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Role of Agriculture in Economic Development: Case of Burkina Faso

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Abstract: **This study examines the agricultural sector impact into Burkina Faso's economic development and its interactions with other sectors using time-series co-integration techniques. We used annual data from 1970-2015 to estimate a Vector Auto regression (VAR) model that includes GDP per capita and added values of agriculture, industry and service sectors. The result of the estimate indicates that it does exist no causal relationship between agricultural GDP and GDP per capita. The agricultural sector has no positive impact on the economic development in Burkina Faso. As for non-agricultural sectors, the only causal link is that found between industry and agriculture. The total independence between the agricultural sector and the services sector shows that the agricultural sector has not yet played its role as an upstream sector from other sectors. I.e. the sector that by its expansion can induce the development of other sectors, which subsequently will favor the development of the economy as a whole.**

Keywords: **Agricultural Sector, Burkina Faso, Co-integration, GDP, Economic Development, Vector Auto Regression (VAR).**

1. INTRODUCTION

The agricultural sector continues to play a crucial role for development, especially in low-income countries where the sector is large both in term of aggregate income and total labor force. Having been a key preoccupation of developing country governments, donors and the international community during the1960s and 1970s, agriculture disappeared from the development agenda in the 1980s and1990s, only to reappear in the first decade of the 21st century because of neglect and underinvestment (Dethier & Effenberger, 2011).

The success of a nation's development depends in particular to the degree of integration of the agricultural sector with the rest of the economy. So agricultural sector constitutes the key of economic development and could a priority in sustainable development policies and strategies

The Majority of Burkina Faso's population lives and work in rural area. The agricultural sector contributes nearly to 33% to Burkina Faso's GDP and employs about 67, 4 % of the workforce (WDI, 2016). It has a central position in the socio-economic development, while facing several challenges that limit its ability to take full advantage of its potential. The agricultural sector suffers from under-investment, it receives little investment compared to mining, and agricultural investments are mainly concentrated in the cotton industry.

Whereas Burkina Faso has great potential for production and food processing which is poorly valued, many investors are facing funding difficulties. This agricultural production potential is expected to boost in particular private investment that is potentially very profitable if the fiscal environment, the agricultural sector financing system and other measures related to investment code, were favorable. Aware of the leading role of agriculture in the socio-economic development, Burkina Faso has taken promising initiatives to increase productive investment in the agricultural sector by undertaken important

reforms to improve the performance of the sectors of agriculture and livestock on the basis of the Agricultural Development Policy Letter drawn up in 1992 (Ministry of Agriculture, 2011).

In the light of the role, the sector plays in the improvement of living conditions in the developing countries like Burkina Faso and the central role of the agricultural sector makes it imperative to study the impact of this sector in economic development and examine the development policies and strategies for the achievement of socio-economic objectives of the country. This study is organized as follows; the second section outlines the theoretical and empirical literature relative to the role of agricultural sector in economic development. The third section makes a brief analysis of economic and agricultural development in Burkina Faso. In this section, the percentage share of the three sectors (agriculture, industry, and services) of the economy and the relationship between agricultural development and GDP growth were discussed. The fourth section presents the methodology and the framework of the model and carries out the econometrics analysis.

2. LITERATURE REVIEW

The debate over the role of agriculture in the process of economic development extends at least as far back as the Physiocrats in the eighteenth century. The biblical advice to store during seven good years to be ready for seven lean years certainly reflects a concern for agricultural planning (C. Peter Timmer, 1988).

The first literature on development considered that in the economic development, agriculture had a supporting role to industrial sectors by ensuring a supply of cheap food for the workers in industrial sectors. Economists considered increasingly agriculture as a delayed sector in the economy, generating a surplus of labor to industrial sector such as formalized by Lewis (1954) and subsequently extended by Ranis and Fei (1961). Lewis' model rests on the idea of surplus labor in the agricultural sector. With lower productivity in agriculture, wages will be higher in the modern sector, which induces labor to move from agriculture to the modern sector, which in turn generates economic growth.

Since the 1960s, a more active role of agriculture as the driving force of global economic growth has been recognized and emphasized by several authors. Schultz (1964), point out that agricultural sector is important for economic growth in the sense that it guarantees subsistence for society, without which growth is not possible.

This early view on the role of agriculture in economics matched Kuznets' (1966) empirical observation that the importance of the agricultural sector declines with economic development. In this view, the role of agriculture in economic development is to supply cheap food and low wage labor to the modern sector. Otherwise, both sectors have few interconnections. Growth and higher productivity in the agricultural sector can contribute to overall economic growth by releasing labor as well as capital to other sectors in the economy.

Based on the Lewis model, Johnston and Mellor (1961) account explicitly for agriculture as an active sector in the economy. In addition to providing labor and food supply, agriculture plays an active role in economic growth through production and consumption linkages. For instance, agriculture can provide raw materials to nonagricultural production or demand inputs from the modern sector. On the consumption side, higher productivity in agriculture can increase the income of the rural population, thereby creating demand for domestically produced industrial output. Moreover, agricultural goods can be exported to earn foreign exchange in order to import capital goods.

Certain empirical investigations of the relation between the agricultural sector and economic growth have also been carried. Timmer (2002) uses a panel of 65 developing countries over 1960–1985 to show a positive correlation between growth in agricultural GDP and its lagged values and nonagricultural GDP growth. He suggests that this correlation can be explained by ''first-order'' effects of agricultural growth on lower food prices, labor migration, and capital flows from agriculture, as well as ''second-order'' effects, such as improved nutritional intake, which improves workers' productivity. Similarly, Self and Grabowski (2007) establish a positive relation between different measures of agricultural productivity and average growth of real GDP per capita over1960–1995 for a cross-section of countries. Gardner (2005), on the basis of panel data from 52 developing countries during1980–2001, concludes that agriculture does not seem to be a primary force behind growth in national GDP per capita.

