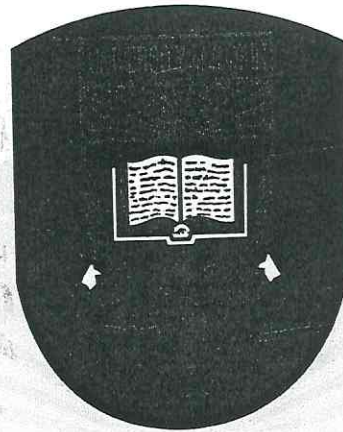


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## THE NEXUS BETWEEN AGRICULTURAL CAPITAL EXPENDITURE AND ECONOMIC GROWTH IN NIGERIA

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### Abstract

This paper investigates the nexus between agricultural capital expenditure and economic growth in Nigeria, using time series data for the period 1980 to 2014. The study becomes more relevant in the wake of the need to diversify Nigeria mono-product economy, which is characterized with proceeds majorly from hydrocarbons. The study also develops an asymptotic theory for inference based on the Fully-modified least squares co-integrating regression (FM-OLS) to determine the impact of agricultural capital expenditure on economic growth in Nigeria. The result shows that the combinations of the explanatory variables significantly explained the behavior of the explained variable and expenditure on agriculture positively and significantly influence economic growth. The study recommended that government should increase budgetary allocations to agricultural sector and collaborate with private investors to resuscitate the sector in order to bounce back as a corollary for economic growth.

Key word: FM-OLS, agricultural capital, economic growth, government expenditure.

### Introduction

The significance of agricultural capital expenditure in bringing about economic growth of a nation cannot be underestimated. It is pertinent to emphasize that agriculture is a major element and factor in economic growth and development. This is encapsulated in its role as one of the major sources of employment, revenue earning and driver of poverty eradication. Nigeria as a nation is naturally endowed with enormous agricultural

resources in terms of aquatic products, livestock and plant products. In the light of this significant contribution of agriculture to the socioeconomic development of a country, Ahmed (1993), opined that it is the mainstay of an economy and it is significant for economic growth and development.

The agricultural sector is estimated to have contributed 34.4 percent variation in gross domestic product (GDP) between 1970 and 2010 in Nigeria (Iganiga and Unemhilin, 2011). The Agricultural sector suffered neglect during the hey-days of the oil boom in the 1970s. The attention of the government of Nigeria was glued to the proceeds from the hydrocarbons to the detriment of the agricultural sector. The government over the years has paid heavy dues on importation of food products and agro allied raw materials, which the country can conveniently produce locally. The low contribution of the agricultural sector to Nigerian economy in recent times is dominated by small-scale farms characterized by small uneconomic and often fragmented holdings, the use of simple implements (hoes and cutlasses) and unimproved planting and storage materials. Abayomi (1997) affirmed this assertion that that stagnation in agriculture is the major reason for poor economic performance, while rising agricultural productivity has been the most important concomitant of successful industrialization.

The burden of food importation coupled with importation bills on agro-allied raw materials has multiplier effects on the economic growth of Nigeria. Statistics has shown that in the 1960s the receipts from agriculture accounted for 65-70% of total exports but fell to about 40% in the 1970s and later crashed to less than 2% in the late 1990s (Lawal 2011; Olajide, Akinlabi and Tijani 2014). On annual average, its contribution to GDP from 1997-2006 was 4.1 percent (CBN 2006 in Iganiga and Unemhilin, 2011). In spite of this low contribution of agricultural sector, the sector is still relevant in terms of its contribution to the GDP. For instance, Emeka (2007) enunciated that the contribution of agricultural sector has remained stable between 30 and 42 percent and it has employed about 65 percent of the total Nigeria's labour force. Nevertheless, the dwindling oil income, because of global economic meltdown has made the oil sector to start losing its relevance to the national economy. This scenario has awoken the zeal of the government towards a diversification of the economy, with particular focus on the agricultural sector which is already at moribund position for the past decades because of the negligence of the sector by successive governments due to readily available 'black gold' income.

