



DOES AGRICULTURAL SECTOR CONTRIBUTE TO THE ECONOMIC GROWTH IN CASE OF REPUBLIC OF BENIN?

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ABSTRACT

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Every nation has his own resources contributing to the well-being of population and the creation of wealth. The sector that contributes in the country growth is not unique, but there are some who require a close look because they have large contribution in the economic growth such as agriculture sector. The determinants of a country economic growth are a lot but contribute differently to the growth. In this paper, we will discuss the extent of agricultural sector to the economic growth in Republic of Benin and how much it contributes. We will use time series data from 1970 to 2016 and co-integration method considering the order of integration. The results reveal that the GDP per capita, agricultural value added and the human development index have long-run relationship. In addition, an expansion of agricultural sector will have a significant impact on the economy in the long-run and ameliorate the living condition of population.

Contribution/Originality: This study is one of very few studies which have investigated the relationship between agricultural sector and the economic growth in Republic of Benin. It gives the empirical answer to the extent of agricultural sector contribution in the economy of Republic of Benin.

1. INTRODUCTION

Agricultural sector in Republic of Benin occupied a crucial place in the development process and it is important for the overall growth of the economy. This sector is the main source of wealth creation in Republic of Benin. It hires 70 percent of the active population, more than 60 percent of males and 35.9 of females and his contribution on the GDP is 32.3 percent in 2005 and 36 percent in 2011 (World Food Program, 2014). But it has a very low rate of investment which is 6.3 percent of budget spending and 17.1 of public investment in Benin (PDDAA, 2010). There have been a discourse about the agricultural sector participation in the economic growth and how it improves the wealth of rural population for a decades. For the contribution of this sector in the economy growth, all the discourses are unanimous but to what extent? That is the point on which there is a lot of disagreement. Then, the role of agricultural sector in achieving a sustainable economic growth and development is still debatable. The presumed relationship between agriculture and economic growth is an extensively debated topic (Los and Gardebroek, 2015). However, the agricultural sector demonstrates over the pass decades that it is inevitable while talking about the determinants of economic growth particularly in the developing economic. It is in various influential development reports often advocated as a vital tool and crucial sector for economic growth (World Bank,

2007) and according to Los and Gardebroek (2015) the recent economic growth in the most developing African countries could potentially shed light on the causality about relation between economic growth and agricultural development.

The benefit of the productivity in agriculture is widely share in the society and touch mostly the rural population. It is the sector that absorbs more of the labor force by providing raw materials for the industrial sector. All actors in the agricultural sector will benefit from the production and that can considerably reduce the unemployment. According to the WB (2007) report on agriculture, the rural labor market offers employment in the agricultural and non-agricultural sectors to skilled and unskilled labor. In Kenya, the agriculture directly contribute to 24 percent of the Gross Domestic Product (GDP) and it accounts for 65 percent of Kenya's total exports and provides more than 60 percent of informal employment in the rural areas. As the agricultural sector grow, the unemployment will considerably decrease in the rural areas. The situation in Africa provide a case that enable us to study and know more about the relation between the agricultural development and economic growth (Los and Gardebroek, 2015).