Bako and Ouédraogo (2011) was interested in the Burkinabe agricultural financing problems by highlighting the opportunities and challenges of this agriculture order to apprehend the sector's financing needs and analyze the problems of his financing. An econometric analysis used from an error correction model revealed that there is a long-term

relationship between agricultural production and public funding and that funding had a positive impact in the short and long term on the agricultural growth. Simulations carried show that from a growth rate of agricultural public funding by 9% over the 2009-2015 period, the country could attain the Millennium Development Goals (MDGs) for reducing hunger.

Oyakhilomen and Zibah (2014), using time series data, unit root tests and the bounds (ARDL) testing approach to cointegration sought to determine empirical information on the relationship between agricultural production and the growth of Nigerian economy with focus on poverty reduction. The result of the data analysis indicated that agricultural production was significant in influencing the favorable trend of economic growth in Nigeria.

ABALLO (2012), used variables such as agricultural real GDP, industrial and service sectors real GDP to test the impact of the performances of agricultural sector on those of other sectors and the standard of living in Benin. For its modeling, model Vector Autoregressive (VAR) on a time interval from 1970 to 2010 was used. He concluded that the performances of agricultural sector cause and positively influence the living standards of the people in Benin measured by GDP per capita and the performance of the service sector. The performances of the non-agricultural sector has no effect on the agricultural sector. There is a total independence between the performances of agricultural sector and those of the industrial sector. A shock on the agricultural sector has an immediate impact on other sectors and the standard of living of the people in Benin but remains transient at all levels.

Katircioglu (2006) analyzes the relationship between agricultural output and economic growth in North Cyprus using cointegration. The author uses annual data covering the 1975-2002 period, to find the direction of causality in Granger sense between agricultural growth and economic growth. Empirical results suggest that agricultural output growth and economic growth as measured by real GDP growth are in long-run equilibrium relationship and there is feedback relationship between these variables that indicates bidirectional causality among them in the long-run period. The author concludes that agriculture still has an impact on the economy although North Cyprus suffers from political problems and drought.

3. ECONOMIC DEVELOPMENT IN BURKINA FASO

Burkina Faso is a country whose economic performances are strongly dependent on external shocks because of the predominance of agricultural exports especially cotton and the importance of external aid in financing the economy. It is also the 4th largest gold producer in Africa.

Between 1970s and 1995s the average annual growth rate in Burkina Faso was relatively low (3.4% annually). As From 1995s, the real growth rate increased significantly (6.5% per year on average). The devaluation of the CFA franc (FCFA) and its induced effects on the competitiveness of the cotton sector constitute two elements of explanation of this dynamic. Political stability and the spillover effects of high public investment contribute also to explain the change of growth pattern. Moreover, weak integration into the global economy has partially protected the economy of Burkina Faso from negative external shocks while internal shocks (weather, for example) recurrently threaten the performance of the economy. In spite of this, the country has benefited from strong economic growth of 5% on average since the early 2000s (Bedossa, 2012).

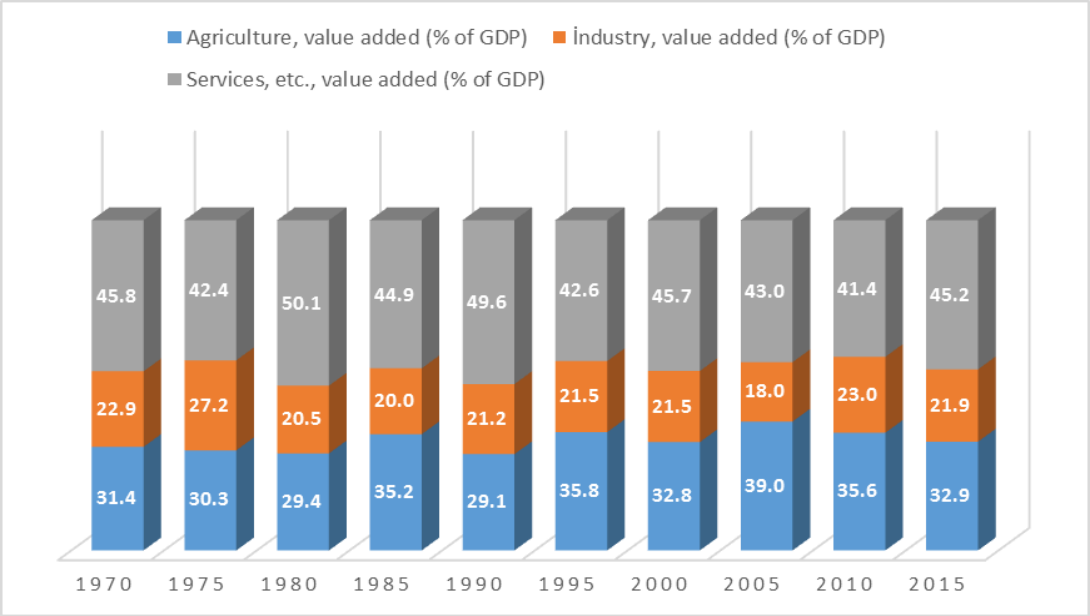
Nevertheless, 83% of the population continues to live in multidimensional poverty situation according to the United Nations Development Program. In fact, Burkina Faso was ranked 183rd by the Human Development Index in 2015. However, economic activity has slowed down considerably over the past three years, with a GDP growth around 4%. This slowing down is due to the fall in international prices of both country's export products (gold and cotton), the repercussions of the crisis of Ebola in the region and to the profound social and political crisis which affected the country.

The socio-economic living conditions in Burkina Faso are particularly precarious and despite the notable expansion of basic public services since the 1970s, a large part of the population remains in a major vulnerability. GDP per capita is still low and malnutrition continues to affect the population regularly in some regions of the country. In this context, a significant part of the population depends on the regional and international food aid in case of shock on the production of food products. Access to basic public services (health and education) is another major socio-economic vulnerability. Thus, the index of human development class Burkina Faso among the most vulnerable countries in the world.