Furthermore, studies conducted by Abayomi (1997), Loto (2011), Adewara and Oloni (2012), Ebiringa and Charles-Anyaku (2012), Daniel and Ihechituru (2012) and Aladejare (2013) on the impact of components of government expenditure on economic growth in Nigeria over the years have shown mixed results. The variations of the findings and seeming contradictions of these studies from the theoretical literature justify the need for this study to re-examine the relationship between agricultural capital expenditure and

economic growth in Nigeria. It also updates previous studies in terms of currency and detailed analysis, and contributes to existing literature by adopting a more robust estimation technique (FM-OLS) which may yield more reliable result.

This optimism is very important for developing countries, in which Nigeria is included, due to increasing government expenditure that is currently experienced. In essence, this study gives a good insight into the problems created by rising government expenditure on importation of foodstuff, raw materials for agro-based industry, and its effects on economic growth.

In view of the above, an attempt is made in this study to re-examine the nexus between agricultural capital expenditure and economic growth in Nigeria from 1980 to 2014. The remaining parts of the study proceed as follows: Section 2 presents a brief review of related theoretical and empirical literature; the methodological framework and model specification of the study is presented in section 3, while the empirical results and discussion of findings are presented in section 4. Finally, section 5 discusses the conclusions, economic implications and policy relevance.

#### **Review of Theoretical and Empirical Literature**

The literature on the relationship between agricultural expenditure and economic growth at the macro level is generally inconclusive. Such empirical studies have been conducted in Nigeria and elsewhere with controversies as to whether there is a link between government spending and economic growth or not. For example, Loto (2011) investigated the impact of sectoral government expenditure on economic growth in Nigeria for the period of 1980-2008 and applied Johansen cointegration technique and error correction model. The results inferred that in the short run expenditures on agriculture and education were negatively related to economic growth.

In a related study conducted by Aladejare (2013) on Nigeria, he succinctly emphasized that agriculture dominates the primary sector, which dominates the entire economy. Apart from being the main source of food for most of the population, the agricultural sector contributes substantially to GDP and thus has remained vital to the Nigerian economy. The result of the study further revealed that the population of the country has grown by about 150.0 per cent between 1963 and 2006, approximately 3.75 per cent per annum. He went further to state that a simple calculation shows that for the per capita income to remain the same as in the 1960s, every sector of the economy should at least have grown by the same percentage. However, he concluded that, the agricultural sector that used to be the mainstay of the economy has declined in its contribution to the GDP, manufacturing has declined, building and construction has also declined, while the wholesale and retail trade as well as the services sectors have remained almost the same as in the 1960s.

In a related argument, Young (1994) in an empirical cross country study affirmed the importance of increased labour force participation, improvement in education and inter-sector transfer of labour from agriculture, which were earlier part of the development thinking. Thus, there has been an increased tendency of convergence between growth economics and development economics.

In their own study, Adewara and Oloni (2012) used Vector Autoregressive models (VAR) to analyze the relationship between public expenditure compositions from 1960 to 2008 on economic growth. The variables used in the analysis included share of government civilian expenditures in GDP, defence, education, agriculture, and economic growth. They observed that expenditure on education has failed to enhance economic growth due to the high rate of jobseekers in the country as well as the growing rate of unemployment. Meanwhile, in another study conducted by Aigbokhan (2001), he opined that the contributions of the sector to the GDP continue to increase. For example, agriculture became the leading sector of the economy in 1950s and 1960s. For these periods, agricultural output accounted for 63 and 54 percents of GDP. However, with the advent of oil in the 1970s, this dropped to 33.2 percent. This marked an epoch in Nigeria's economic history through 1973/1974 (crude oil price shocks). It further went down to 30.2 percent for the period of 1975-79. Similarly, Abayomi (1997) noted 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. Over the years, government has almost been the sole provider of financial and other capital resources to support agriculture. Government has attempted to increase her expenditure on agriculture through budgetary allocation and through the provision of cheap and readily available credit facilities (Nwosu, 2004).

Furthermore, Food and Agricultural Organization (FAO, 2008 in Iganiga and Unemhilin, 2011) reported that in terms of capital allocation to agriculture in Nigeria, it was an average of 4.74 percent from 1970-1980. But, from 1980-2000, it rose to 7.00 percent and 10 percent from 2001-2007, though revealing an increase, it still falls short of FAO (2008) recommendation that 25 percent of government capital budget be assigned to the agricultural development capital budget. DFID (2005) reported that the largest category of private investors in Nigerian agriculture consists of the multitude of smallholder farmers, scattered across the country.