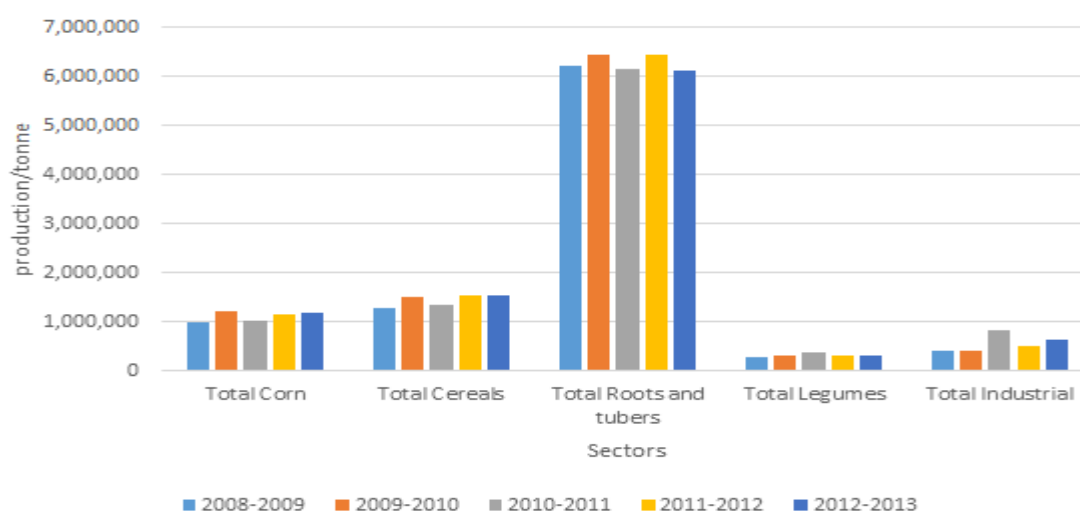


Figure-1. Different sectors of agriculture in Benin

Source: Author own computation base on MAEP data

In the Figure 1, we can see that the roots and tubers production is very high because they are used every day and consumed locally. The industrial production is basically for exportation especially cotton which count for 80% for export revenue.

It has been always argued that agriculture contributes to the economic growth in Africa in particular in sub-Saharan African countries. International institutions like World Bank and African Development Bank stress on the importance of agriculture in economic development and they suggest that government should invest more and give particular attention on the sector. The main motivation of this study is to give an empirical response to the contribution of agricultural sector on Republic of Benin economy. Therefore, we will investigate the extent of agricultural sector in the contribution of the economic growth in Republic of Benin by using a time series analysis.

In the study we find that there is a long-run relationship between GDP per capita, agricultural value added and the human development index. An expansion in agricultural sector will have a significant impact on the GDP per capita in the long-run.

The rest of the paper is organized as follows. Next, we will be giving an overview of Benin economy by emphasizing on the main contributors. In section 3, we discuss the literature review followed by the methodology and empirical results discussion. We conclude in the last section.

2. AN OVERVIEW OF BENIN ECONOMY

Republic of Benin is located in West Africa, next to Nigeria it is a low-income country with a real gross domestic product (GDP) growth projected to go down to 4.6% in 2016 according to the World Bank. Republic of Benin is also a member of the West African Economic and Monetary Union (WAEMU)¹. The two main sectors that make the economy of Benin are the tertiary and agriculture sectors. The tertiary sector as a whole accounts for 50% of GDP, while agriculture sector accounts for approximately 25% of GDP and between 45% and 55% of the country's employment. The economy depends heavily on the transit trade and informal re-export to Nigeria which account for approximately 20% of GDP and on the agricultural production². For example in 2012, the growth rate was 5% from there, it steadily fall to 7% in 2013, and then start slowing down to 6.5% in 2014 and then return to 5% in 2015, mainly as the re-export products to Nigeria slowdown and due to the sharply decline on agriculture production.

Since 1990 just after the national conference of vital elements of the nation, Benin has adopted the liberalist economic. The country always got support for its major projects from the Bretton Woods institutions— International Monetary Fund (IMF) and the World Bank (WB) — since then. The economy is dominated by the agriculture sector where it has the comparative advantage principally in the cotton production, employs approximately half of the active labor force and remains dependent on cotton and transit trade. For instance, in 2016 cotton production reached 451000 tons from 269218 tons in 2015. Republic of Benin economy is vulnerable to Nigeria economy. When there is a disturbance in Nigeria economy, it affects directly the neighbors specially Benin. For instance, the recent economic slowdown in Nigeria has resulted in a decrease in demand for informal re-export and agricultural products from Benin. Thus, as the direct result of slower growth and indirectly as a result of a depreciating Nigerian currency.