In view of the preceding elements, it is notable that Burkina Faso has not yet initiated a socio-economic development sustained and sustainable. Until the early 2000s, Burkina Faso growth model had however assured the economy a rhythm of sustained and stable growth for two decades. In this context, the emergence of new structuring of growth is particularly important in light of many social and economic challenges faced by the country. To accelerate growth, the country could focus on priority areas. It is therefore necessary to examine the key sectors of the economy.

- **Share of sectors in the GDP growth:**

The review of the sectoral breakdown of gross domestic product (GDP) reveals that the distribution of value added by sector has not changed significantly since the early 1970s.



Source: World Development Indicators 2016

Figure 1: Share of sectors in GDP of Burkina Faso

As shown in the figure above, the service sector, with the largest share in added value is the (45% on average over the period 1970-2015) the first branch of the economy. Overall, the services sector is characterized by high flexibility and low capital requirements. It otherwise absorbs some of the low-skilled labor. These characteristics allow the regular emergence of temporary growth relay (telephony, for ex.) whose contribution to the growth can nevertheless be very significant. The primary sector, consisting partly of Agriculture and Livestock (pillars of the Burkinabe economy), is the second sector of the economy with an average participation in the GDP of 33%. The secondary sector has experienced strong mutation during the 2000 decade. Carried out until 2008 by ginning cotton, the building-public works sector and some small manufacturing industries, it is now driven by the extractive industry. Its average contribution to the GDP remains around 22% over the study period.

- **Agricultural development in Burkina Faso and GDP growth:**

The agricultural sector suffers from heavy dependence on climatic conditions and to changes in the prices of annuity products (cotton, shea almond, peanut and sesame) on international markets. Agriculture is dominated by small family farms from 3 to 6 hectares employing on average three to five agricultural assets. It is based essentially on the rainfed cereals and is therefore largely dependent on rainfall. Livestock occupies a prominent place in economic, social, and environment and represents 12% of GDP and 18.6% of export earnings. The annual average of this sector to the annual growth is around 3.8% over the period 1970-2015. Burkina Faso has been an agrarian country, with its rural population at more than 85% and agriculture accounting for around 60% in employment and 33% in GDP. As we can see in the figure below, there are close relationship between GDP growth and agricultural added value in Burkina Faso. Even simple coefficient of correlation also shows a very high relationship between growth rates of GDP and agriculture. During years over 1970 to 2015 correlation index of GDP and agriculture growth was 0, 63.

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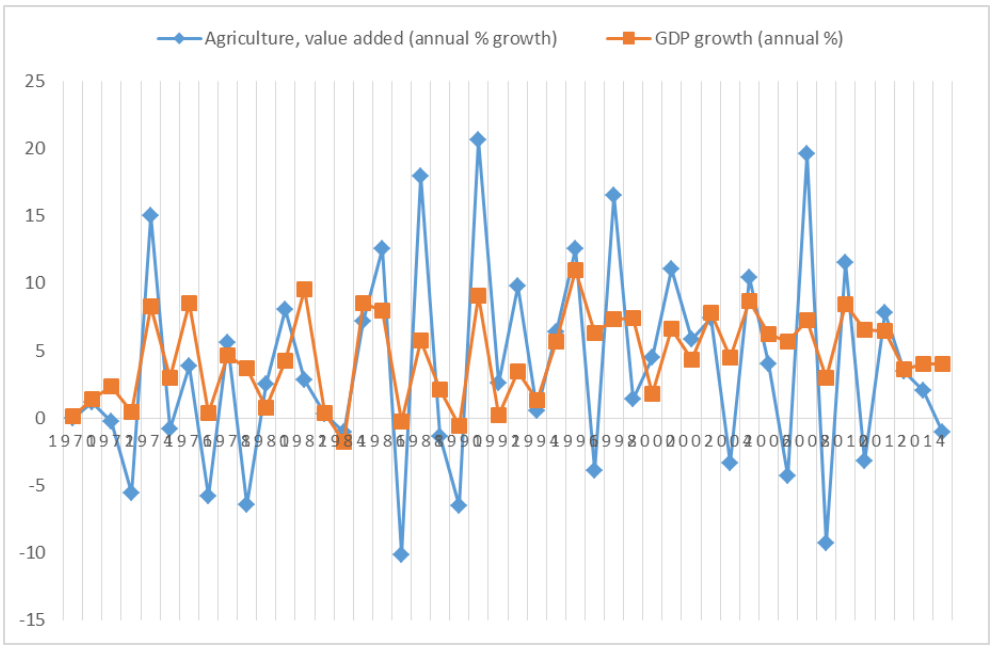

Source: World Development Indicators 2016

Figure 2. Agricultural and GDP growth in Burkina Faso

4. METHODOLOGY

Using an econometric model, this section estimates the relationship between the economic performances of the agricultural sector and the economy in general and its interaction between other sectors (industry and services). In order to overcome hazards due to the application of methods of classical linear regression on data that change over time, recent developments on time series econometrics will be used. In economic literature, the traditional approach that was used to measure the impact of agriculture on economic growth was made by determining the effect of agricultural sector growth on other sectors so-called "modern" and the economy in general. The agricultural sector was considered as exogenous and its performances served to explain a part of the evolution of the rest of the economy. This methodology will be heavily criticized and authors have made proposals as to the evaluation of the impact of agriculture on the economy of a country.

İt is important to note that with advances in time series econometric techniques, Kanwar (2000) & Chaudhuri and Rao (2004) recommend that in estimating the relationship between agricultural and non-agricultural sectors the former should not be assumed to be exogenous, rather, this should first be established. Kanwar (2000) investigated the co-integration of the different sectors of the Indian economy (namely, agriculture, manufacturing industry, construction, infrastructure, and services) in a vector autoregressive (VAR) framework to circumvent problems of spurious regressions given the presence of non-stationarity data. So we have retained for this modeling a Vector Autoregressive (VAR) model, if necessary an error correction model (ECM) in case of the presence of at least one co-integrating relationship between the variables.