In the same vein, Iganiga and Unemhilin (2011) in their study on the impact of federal government agricultural expenditure on agricultural output in Nigeria, used the Cobb Douglas Growth Model, Descriptive Statistics and Econometrics Model to analyze the data. Cointegration and Error Correction methodology were employed to draw out both long-run and short-run dynamic impacts of these variables on the value of agricultural

output, which revealed that Federal government capital expenditure was found to be positively related to agricultural output. With a one-year lag period, it shows that the impact of government expenditure on agriculture is not instantaneous. Their study concluded that investment in the agricultural sector is very imperative and this should be complemented with monitored credit facilities. However, Ebiringa and Charles-Anyagwu (2012) using the Cochrane-Orcutt and ECM technique to determine the impact of government expenditure on economic growth in Nigeria, showed that expenditure components such as education, defence, telecommunication, health, and security sectors had positive impact on Nigeria's economic growth but expenditures on agriculture and transportation have failed to enhance economic growth in Nigeria, thus having negative impact.

Similarly, Daniel and Ihechituru (2012), in their study on the effects of agricultural reforms on the agricultural sector in Nigeria revealed that agriculture contributed minimally during the period they reviewed in terms of output, market, foreign exchange and capital formation or transfer. This poor performance was attributed to policy instability, poor coordination of policies, poor implementation and mismanagement of policy instruments and lack of transparency. Their study recommended that the government should institute an enduring genuine democracy and good governance in Nigeria to achieve poverty reduction, sustainable livelihood and food security, which will guarantee comprehensive economic development and attainment of the Millennium Development Goals (MDGs). The main thrust of this study is to investigate the nexus between agricultural capital expenditure and economic growth in Nigeria between 1980 and 2014.

This present paper is similar to other empirical studies carried out as it tries to explore the nexus between agriculture total expenditure and economic growth in Nigeria and the impact thereof but differ as it improves on some of the existing studies characterized by mixed results. In addition, this paper will fill the gap of information paucity on the relationship between agricultural expenditure and economic growth over the period under study by providing the required empirical information.

#### Research Methodology

The paper has employed annual data on economic growth (RGDP), and Agriculture total expenditure (AGTEXP) between 1980 to 2014 to ensure the robustness of the estimation results. This period was chosen in order to test empirically the extent or the significance of agricultural sector to the economic growth of Nigeria, regardless of several years of neglect by successive governments especially during the hey-days of the oil boom in the 1970s and to assess the renewal of efforts aimed at stabilizing the sector that is already in moribund stage. The data used are retrieved from the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and World Development Indicators (WDI)

publications and records.

The estimation technique employed in the study is the Regression model. The multiple regression model that examines the nexus between agricultural capital expenditures and economic growth in Nigeria was carried out using the Fully-Modified Least Squares (FM-OLS) cointegrating regression.

The major interest of the paper is to test the following hypothesis:

H0: Agriculture capital expenditure does not have significant impact on economic growth in Nigeria.

#### Model Specification, Identification and Choice of Variables

With reference to Scarpetta and Basainini (2001) and Mankiew et al (1992) in order to determine the relationship among economic growth, (RGDP), Agriculture Total Expenditure (AGTEXP), Physical Capital Formation (PCF) and Total Stock of Human Capital (THC), hence, the following explanation variables were selected for this paper based on economic theory and existing empirical studies:

$$\ln RGDP = f(\ln AGTEXP, \ln PCF, \ln TRACO, \ln DEFEXP, \ln THC) \dots \dots \dots (1)$$

$$\ln RGDP = \beta_0 + \beta_1 \ln AGTEXP + \beta_2 \ln PCF + \beta_3 \ln TRACO + \beta_4 \ln DEFEXP + \beta_5 \ln THC + et \dots \dots \dots (2)$$

RGDP = Economic Growth in Nigeria which is proxied by real gross domestic product (RGDP),

AGTEXP = Agriculture expenditure (proxy for agricultural capital) Agriculture total expenditure (summation of recurrent and capital)

PCF = Stock of Physical Capital (proxied by gross capital formation)

TRACO = Expenditure on transport and communication (proxy for physical capital)

DEFEXP = Defense Expenditure

THC = Total Stock of Human Capital (proxied by population)

et = Error term

N/B: all variables are in their natural logarithm form.

