse or shock in the employment generation can contribute to 13.08% to the per capita income increase in the short run.

Table 4 Variance Decomposition of INPCI

Period	S.E.	INPCI	INAGR	INEMPT
1	0.091593	100.0000	0.000000	0.000000
2	0.110429	92.38116	0.560556	7.058285
3	0.123683	85.55975	1.357589	13.08266
4	0.140498	73.34234	1.052489	25.60517
5	0.156712	62.26632	1.467121	36.26656
6	0.172073	53.04323	2.207358	44.74941
7	0.188109	45.09235	2.953124	51.95452
8	0.204718	38.52959	3.733876	57.73653
9	0.221080	33.34024	4.478354	62.18140
10	0.236874	29.24636	5.105658	65.64798

Source: Authors' Computation, 2020.

In the long run, say 10 years interval 1981-990, 1991-2000 impulse or innovation to per capita income account for 29.25% fluctuations in per capita income (own shocks), shocks or impulse to agricultural output performance can cause 5.11% forecasting fluctuations in the variance of per capita income. In the long run, the shocks in the fluctuations of employment generation can contribute to   65.65% fluctuation in per capita income.

The implication of the result of the vector auto-regression model to ascertain the dynamic interactions among agricultural output, employment generation and PCI increase in Nigeria over the scope of the study reveals that within the system of equations, there is a dynamic interaction between agricultural output, per capita income and employment generation. Thus, the implication of the empirical results obtained is that more emphases need to be place on the agricultural sector as its output has the capacity to improve the lives of the people and create employment in the economy.

5　Conclusion and Recommendation

Subsequent to the findings carried out in this paper, it is concluded that for Nigeria to be on the track to sustainable growth, government need to examine that factors delayed the growth of its Agric industry. The economy has the essential mechanisms in place to go to mechanized agricultural-based nation. The findings made concluded that agricultural sector provides job

opportunities for the teaming population thereby increasing the per capita income of the people.

Nigeria needs to have financial capita added to the agricultural sector to revive the sector back. Our results indicate that no long run relationship among per capita income, employment generation and agricultural output. These suggest that government need to make more enabling environment and strong (effective and efficient) mechanism that will improve agricultural sector output.

Furthermore, the result of the vector auto- regression model (VAR) using both impulse response and variance decomposition indicates that there are positive dynamic interactions between agricultural output performance, employment generation and per capita income in Nigeria. More emphases consequently need to be place on the agricultural sector as its output has the potential in improving lives and create employment in the economy.

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