4.1. The Functional Form of the Model:

For the estimation of the relationship between agricultural sector performances and those of the economy and its interaction with other sectors (industry and services), we have retained the following variables:

PGDP: Per Capita Gross Domestic Product (2010 US Dollar);

AGDP: Agriculture Gross Domestic Product;

İGDP: İndustry Gross Domestic Product;

SGDP: Services Gross Domestic Product;

For the purpose of the research, the relationship among the dependent and independent variables is presented as following:

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$$\mathbf{PGDP} = \mathbf{f}(\mathbf{AGDP}, \mathbf{\dot{I}GDP}, \mathbf{SGDP}) \quad \textbf{(1)}$$

Model Specification:

The mathematical formulation of the model is presented as follows:

$$\mathbf{lnPGDP_t} = \boldsymbol{\alpha_1} + \boldsymbol{\beta_2}\mathbf{lnAGDP_t} + \boldsymbol{\gamma_3}\mathbf{ln\dot{I}GDP_t} + \boldsymbol{\delta_4}\mathbf{lnSGDP_t} + \boldsymbol{\epsilon_t} \quad \textbf{(2)}$$

ln: Natural logarithm;

$\boldsymbol{\alpha_1}$ **:** Constant term;

$\boldsymbol{\beta_2}, \boldsymbol{\gamma_3}, \boldsymbol{\delta_4}$ **:** coefficients of the explanatory variables;

$\boldsymbol{\epsilon_t}$: Error correction term.

4.2. Econometrics Analysis:

The data analysis was carried out using Eviews 8.0.

4.2.1. Test for Stationarity:

This section presents the Unit root test conducted on the variables. As the first step, to diagnose the stationary status of the variables in order to determine the appropriate test and estimation model to employ.

Table 1: Unit Root test applied to variables

Variables	ADF TEST Critical Values		ADF Test Statistic	Prob- Values	Decision rules
lnpgdp	1%	-4.180911	-7.987501	0.0000	I(1)
	5%	-3.515523			I(1)
lnagdp	1%	-4.186481	-6.842475	0.0000	I(1)
	5%	-3.518090			I(1)
lnigdp	1%	-4.192337	-5.490540	0.0003	I(1)
	5%	-3.520787			I(1)
lnsgdp	1%	-4.180911	-7.977859	0.0000	I(1)
	5%	-3.515523			I(1)

Source: Computed by author; Eviews

The unit root test conducted on the variables shows that the variables found to be non-stationary at level. A further test of stationarity by first level of difference shows the variables attained stationarity. lnPGDP, lnAGDP, lnIGDP and lnSGDP attained the stationarity by first level of differencing at one percent level of significance. The results of this test necessitate the performance of cointegration test in order to confirm the existence of long run relationship among the variables. Before this test, we will determine the order of the VAR.

4.2.2. Cointegration Test:

İt is necessary to conduct Cointegration test for the model to determine if there is long run association among the variables. The results of this test will allow to decide on the utilization of a VAR in case of no co-integration or VECM if there is a cointegration relationship.

Table 3: Presentation of Johansen Test of Cointegration

Hypothesized: Number of Cointegrating Equations	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob. **
None	0.426226	46.27971	47.85613	0.0698
At most 1	0.266524	21.83681	29.79707	0.3077
At most 2	0.161997	8.198526	15.49471	0.4444
At most 3	0.009551	0.422273	3.841466	0.5158

Source: Computed by author; Eviews

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

The test shows that there is no cointegrated equation at the 0.05 level. That implies that there is no long run relationship among the variables; consequentially, this necessitates the use of a simple VAR model operated on differentiated variables once because in our case here there is integration and not cointegration.

4.2.3. Determining the order of the VAR:

For reasons specific to the data size, the maximum size is fixed at 4. Then the values of the information criteria were calculated. The results are presented in the table below.

Table 2: order of the VAR

Lag	LogL	LR	FPE	AIC	SC	HQ
0	291.4230	NA	1.34e-11	-13.68681	-13.52132*	-13.62615*
1	308.9711	30.91811*	1.25e-11*	-13.76053*	-12.93307	-13.45723
2	321.2306	19.26492	1.52e-11	-13.58241	-12.09298	-13.03648
3	331.8095	14.60892	2.09e-11	-13.32426	-11.17286	-12.53569

Source: Computed by author; Eviews

The Three information criteria (LR, FPE, AIC), give the optimal lag 1. The SC and HC criteria give no optimal lag. The SC and HQ criteria lead to convergence estimators of p (p=optimal lag) while the AIC criterion gives an efficient estimator of p. The value p = 1 will be retained because of the length of our series.

4.2.4. VAR model estimated:

The estimated VAR model gives the following results:

Table 4: VAR Model

	D(LNPGDP)	D(LNAGDP)	D(LNIGDP)	D(LNSGDP)
D(LNPGDP(-1))	0.537905	0.829592	-1.381423	1.685794
	(0.44977)	(0.95366)	(1.32673)	(0.80143)
	[1.19594]	[0.86990]	[-1.04122]	[2.10349]
D(LNAGDP(-1))	-0.265156	-0.813756	0.744674	-0.505606
	(0.14879)	(0.31549)	(0.43891)	(0.26513)
	[-1.78203]	[-2.57933]	[1.69665]	[-1.90702]
D(LNIGDP(-1))	-0.127437	-0.239963	0.036529	-0.196350
	(0.10330)	(0.21902)	(0.30470)	(0.18406)
	[-1.23370]	[-1.09562]	[0.11988]	[-1.06678]
D(LNSGDP(-1))	-0.275963	-0.537392	0.780340	-0.733148
	(0.18768)	(0.39795)	(0.55362)	(0.33442)
	[-1.47036]	[-1.35040]	[1.40951]	[-2.19227]
C	0.037947	0.085407	0.001380	0.081785
	(0.01123)	(0.02382)	(0.03314)	(0.02002)
	[3.37798]	[3.58565]	[0.04166]	[4.08584]