## Empirical Results and Discussion of Findings

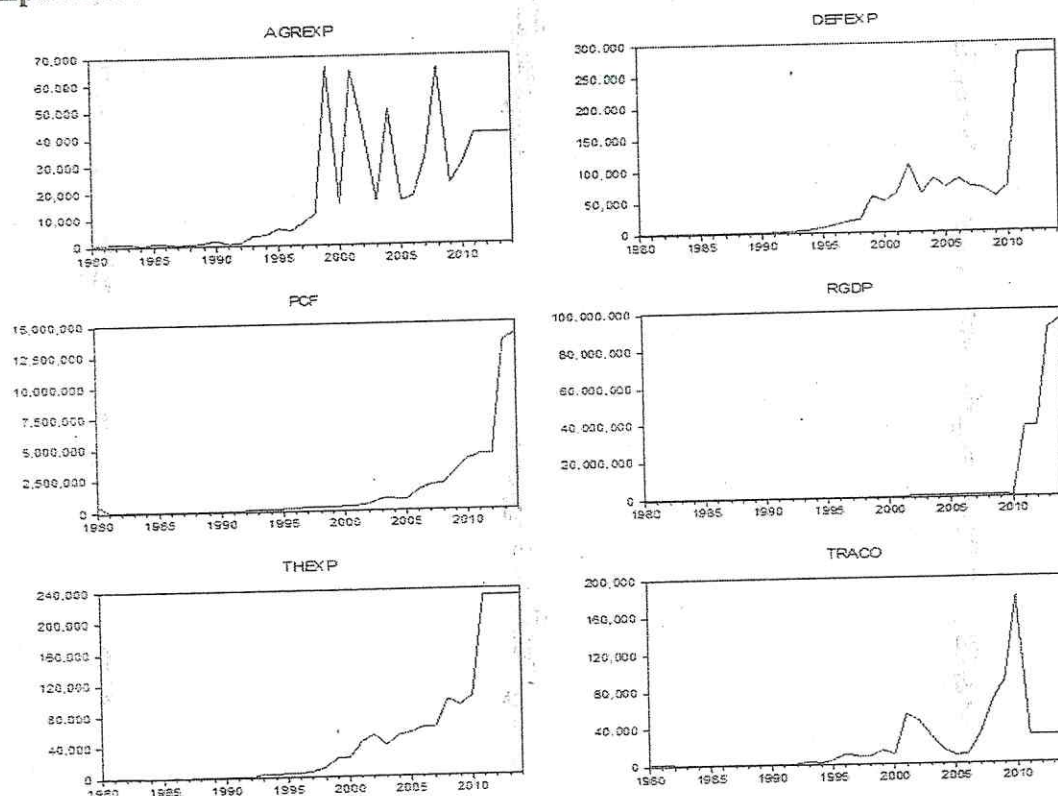


Figure 1: Trend Analysis of Variables  
Source: Authors' Computation, 2017.

Figure 1 presents the trend analysis of the variables to examine their upward and downward movement over the period under review. The figure shows that agricultural capital expenditure was steadily increasing at the beginning of the period up till 1998, after which it surged upwards and downwards continuously until the end of the period. Defence expenditure is also seen to exhibit a steady upward rise from the beginning and increased sharply in 2010 where it remains till date. Capital formation is seen to move in similar fashion as that of defence expenditure, however, its upward surge occurred in 2015. Real GDP is also seen to increase steadily from the beginning and increase very sharply in 2011 and 2012, and remains at that high level till the end of the period. Total stock of human capital is also seen to exhibit an upward trend from the beginning of the period to the end. Transportation and communications expenditure is seen to be relatively unstable over the period. It got to its highest point in 2010 and fell drastically thereafter in 2011.

