Agricultural Exports and Economic Growth in Burkina Faso

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Abstract
The objective of this research is to analyze the relationship between agricultural exports and economic growth in Burkina Faso. It employs Solow (1956) production function model augmented agricultural exports as a theoretical framework for the analysis. For the empirical analysis, we studied the long-term relationship between agricultural exports and economic growth in Burkina Faso through the cointegration test of Johansen (1988). The data used in this investigation cover the period 1970 to 2018 and come from the database of the World Bank and FAO. The results showed that there is a long-term relationship between the variables of the model. As a result, we have estimated a vector error-correction model that shows a positive relationship between agricultural exports and economic growth. The results of the Granger causality test show that it is exports that affect economic growth in Burkina Faso. Thus, it is suggested to policy makers to support agricultural producers through agricultural subsidies or export promotion policies.
Keywords: agricultural exports, economic growth, Burkina Faso

1. Introduction

The capacity of a country to export is an indicator of its internal dynamism and its insertion in the international market. Indeed, exports allow a country to go beyond the local market to evolve towards more buoyant markets and more providers of foreign exchange in order to improve its economic performance (Ouédraogo et al, 2003). This is the case of China, which has achieved economic growth rates of more than 10% for several years (World Bank, 2014) thanks to its exports.

For Bhagwati (2004), trade is an important instrument for achieving economic growth. Integration into world tradeseems to be an effective way to achieve better economic performance. Exports are the main source of foreign exchange in Burkina Faso (DGCE, 2012). They are used to finance imports of manufacturing goods and capital goods for the investments required for economic growth.

The relationship between exports and economic growth has been the subject of several debates in economic theory. Classics including Smith (1776) and Ricardo (1817) show that international trade plays an important role in the economic growth. For them, each country must specialize in the export of goods for which it has an absolute or comparative advantage to stimulate its economic growth. For neoclassicals, exports make rational use of resources. Viner (1950) shows that international trade allows an optimal allocation of resources through the creation of trade flows. For example, a country may abandon an asset that it produces inefficiently for the benefit of a partner country and import it. It will therefore devote its resources to the production and export of goods for which it has a comparative advantage.

In view of these approaches, the positive effects of exports on economic growth seem to be confirmed. However, when considering developing countries whose exports are essentially primary products, this relationship can be questioned. In fact, developing countries are essentially exporters of primary products. In Burkina Faso, the composition of its exports shows that the country is specialized in primary exports. Over the period 2007 to 2016, gold and cotton exports from Burkina Faso accounted for more than 85% of total exports (Kaboré et al, 2019).

Lewis (1950) developed the thesis of export pessimism. Focusing on agricultural products, he doubts economic growth based on agricultural exports; the main cause being the inelasticity of demand for these products in relation to supply. In addition, the theory of the relation between the "center" and the "periphery"[1] developed by Prebisch (1950) shows that the specialization of developing countries in the exports of primary products can only be a factor of weak economic growth; because of the continued deterioration of the terms of trade. Noula et al. (2013), show that specialization in agricultural exports led Cameroon to an economic crisis in the 1980s due to lower international prices for primary products. Levin and Raut (1997) show that agricultural exports do not affect economic growth in a study conducted in 9 developing countries in Asia.

As a result, a more refined analysis considering only exports of agricultural products appears necessary. In Burkina Faso, few studies have analyzed the relationship between exports and economic growth. CAPES (2003) studied the influence of exports on economic growth in Burkina Faso. The study considered exports as a whole. The results show that exports contribute significantly to GDP growth in both the short and long term. This study examines the relationship between agricultural exports and economic growth in Burkina Faso. This work aims to

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[1]The center represents developed economies while the periphery refers to developing economies

analyze the long-term relationship between agricultural exports and economic growth in Burkina Faso.

The rest of the paper is organized as follows. The second section presents the literature review on the issue and the third section presents the theoretical framework, the analysis methodology and the data. The fourth section is devoted to the analysis and interpretation of empirical results. As for the last section, it draws a general conclusion from the research followed by the implications of economic policies.

2. Literature review

In this section we will review empirical studies that have investigated the relationship between exports and economic growth. In a first sub-section, we present the studies that have dealt with exports in a global manner and then in a second subsection focus on studies that have analyzed the relationship between agricultural exports and economic growth.

2.1 Relationship between exports and economic growth

Rana and Pradoumna (1985) studied the influence of exports on economic growth in 14 developing countries in Asia. The results revealed that exports contribute significantly to the economic growth of these countries.