Source: Computed by author; Eviews

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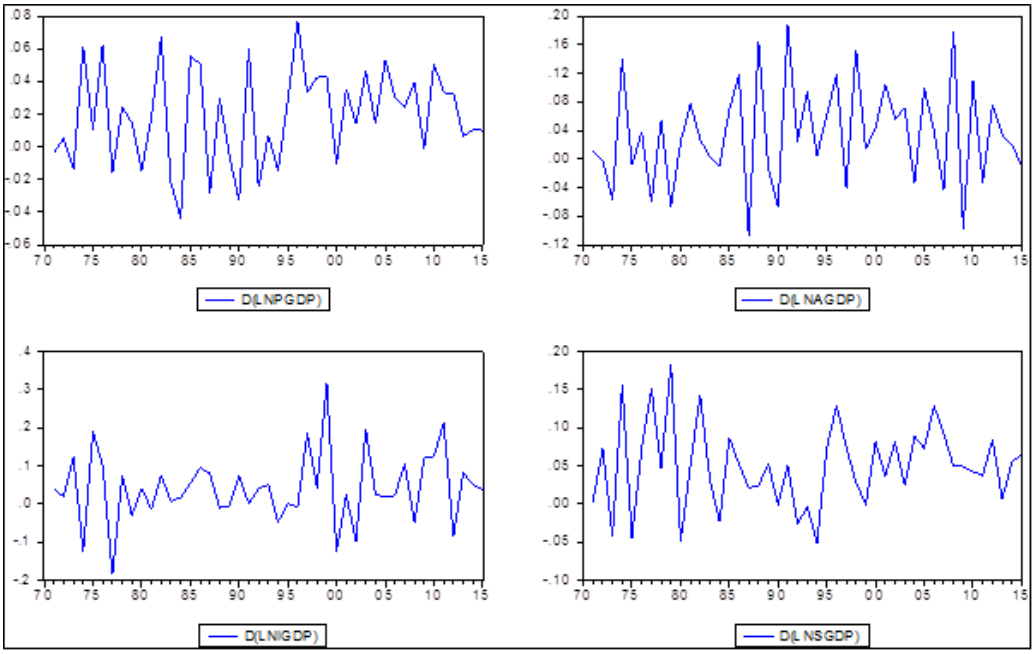
The estimation results suggest a weak causal relationship between the variables because the coefficients associated with retarded terms are not significantly different from 0 as the value of Student's t of these coefficients is less in absolute value to the value critically read in the Student table for a threshold α = 5% (1.96).

Also the analysis of the equations shows that for example, the main sectors (agriculture, industry and services) of the economy negatively influence GDP per capita. We could also observe a positive influence living standards of the population (GDP per capita) on the performances of agricultural and services sectors. The industrial sector performances are positively influenced only by those of the agricultural sector.

- **Stationarity test of the VAR model:**

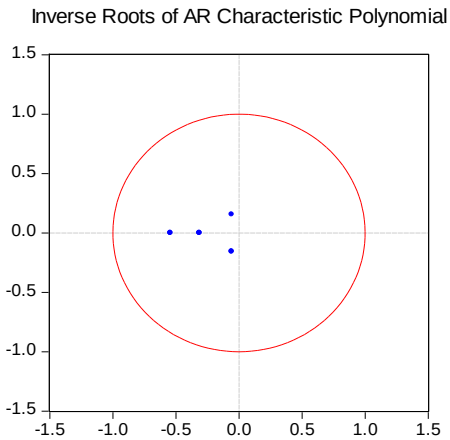
We can start by checking the stationarity of our series in first differences by visual examination. As we see, each of the series seem stationary.



Source: Realized by author; Eviews

Graph 1: First differences visual examination

Furthermore, we are able to check the stability of the VAR through EVIEWS that allows us to visualize graphically the reverse of the roots assigned to the AR part of each variable. We obtain the following graph:



Source: Realized by author; Eviews

Graph 2: Inverse Roots of AR Characteristic Polynomial

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Through the analysis of the graph, we observe that no root of the characteristic polynomial is outside the circle, I.e. that all the roots are less than "1" in a module. The VAR is therefore stationary.

Similarly, EVIEWS gives us the mathematical conditions of stationarity, as we can see on the graph below:

Table 4: Mathematical conditions of stationarity

Root	Modulus
-0.543250	0.543250
-0.313461	0.313461
-0.057879 - 0.155557i	0.165976
-0.057879 + 0.155557i	0.165976
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Source: computed by author; Eviews

We note that all module roots are less than 1, therefore our VAR model is stationary.

4.3.5. Granger causality test:

The causation analysis will allow us to know the statistically significant influences of the four variables in the model between them. Analysis of this causality is a prerequisite to the study of the dynamics of the model. Let us remember that Granger considers that a variable X causes another variable Y if the predictability of the first is improved when information on the second is incorporated in the analysis. We get the following results:

Table 5: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LNAGDP does not Granger Cause LNPGDP	45	2.77212	0.1034
LNPGDP does not Granger Cause LNAGDP		0.00748	0.9315
LNIGDP does not Granger Cause LNPGDP	45	1.55955	0.2186
LNPGDP does not Granger Cause LNIGDP		15.3148	**0.0003**
LNSGDP does not Granger Cause LNPGDP	45	0.34796	0.5584
LNPGDP does not Granger Cause LNSGDP		3.73428	0.0601
LNIGDP does not Granger Cause LNAGDP	45	4.08744	**0.0496**
LNAGDP does not Granger Cause LNIGDP		16.4467	**0.0002**
LNSGDP does not Granger Cause LNAGDP	45	2.19152	0.1462
LNAGDP does not Granger Cause LNSGDP		2.53499	0.1188
LNSGDP does not Granger Cause LNIGDP	45	9.43400	**0.0037**
LNIGDP does not Granger Cause LNSGDP		4.84696	**0.0332**

Source: Computed by author; Eviews

Y does not cause X, if H_0 is accepted, at the threshold $\alpha = 5\%$. The H_0 hypothesis is accepted if the p-value > 5%.