The strategic geographical position of Benin allows the economy to have a comparative advantage in commerce and trade. The neighbor Nigeria absorbs a very large fraction of the transit product including Burkina-Faso and Niger. According to the United Nation Development Program (UNDP), the population living below income poverty line is 36.2% and 53.1% respectively in term of national poverty line and PPP \$1.90 a day between 2005 and 2014. As shown in the table 1 below, Benin has always a current account deficit meaning a trade deficit. The deficit is increasing year by year and expected to reach -10.1, a moderate inflation in accordance with the criteria convergence of West African central bank target.

“The cotton sector, represents 80 percent of export revenues, 45 percent of tax revenues, 13 percent of the formation of national GDP in terms of value added, and 60 percent of the industrial fabric of the country” (World Bank Report No. 63939-BJ).

Table-1. Benin Macroeconomic indicators

	2015	2016(e)	2017(p)	2018(p)
Real GDP growth	5.2	4.0	5.5	6.2
Real GDP/capita growth	2.9	1.7	3.2	3.9
CPI inflation	0.4	0.2	2.1	2.6
Budget balance % GDP	-6.5	-6.2	-9.4	-6.9
Current account % GDP	-6.5	-7.1	-8.8	-10.1

Sources: UNDP, domestic authorities, (e) Means estimated (p) Means projection.

In the figure 2 we can see that the agriculture value added is moving along side with the GDP per capita growth and that the human development index is also increasing since 1980. The chart reveals also that agriculture value added has a peak of 37.86% in 1989 while at the same time the GDP per capita hit -5.88%. The increasing of

¹ WAEMU is a group of seven francophone countries who use the same currency CFA

² <http://www.worldbank.org/en/country/benin/overview> visited on Jun 2017

HDI is a sign of living condition amelioration in Benin Republic which imply poverty reduction although the sharply decrease of the agricultural value added in 1998. The important thing about the chart is that neither GDP per capita nor agriculture value added growth effect the foreseen of human development index.

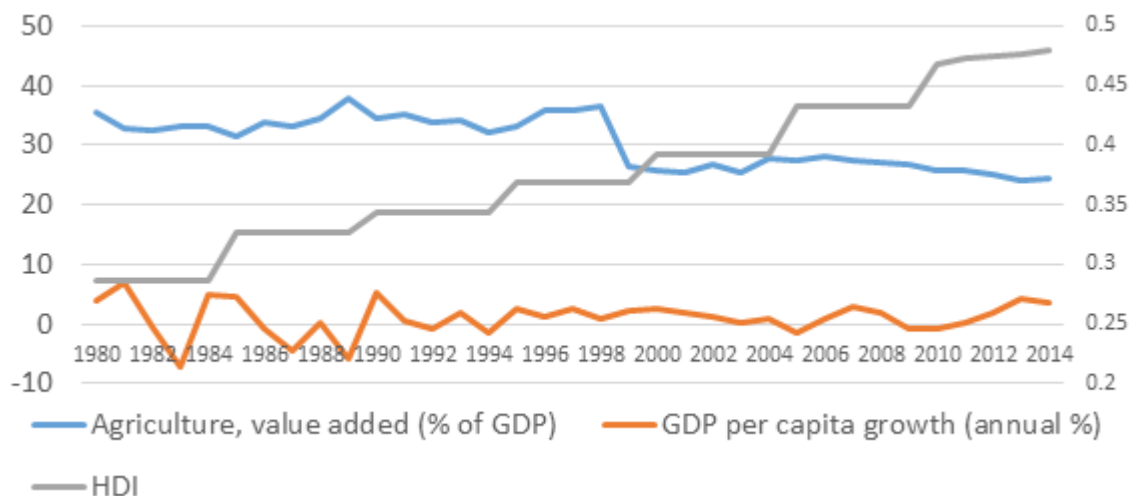


Figure-2. GDP per capita growth (annual %) and Agriculture, value added (% of GDP) 1980-2014

Note: The gray line is depicted on the right-axis.