In the same line Gupta (1985) gets to the conclusion that there is a dual causality between exports and economic growth. His investigation focused on Israel and the Republic of Korea. In these countries, exports are both a cause and a consequence of economic growth.

Ram (1987) studied the relationship between exports and economic growth using panel data in 88 developing countries. The results show that the contribution of exports to economic growth is important. Individual country analysis shows that there is a positive relationship between exports and economic growth in 80% of these countries. Pooled regression provides almost the same results. The relationship between the two variables is positive for all countries except for a few very poor countries.

Ekanayake (1999) studied the relationship between exports and economic growth in 9 developing countries in Asia based on a time series covering the period 1960-1997. It results in mixed results. With the exception of Malaysia, there is a dual causality between exports and economic growth.

El-Sakka and Al-Mutairi (2000) conducted a study on the relationship between exports and economic growth in Arab countries during the period 1970-1999. They relied on cointegration and causality tests. The results obtained are similar to the above mentioned analyzes. Indeed, the study revealed that there is a dual causality between exports and economic growth in countries such as Algeria, Jordan and Mauritania. On the other hand, in Saudi Arabia, Morocco, Syria and Iraq, the thesis of export-led growth is verified. In the United Arab Emirates, the sense of the relationship is unique but it is rather the economic growth which is at the source of the increase of the exports. In countries like Libya, Tunisia, they found that there is no relationship between the 2 variables.

In the same vein, Subasat (2002) obtains mixed results. His analysis of the empirical relationship between exports and economic growth in developing countries has shown that the most export-oriented countries, such as middle-income countries, are experiencing faster economic growth than relatively low-income countries. The study also showed that export promotion does not necessarily have significant impacts on economic growth, especially in low-income countries.

CAPES (2003) studied the influence of exports on economic growth and poverty reduction in Burkina Faso. The results showed that exports contribute significantly to GDP growth in both the short and long term. In the short term, export growth of 1% leads to GDP growth of 0.27%. In the long term, the influence of exports is greater. At this level, an increase in exports of 1% leads to GDP growth of 0.78%.

In the same line, Lezona (2005) leads to a similar result in Congo Brazaville. Indeed, he studied the influence of exports on economic growth in this country on the basis of a time series that spans the period 1972-2002. The results show that exports do not have a significant influence on the economic growth of this country.

Shirazi and Manap (2005) tested the export-led growth thesis in 5 South Asian countries. The results revealed that there is a strong correlation between exports and economic growth with the exception of Sri Lanka and India. In addition, they have shown that there is a dual causality between exports and economic growth in Bangladesh and Nepal, while in Pakistan it is exports that stimulate economic growth.

Saminirina and Adamson (2013) examined the relationship between exports and economic growth in Madagascar. Econometric analysis shows that an increase in export of 10% results in an economic growth of 0.95%.

Dritsakis (2014) is interested in analyzing the relationship between exports and economic growth in the United States of America, the European Union and Japan. To do this, he used the Johansen cointegration test and the Granger causality test. The results show that with the exception of Japan, there is a cointegration between the two variables. In addition, the causality analysis shows that there is a dual causality between exports and economic growth in these two zones.

Gokmenoglu et al (2015) analyzed the long-run relationship between exports and economic growth in Costa Rica using Johansen's (1988) cointegration test and the Granger causality test. The Johansen cointegration results

indicate a long-run equilibrium relationship between exports and economic growth. The results of the Granger causality test show unidirectional causality ranging from economic growth to Costa Rica's export growth.

Kpemoua (2016) analyzed the impact of exports on economic growth in Togo as well as the existence of a causal relationship between exports and economic growth based on cointegration techniques Johansen (1988) and Granger causality. The empirical results reveal a positive and significant correlation at the 1% long-term threshold between exports and economic growth and a sense of causality ranging from exports to economic growth.

2.2 Relationship between agricultural exports and economic growth
Previous studies have focused on a global analysis of exports. Developing countries in general and Burkina Faso in particular, are exporters of primary products. It is therefore important to focus on the empirical work that has analyzed the effects of these exports on economic growth.

The study by Johnston and Mellor (1961) discussed the role of the agricultural sector in the economic development process. It concluded that exports of these products were the main source for increasing income and gaining gains from international trade.

Levin and Raut (1997) compared the contribution of primary and manufacturing exports to economic growth. They conducted their study in 09 developing countries over the period from 1960 to 1997. The results showed that exports of manufacturing products were the main source of economic growth. The contribution of primary products is negligible.

Dawson (2005) analyzed the contribution of agricultural exports to economic growth in developing countries. The author used a panel of 62 countries covering the period 1974-1995. The results confirm the thesis of export-led growth. He highlighted the crucial role that agricultural exports play in economic growth.