- **Causality test between LNAGDP and LNPGDP**: The two null hypotheses are accepted. There is no causality between LNAGDP and LNPGDP at Granger's sense.

- **Causality test between LNIGDP and LNPGDP**: The null hypothesis that the LNPGDP does not cause LNIGDP is rejected. At Granger's sense (differentiated series), GDP per capita influences the performances of the industrial sector at the 5% threshold over the period studied. However, it should be noted that reverse causality is statistically rejected.

➢ **Causality test between LNSGDP and LNPGDP**: The two null hypotheses are accepted. There is no causality between LNSGDP and LNPGDP at Granger's sense.

➢ **Causality test between LNAGDP and LNIGDP**: The null hypothesis that LNAGDP does not cause LNIGDP is rejected. At Granger's sense (differentiated series), the agricultural performance influences those of the industrial sector at the 5% threshold over the period studied. Inverse causality is statistically verified. It is therefore a reciprocal causal link between LNAGDP and LNIGDP variables.

➢ **Causality test between LNAGDP and LNSGDP**: The two null hypotheses are accepted. There is no causality between LNAGDP and LNSGDP at Granger's sense.

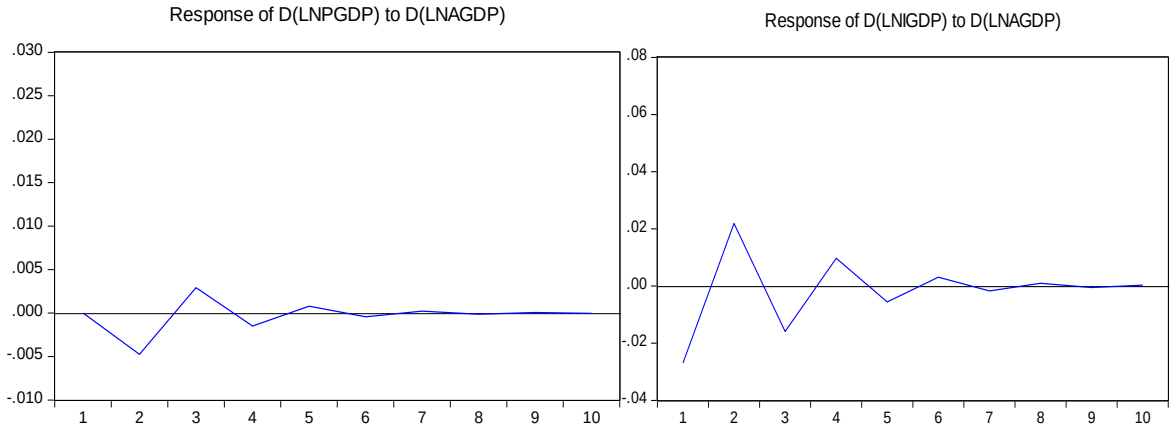
➢ **Causality test between LNIGDP and LNSGDP**: The null hypothesis that LNSGDP not cause LNIGDP is rejected. At Granger's sense (differentiated series), the service sector performance influence those of the industrial sector at the 5% threshold over the period studied. Inverse causality is statistically verified. It exist therefore a reciprocal causal link between LNSGDP and LNIGDP variables.

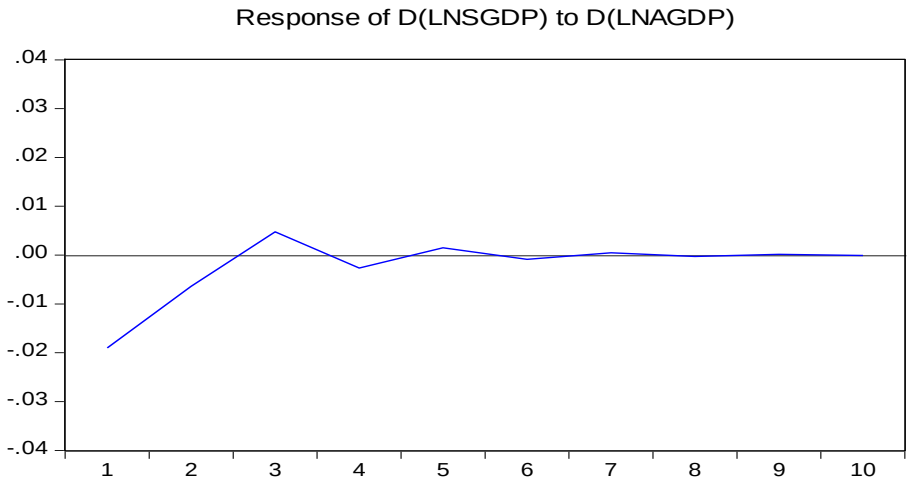
Granger causality tests, have bright out three relationships ie, a unidirectional causal relationship between LNPGDP and LNIGDP (LNPGDP influence LNIGDP), a reciprocal causality relationship between LNAGDP and LNIGDP and also between LNSGDP and LNIGDP.

4.2.6. Impulse response functions analysis:

These functions allow identifying the nature of impacts on the different variables specified in the model. Figures tracing the impulse response functions are below.