### Unit Root Test

**Table 1: Unit Root Test**

| S/N | VARIABLE                   |                       | TEST          |                   |         | ORDER OF INTEGRATION |
|-----|----------------------------|-----------------------|---------------|-------------------|---------|----------------------|
|     |                            |                       | Adf Statistic | 5% Critical Value | p-value |                      |
| 1   | Log Real GDP               | Level                 | 0.316083      | -2.963972         | 0.9753  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -5.435218     | -2.967767         | 0.0001  |                      |
| 2   | Log Agric Expenditure      | Level                 | -2.571491     | -2.976263         | 0.1110  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -8.930610     | -2.976263         | 0.0000  |                      |
| 3   | Log Defense Expenditure    | Level                 | -1.923399     | -3.587527         | 0.6148  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -3.915949     | -3.587527         | 0.0253  |                      |
| 4   | Log Physical Capita        | Level                 | -1.643657     | -3.568379         | 0.7509  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -5.459235     | -3.574244         | 0.0006  |                      |
| 5   | Log Human Capital          | Level                 | 1.235503      | -3.595026         | 0.9999  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -3.725196     | -3.574244         | 0.0365  |                      |
| 6   | Log Transport & Comm. Exp. | Level                 | -0.864451     | -3.568379         | 0.9473  | I(1)                 |
|     |                            | 1 <sup>st</sup> Diff. | -5.146493     | -3.574244         | 0.0014  |                      |

Source: Authors' Computation, 2017.

Presented in Table 1 is a test for the presence of unit root of each of the variables used in the model. Unit Root Test is a test to ascertain if the variables used in this model are stationary or non-stationary series. The unit root tests are conducted using the Augmented Dickey-Fuller (ADF) procedure. The trend and intercept options were chosen when conducting unit root test for each of the time trending variables while intercept option was chosen for variables that are not trending with time. The ADF results revealed that all variables are not stationary at level. This is evident from each of their ADF statistic being less than their respective critical values at 5% level of significance and their p-values being greater than 0.05. However, each of the variables are stationary at first difference. This is evident from each of their t-statistic value being greater than the critical value at 5% significance level and their p-values being less than 0.05. This indicates that each of the variables are integrated of order 1 series hence, are regarded as I(1) series. The implication of this result is that using Ordinary Least Squares (OLS) method to estimate the parameters will lead to spurious regression result since the variables are non-stationary series. This necessitates the test of cointegration to check, if at all, there is a long-run relationship among the non-stationary variables used in the model. An appropriate estimation technique which will control the non-stationary nature of those series can then be used. The result of Engle-Granger single equation cointegration test is presented in Table 2.

**Table 2:** Engle-Granger Single Equation Cointegration Test

| Model        | tau-statistic | p-value | z-statistic | p-value |
|--------------|---------------|---------|-------------|---------|
| Log Real GDP | -5.312526     | 0.0198  | -29.70801   | 0.0281  |

Source: Authors' Computation, 2017.

Table 2 presents the cointegration test for the variables in concern in the model, in order to verify if there exist long-run relationships among them. The test states a null hypothesis that no long-run relationships exist among the variables. The decision rule is to reject the null hypothesis if the reported statistics (i.e. tau and z) are statistically significant and, accept null hypothesis if otherwise. The result above shows that for the model in concern, both the tau and z statistic are statistically significant. This is evident from each of their p-values being less than 0.05. The result indicates that the test is significant for the model in concern and suggests the rejection of null hypothesis. A conclusion can then be arrived at that, there exist long-run relationships among the non-stationary series in the model.

### Regression Analysis

The regression result presented in Table 3 shows the impact of government expenditure on agriculture and other selected sectors on economic growth in Nigeria.

**Table 3:** Fully-Modified Least Squares Cointegrating Regression With Money Supply

| Variable           | Coefficient | Std. Error | t-statistic | p-value |
|--------------------|-------------|------------|-------------|---------|
| LNAGRICEXP         | 0.298764    | 0.123832   | 2.412656    | 0.0129  |
| LNDEFEXP           | 0.259267    | 0.836958   | 0.309772    | 0.7590  |
| LNPCF              | 1.244411    | 0.566866   | 2.195249    | 0.0366  |
| LNHC               | 0.152869    | 0.763296   | 0.200275    | 0.8427  |
| LNTRACO            | -1.134868   | 0.465461   | -2.438163   | 0.0214  |
| C                  | 6.621822    | 3.825167   | 1.731120    | 0.0944  |
| R-squared          | 0.708661    |            |             |         |
| Adjusted R-squared | 0.656636    |            |             |         |
| F-statistic        | 8.038392    |            |             |         |
| p-value            | 0.0001      |            |             |         |

Source: Authors' Computation, 2017.