Source: Author own calculation based on WDI and UNDP data

3. LITERATURE REVIEW

Agricultural sector has been a backbone of the economy in most developing countries reducing unemployment and providing a decent life to the rural population. Even in the time of major economic and financial crisis, the sector survives and backbone the economic growth. The role it plays in a sustained of growth is very important. Izuchukwu (2011) used panel data and applied multiple regression to examine the impact of agricultural sector on the Nigerian economy, and the result indicates that there is a positive relationship between the Gross Domestic Product (GDP) and the domestic savings. Enu (2014) also find a significant impact of agriculture on the Ghana economic growth. Agricultural sector has been the engine of growth and make a critical contribute to the growth of the overall economy (Gardner, 2003; Tiffin and Irz, 2006; Awokuse, 2009; Izuchukwu, 2011). For example, Gardner (2003) found that an increasing in the real output level per worker resulting from the productivity in the agricultural sector growth increases the productivity of labor in the entire economy, and hence increases real income per worker. A higher productivity and growth in the agricultural sector is followed by a possible contribution to the overall economic growth and at the same time release labor as well as capital to other sector in the economy (Dethier and Effenberger, 2012). According to Schultz (1964) in the sense that agriculture guarantee the subsistence of society without which growth is impossible, then it is important for the economy growth.

Beside the agriculture role of supplying food and labor, it contributes to the poverty reduction essentially in the rural area where the sector employ a considerable level of labor force. Productivity in agricultural sector is a potential instrument for poverty reduction. According to Dethier and Effenberger (2012) the agricultural sector contribution to poverty reduction occur directly and indirectly; directly on farm employment and profitability through the effect of agricultural growth, and indirectly in such a way that the increasing in agricultural output imply job creation in both upstream and downstream non-farm sectors as a response to higher domestic demand. Further, the WB (2007) on agriculture for development say that in the agriculture-base countries, agriculture can be the main source of growth and can also reduce poverty by improving the environment. Moreover, according to the World Bank Report No. 63939-BJ, agricultural sector remains one of the key engines of economic growth in Benin with a 0.9 percent average contribution to growth between 2007 and 2009.

Although various literatures have outlined the evidence of agricultural sector importance in the economic growth and poverty reduction, there is some theoretical model opposing the role of agriculture in the development. Matsuyama (1992) model³ suggests that under an open economy assumption, there is a negative link between agricultural productivity and the economic growth. Tiffin and Irz (2006) found in their study of causality between agricultural value-added and the economy growth empirical evidence of the causality existence in developing countries, but remain unclear in the developed countries.

4. DATA AND METHODOLOGY

4.1. Data

The data used in the study are from the World Development Indicators (WDI), Human Development Index (HDI), and from the government of Republic of Benin. The Gross Domestic Product (GDP) per capita and agricultural value-added are from the WDI. Annual GDP per capita aggregates are based on constant 2010 U.S. dollars⁴. Agricultural Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs it is in U.S. dollars constant 2010⁵. The HDI is a summary measure for analyzing long term progress in three main dimensions of human development like a long and healthy life, access to knowledge and a decent standard of living.

4.2. Model

The formulation of the model in stochastic form is as follows

$$\text{LOGGDPPC}_t = \beta_1 + \beta_2 \text{LOGAGRVAL}_t + \beta_3 \text{HDI}_t + e_t \quad (1)$$

Where:

LOGGDPPC stands for the logarithm of GDP per capita, LOGAGRVAL for the logarithm of agricultural value added and HDI the logarithm of the human development index. β_1 to β_3 represent the coefficients and e_t represents the error term.

4.3. Econometric Procedure

In time series analysis, the first step is to conduct a stationary test. A stationary test is to determine whether the variables have a unit root or not. When in a time series data there is a unit root in its autoregressive representation it is subject to a stochastic trend and is consequently non-stationary thus, the series is say to be integrated but if the stochastic trend is common to multiple time series a linear combination of the series exist, which is not integrated then the series is say to be co-integrated (Tiffin and Irz, 2006). However, in many empirical analyses macroeconomic variables exhibit trends. "Formal statistical tests of the unit root hypothesis are of additional interest to economists because they can help to evaluate the nature of non-stationarity that most macroeconomic exhibit" (Phillips and Perron, 1988). Hence, working with non-stationary time series result in

³ For more details about the model used by Matsuyama, it is available at Matsuyama (1992).