➢ **The shock into the agricultural sector:**





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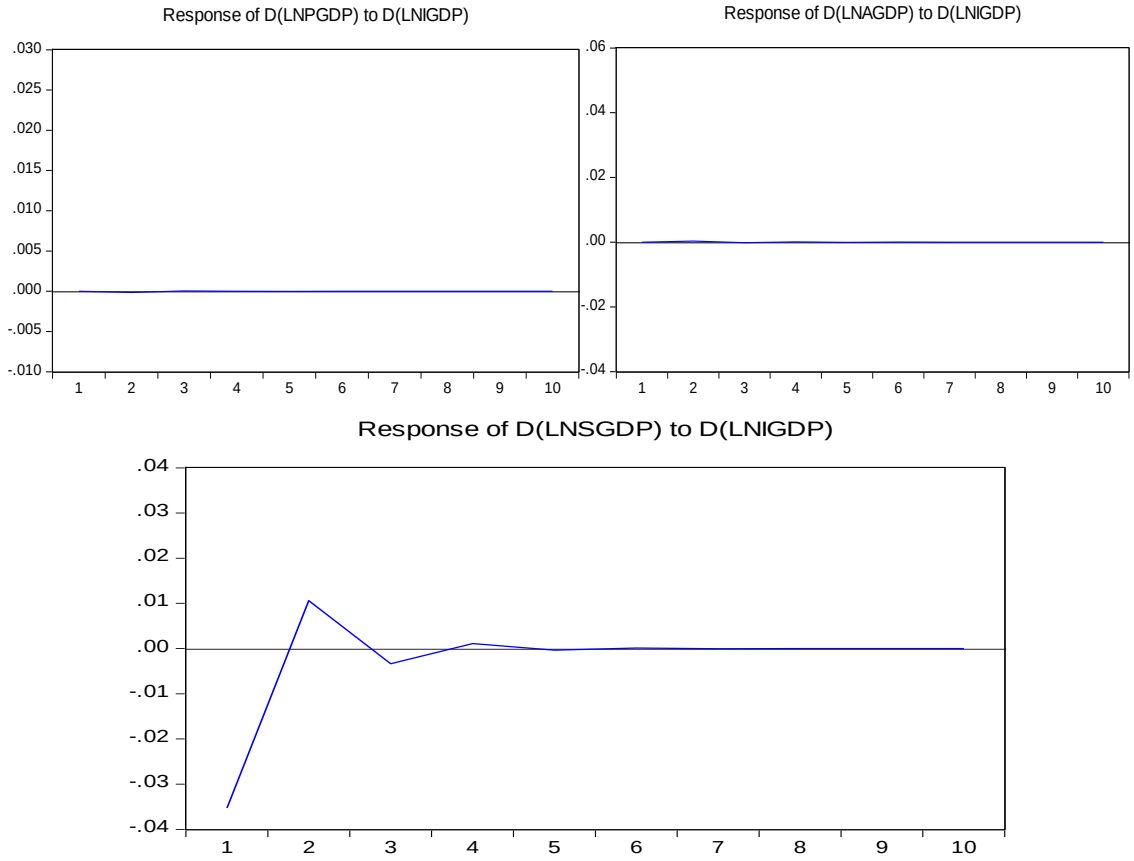
The shock in the agricultural sector is translated by a null effect in the first period and negative in the second period on GDP per capita. This effect becomes positive the next period and alternates by decreasing in intensity until it becomes null towards the eighth period. The same shock has an almost null effect on industry sector. A shock on the agricultural sector does not impact the industry. The shock in the agricultural sector has resulted by a negative effect on the service sector in the first two periods. This shock results by a positive effect in the third period but remains negligible. The performances in the agricultural sector impact negatively those in the service sector.

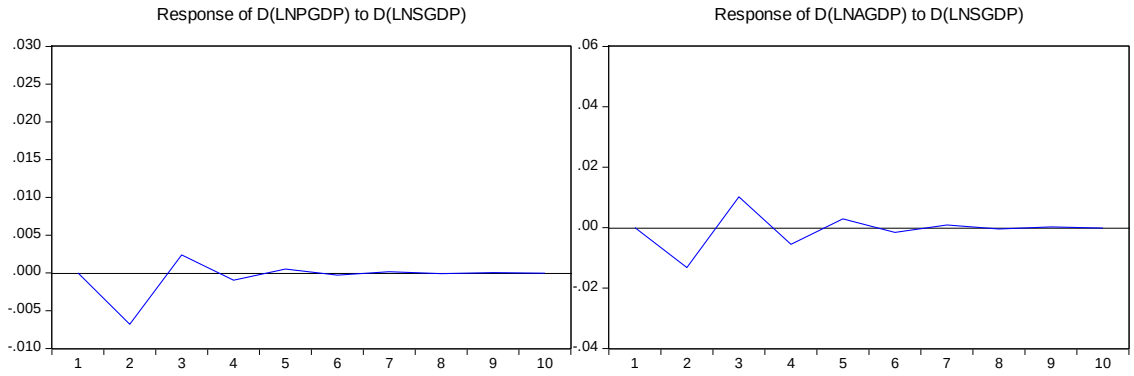
- **The shock into the industrial sector**:

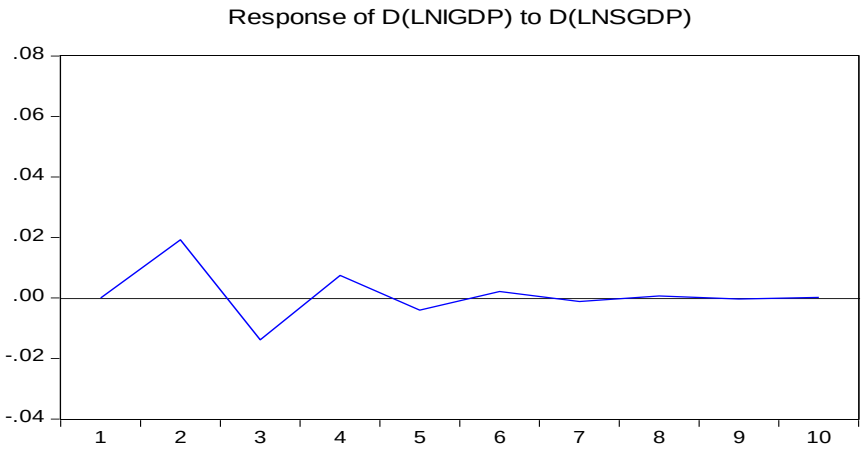


Source: Realized by author; Eviews

The shock in the industry has resulted in almost no effect on GDP per capita and the agricultural sector. This shows that the performances of the industrial sector level almost do not influence the level of life of the population and agricultural activities. A shock in the industrial sector leads on the other hand by an immediate negative effect on the service sector. This effect alternates from one period to another, decreases in density, and then becomes zero from the fifth period.