Table 3 presented Fully-Modified Co-integrating regression results of the impact of government capital expenditure on agriculture and other selected sectors on economic growth in Nigeria. The reported R-square of the model shows that the model explains about 70.9% of the variations in the economic growth of Nigeria. This indicates that the model is in good fit. F-statistic also shows that the overall model is significant with a value

of 8.038392 and p-value of 0.0001, which indicates a rejection of the null hypothesis that the overall model is not significant. From the result above, agricultural expenditure, physical capital, and expenditure on transport and communications are statistically significant in affecting economic growth. This is shown by each of the p-values being less than 0.05. Agricultural expenditure and physical capital have positive effects while expenditure on transport and communications have negative effects. The result indicates a rejection of the null hypothesis that agricultural expenditure does not have significant impact on economic growth of Nigeria. On the other hand, defense expenditure and human capital are found to be statistically insignificant. This is shown by each of their p-values being greater than 0.05. This implies that both variables are not important in explaining economic growth of Nigeria. The result indicates that a percent increase in agricultural expenditure will lead to an increase of about 0.3 percent in the economic growth of Nigeria, and vice versa. Similarly, a percent increase in physical capital will lead to an increase of about 1.2 percent in the economic growth of Nigeria, and vice versa. On the contrary, a percent increase in expenditure on transport and communications will lead to a decrease of about 1.1 percent in the economic growth of Nigeria, and vice versa.

### Discussion of Findings

This present paper is similar to other empirical studies carried out as it tries to explore the nexus between agriculture capital expenditure and economic growth in Nigeria and the impact thereof, but differs, as it improves on some of the existing studies which have mixed results.

This paper is in agreement with Iganiga and Unemhilin (2011) that opined that federal government capital expenditure was found to be positively related to agricultural output and Aladejare (2013) who found that the government spending at the aggregate level has positive impact on the growth of GDP and apart from being the main source of food for most of the population, the agricultural sector contributes substantially to GDP and thus has remained vital to the Nigerian economy. On a similar note, the study agreed with Nwadiubu and Onuka (2015) that opined that increasing public spending on health, communication and transport leads to the growing rate of the economy. This is in agreement with the Keynesian's theory.

On the other hand, this paper is contrary to Ogiogio (1995) and Loto (2011) who submitted that in the short run, expenditures on agriculture and education are negatively related to economic growth. In addition, Akpan's (2005) is of the view that no significant relationship exist between economic growth and most of the components of government expenditure and Otu and Adenuga (2006) who found no significant relationship between most of the components of expenditure and economic growth. The paper, however, disagreed with Ebiringa and Charles-Anyaku (2012) that found mixed evidence in their study using Cochrane-Orcutt and ECM. This is because, they observed that public

expenditure on health, telecommunication, education, defence and security sectors had positive effects on the country's economic growth while rising public expenditures on agriculture and transport have impacted negatively on the economic growth of the Nigeria.

#### Conclusions, Economic Implications and Policy Relevance

The major focus of this paper is to establish the empirical analysis of nexus between agriculture capital expenditure and the economic growth of Nigeria using time series data for the period of 1980-2014. The paper has revealed that the explanatory variables (THC, DEFEXP, PCF, TRACO, and AGRTEXP) jointly yielded an R-square ( $R^2$ ) of 0.709. This shows that 70.9% of the total variance in the explained variable (RGDP) was accounted for by the combination of the explanatory variables. This implies that THC, DEFEXP, PCF, TRACO, AGRTEXP jointly explained 70.9% of the total variance on RGDP. This implies that a broad perspective on the agricultural expenditure is crucial for sustainable economic growth in Nigeria. In addition, a rigorous development of the agricultural sector will increase agricultural production and thereby improve productivity and income of rural population and attracts industries to rural area.

Based on findings from the empirical analysis, the paper therefore recommends that to stimulate activities in the economy, the budgetary allocations that goes into funding the agricultural sector should be increased since this component exerts positive and significant impact on the economy. In addition, in the wake of food insufficiency and increasingly annual bills on food importation, the government should take proactive measures to diversify the economy towards more productive economic activities that would drastically reduce the dependency on oil revenues. The government should also embark on expansionary fiscal policies, in the form of attraction of more private investments to the agricultural sector and other sectors, to boost the productivity of labour and enhance economic growth in the country.

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