⁴ GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources (WDI)

⁵ Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator (WDI).

spurious regression⁶ (Newbold and Granger, 1974; Nelson and Plosser, 1982). Dickey and Fuller (1981); Phillips and Perron (1988) developed two stationary tests which are used more in econometric researches.

In this paper, we employ ADF test to examine the existence of unit root in the series. The ADF equation is given below (including constant and trend case):

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

ΔY_t denotes related variable, Δ denotes first order operator and $\beta_1, \beta_2, \delta, \alpha$ denote parameters used in model and t denotes time trend. m parameter is known as lag in equation (1) and magnitude of this value is determined by Akaike or Schwarz criteria. ADF test is set up by variable is not stationary null hypothesis ($H_0: \delta = 0$) and alternative hypothesis ($H_1: \delta < 0$) (Dilek *et al.*, 2016). T shows number of observation in equation (2). Critical values are used for ADF test. ε_t denotes Gaussians white noise that is assumed to have a mean value of zero, and possible auto correlation represents series to be regressed on the time to Sertoglu *et al.* (2017).

After the series are checked for stationarity, co-integration technique can be applied in the existence of unit root for the whole series (instead of applying OLS technique which requires stationarity but taking first differences is criticized as it leads to loss of long run information). The co-integration technique used in this study is Johansen and Juselius (1990) test.

4.3.1. Empirical Procedure

The first step in the procedure is to test the present of unit root in each series by estimating an ADF equation. In the ADF test I use both constant and constant trend because the variables may exhibit a stochastic trend. To ensure that the errors empirically follow a white noise process⁷, I have to consequently choose the lags length as it remains a crucial and difficult exercise in practice (Wolters and Hassler, 2006). After the unit root test and prove of stationarity, we did the co-integration test in order to analyze the long-run relationship between the variables.

4.3.2. Empirical Results and Discussions

The unit root test of ADF is given in the table 2. At the statistic level we cannot reject the null hypothesis meaning that the series have a unit root and consequently they are non-stationary. To establish the stationarity, we proceeded in differentiating the series at a different lags length. Doing so, we took the first difference for all variables. And as we can expect, the series became stationary meaning that we are able to reject the null hypothesis at different critical levels. Thus, we can say that all the series are integrated of the same order since they exhibit stationarity after taking the first difference. Then now we proceed to co-integration test as series are of the same order. The result of the Johansen co-integration is showing in the table 3 using the Pantula principle. From the test, we just find one co-integrating vector at 0.05 level. Then we reject the null hypothesis of no co-integrating vector as trace statistic (33.41841) is more than the critical value (24.27596) at 0.05 significant level which is also verify at

⁶ It is possible to obtain apparently significant regression results from unrelated data when using non-stationary series in regression analysis. Such regressions are said to be spurious

⁷ A white noise process is a serially uncorrelated, zero-mean, constant and finite variance process. A time series y_t is a white noise process if:

$$E(y_t) = 0 \text{ for all } t$$

$$\text{Var}(y_t) = \sigma^2 \text{ for all } t, \sigma^2 < \infty$$

$$\text{Cov}(y_t, y_s) = 0 \text{ if } t \neq s$$

the probability level (0.0027) less than 5% and we accept the alternative of one co-integrating trace test because we fail to reject the second null hypothesis so there is at most one co-integration. Thus, there is long-run relationship between the series.