- **The shock into services sector**:





Source: Realized by author; Eviews

The shock into the service sector has resulted by an immediate null effect on GDP per capita and the agricultural sector. This effect becomes negative in the second period and alternates from one period to another and decreases in density until it becomes zero from the fifth period. The same shock has resulted by a null effect on the industrial sector in the first period. This effect becomes positive in the second period and alternates from one period to another and decreases in density until it becomes zero from the seventh period.

4.2.7. Analyse de la décomposition de la variance :

The variance decomposition allows determining to what extent the variables interact between them, i.e. in what "direction" the shock has the most impact. Findings related to the study of the variance decomposition of each variable are shown in Annex Y.

- Over a period of ten (10) years, the variance of the forecast error of GDP per capita is due to 91.17% of its own innovations, 3.45% of the agricultural sector economic activity, 0.003% of industrial sector and 5.37% of service sector. The activities in the services sector contribute more to improving the standard of living of the population.

- The variance of the forecast error of the agricultural GDP, is due to 57.4% of its own innovations, 5.35% of economic activity in the service sector, 0.002% of the industrial sector and 37.25% of GDP per capita. It therefore shows that the performance of the agricultural sector activities are more influenced by the improvement of living standards of the population here measured by GDP per capita.

- The variance of the forecast error of the industrial GDP is due to 67.23% of its own innovations, 15.97% of agricultural sector, 6.41% of the service sector and 10.39% of GDP per capita. The agricultural sector contributes more to improving the performance of the activity of industry sector.

- The variance of the forecast error of the service sector GDP is due to 28.16% of its own innovations, 12.78% of GDP of agricultural sector, 40.22% of industry and 18.83% of the standard living of the population measured by GDP per capita. The performances of industrial sector more contribute to those in the services sector.

The results on the analysis of the variance decomposition confirm those obtained at the analysis of the impulse response functions.

5. CONCLUSION

The VAR model used to analyze the impact of agriculture on economic development in Burkina Faso during the period of 1970 to 2015 showed a weak causal structure between the different sectors. At the significance threshold of 5%, there is practically no causal relationship between GDP per capita and the performances of the agricultural sector. As for non-agricultural sectors, the only causal link is that found between industry and agriculture. However, the results of the analysis of the impulse response functions and variance decomposition show that in reality the impact of agriculture on industry is negligible. We note a total independence between the agricultural sector and the service sector.

These results can be explained by the fact that agriculture in Burkina Faso is still at the stage of consumption. It is only a subsistence farming on small areas just to provide for food needs but not an income generating activity. In addition, disarticulation of sub-Saharan African economies in general and Burkina economy in particular may be a reason. Indeed the economy of Burkina Faso is an extroverted economy, raw materials coming from primary sector (agriculture and livestock) are exported in raw form, and the industry does not always use locally produced raw materials. Commercialized finished products are from imports for most.

Moreover, the hypothesis of a labor transfer from agriculture to industry is difficult to observe in Burkina Faso. This can be explained by the fact that on the one hand, the industrial sector is not structurally capable of absorbing the workforce underemployed from agricultural sector and by the fact that workforce is not sufficiently qualified. The labor transfer is done most often towards the informal sector with the rural exodus phenomenon, which explains the growing evolution on the part of informal sector (services) in the Burkina Faso's economy over recent years. Agriculture in Burkina Faso has trouble to play its role of upstream sector in the economy, that is to say, the sector which by its expansion can induce the development of other sectors which subsequently promotes the development of the economy as a whole.

Based on these observations, we tried to formulate some recommendations as follows:

- The existence of appropriate and competitive processing industries is an obstacle for the development of the agricultural sector. The transformation of basic products gives a greater value added to the product, and therefore increases the wealth created. At the same time, the promotion of agro-industries is likely to create additional jobs as well in agriculture and outside it. The export of basic products in their raw state contributes to the deterioration of terms of trade. The creation of agricultural product processing factories is therefore required.

- We often remark that in Africa and particularly in Burkina Faso, the increase of agricultural production are generally more due to an increase of the agricultural surface than an improvement of yields. This is due to the fact that agriculture is not modernized and the fact that the workforce is less qualified. It is urgent to improve agricultural productivity through an increase in capital and technology intensity.

- African States had pledged to provide 10% of their budgets to agriculture. That figure is not yet reached. On the other hand, the problems in the agricultural sector are numerous especially the high cost of fertilizers and other inputs and the insufficiency of conditioning means in particular for food crops. It would be necessary to review the agriculture funding policies. It would be also necessary to encourage agribusiness. This will allow investing more in this sector and thus increasing agricultural yields and the share of this sector to GDP.

- One of the causes for bad agricultural yields in Burkina Faso is the phenomenon of climate hazards. Agriculture is practiced only during rainy season so it remains dependent on rainfall conditions. One might therefore bypass this dependency by practicing farming of against-season. This would occupy the farmers who spend a good part of the year without work and they will see their incomes and living conditions improve.

- To accelerate growth, the country could focus on infrastructure such as roads, energy and information and communications technology. This axis of development would aim to improve the economic competitiveness and facilitate access to regional and international markets. Better diversification of the economy is also strategic in the perspective of reducing the high dependency of the country on a small number of export commodities like the gold and cotton.

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