Table-2. Augmented Dickey-Fuller test statistic

Variable	Case	Statistic (level)	Statistic (1 st difference)
LOGGDPPC	Constant	0.079042 (0.9607)	-6.880910 (0.0000)*
	Constant and Trend	-2.713554 (0.2362)	-6.871891 (0.0000)*
LOGAGRVAL	Constant	-0.078478 (0.9456)	-7.647019 (0.0000)*
	Constant and Trend	-3.796036 (0.2061)	-7.552605 (0.0000)*
HDI	Constant	-1.536469 (0.5060)	-6.524719 (0.0000)*
	Constant and Trend	-2.001058 (0.5846)	-6.444871 (0.0000)*

The null hypothesis is unit root. LOGGDPPC means logarithm of GDP per capita. LOGAGRVAL is the logarithm of agricultural value added and HDI the human development index. The numbers in bracket are the probabilities. (*) denotes the significant at 5% level

Table-3. Johansen co-integration result

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
R=0	0.454756	33.41841	24.27596	0.0027
R≤1	0.110910	7.944456	12.32090	0.2410
R≤2	0.069094	3.007084	4.129906	□□.098□

(*) rejection of the null hypothesis at 5% level which "there is no cointegrating vector"

The last stage now is to run the vector ECM. Vector ECM approach helps to identify the speed of adjustment of the variable considered toward their long-run equilibrium path (Sertoglu *et al.*, 2017). The ECM links the long-run equilibrium relationship implied by co-integration with the short-run dynamic adjustment mechanism that describes how the variables react when they move out of long-run equilibrium. If the coefficient of co-integrating model (error correction term which value is comprise between -1 and 0) in the long-run is negative in sign and significant then we can say that there is a long-run causality running from HDI and Agricultural value added to GDP per capita. The second issue which is the short-run causality requires to set a null hypothesis. Critical values for the short-run causality test are obtained, by resampling repeatedly and testing the null hypothesis using the modified Wald statistic (Tiffin and Irz, 2006). The table 4 below gives the result of vector ECM. We can see that the error correction term (ECT) is negative for the GDP per capita, agricultural value added and for HDI. This mean that there is a long-run causality between variables with a weak evidence of possible convergence as the coefficient of ECT is statically insignificant. Thus, in a long-run equilibrium path, an expansion of agriculture output and a deviation of HDI will have a considerable impact on Republic of Benin economy. In the short-run, there is no causality between agricultural value added and GDP per capita as well as between HDI and GDP per capita.

Table-4. Vector ECM result

Short and long-run causality	Coefficient	Standard Error	t-Statistic	Probability
long-run causality LOGGDPPC	-0.000201	0.003326	-0.060568	0.9520
LOGAGRVAL	-0.030637	0.00596	-5.13763	
HDI	-0.001011	0.00261	-0.38681	
Short-run causality LOGAGRVAL(-1)	0.154566	0.08560	1.80479	0.0882
HDI(-1)	0.036321	0.21757	0.16693	0.8482

Source: Author own computation based on the data

In the literature there have been several studies about the contribution of agriculture in economic growth such as Sertoglu *et al.* (2017), Awokuse (2009); Gardner (2003); Izuchukwu (2011); Tiffin and Irz (2006). They all find that agriculture contribute to the economic growth and development. Further, they said that agricultural sector is the engine of economic growth. In addressing the question rise by Gardner (2003); Tiffin and Irz (2006) in their paper find that Benin is among the countries for which only the hypothesis that GDP does not cause agricultural value added can be rejected.

5. CONCLUSION

This paper investigates the extent of agricultural sector contribution in Republic of Benin economic growth and also it impacts on poverty reduction. To show this extent and contribution we use (Johansen and Juselius, 1990) co-integration method. Before using co-integration we make sure that the variables are integrated of the same order as it is the necessary condition before run co-integration regression. It is in that way we first did the unit root test by using ADF test and found that the variables have a unit root at different lags lengths at statistic level but at the first difference level, they were stationary. As the results shown with Johansen co-integration, the series exhibit a long-run causality and the absence of short-run causality. The study also reveals that an expansion of agricultural sector will have a significant impact on Republic of Benin economy in the long-run follow by the amelioration of living conditions.

In the absence of natural resources like in Benin, it is necessary to make investment in the agricultural sector which contributes more in the economy growth and reduces poverty. It is urgent also to specialize in the domain where there is comparative advantage like cotton and re-exporting sector. The domestic investment should be diversified no just concentrated in one domain like in cotton which generates a lot of currency.

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