As a result of this work, Sanjuan-Lopez and Dawson (2010) examined the contribution of agricultural exports to economic growth in developing countries. They used panel data that spans 42 developing countries to perform the analysis. The results corroborate previous studies. Indeed, they indicate that an increase in exports of 1% leads to a GDP increase of 0.07%.

Faridi (2012) studied the contribution of agricultural exports to economic growth in Pakistan. He conducted his study using the cointegration technique of Johansen on the basis of a time series that covers the period from 1972 to 2008. The results show that agricultural exports negatively affect economic growth in Pakistan. An increase in these exports of 1% results in a 0.58% drop in GDP.

Noula et al. (2013) also examined the influence of agricultural exports on economic growth in Cameroon by taking the case of cocoa, coffee and bananas. The data used cover the period 1975 to 2009. They obtained mixed results. The study found that banana and coffee exports contribute to Cameroon's GDP growth, while cocoa exports do not significantly affect economic growth.

Kang (2015) analyzed the relationship between agricultural exports and economic growth. He focused on the specific case of rice where he merely examines the situation of the major exporting countries namely Vietnam, India, Pakistan and Thailand. The results showed that rice exports stimulate economic growth in these countries.

3. Analytical framework
3.1 Model Specification
Several studies on economic growth have used production functions. It is therefore possible to adapt these models to achieve the objective of this study. As a result, the theoretical framework of this paper is based on the neoclassical model of growth developed by Solow (1956). It is specified from a production function whose inputs are labor and capital. The basic model is as follows.

$$Y_t = f(L_t, K_t) \quad (1)$$

Y, L, K represent respectively output, labor force and capital. The index t is a time indicator.
In order to capture the effect of agricultural exports on Burkina Faso's economic growth, the model was expanded to include exports. Their introduction into the model makes it possible to take into account the international factors that affect production and that are not captured by the traditional arguments of the neoclassical function. Dawson (2005), Faridi (2012), Noula et al. (2013), used such models to study the relationship between agricultural exports and economic growth. The following expanded model will be used in the investigation.

$$Y_t = f(L_t, K_t, AX_t) \quad (2)$$

Where AX_t represents agricultural exports. The Cobb-Douglas form of equation (2) becomes:

$$Y_t = A_t K_t^{\beta_1} L_t^{\beta_2} AX_t^{\beta_3} \quad (3)$$

Taking the logarithm of equation (3) leads to the next econometric form.

$$\ln Y_t = \ln A_t + \beta_1 \ln K_t + \beta_2 \ln L_t + \beta_3 \ln AX_{Ct} + \varepsilon_t \quad (4)$$

Considering the variables taken in this model, we obtain the following equation:

$$l\,gdpcapitaconst_t = \beta_0 + \beta_1 \lg cf_t + \beta_2 \text{lactpop}_t + \beta_3 laxvaluep_t + \varepsilon_t \quad (5)$$

The endogenous variable (lgdpcapitaconst) selected is the real Gross Domestic Product (GDP) per capita. It helps to understand the evolution of economic growth in volume.

The independent variables used in the model are:

- L represents the active population (lactpop). According to the International Labor Organization (ILO), these are people aged 15 to 59 years. It plays an important role in the production process and can therefore positively affect economic growth.
- K designates the gross fixed capital formation (lgcf). It is the sum of all the expenditures made to improve the physical and human capital.
- AX represents the value of exports of agricultural products (xavaluep).

3.2 Data Sources

This research uses secondary data covering the period 1970 to 2018 to analyze the relationship between agricultural exports and economic growth in Burkina Faso. The data is provided by two sources. Export data for agricultural products are provided by the FAO database. Data for the other variables come from the World Bank's database (World Development Indicator 2018).

3.3 Methodology

This paper is based on recent developments in time series econometrics to analyze the long-term and causal relationships between agricultural exports and economic growth in Burkina Faso. As a result, the approach will be done in three steps: unit root test, Johansen cointegration test (1988), Granger causality tests (1988) as part of an error-correction vector model.

4. Empirical results

4.1- Stationarity test results

In the econometric literature, there are several tests that determine the degree of integration of a variable. There are, among others, the Dickey-Fuller (DF) test, the Augmented Dickey-Fuller (ADF) test, and the Phillips-Perron (PP) test. Ongono (2010) shows that the results of the ADF and PP tests are almost identical. Because of this, the ADF test is used to determine the order of integration of the variables in the model. The null hypothesis of the test assumes that the series is nonstationary against the alternative hypothesis that the series is stationary. The decision rule is:

- If the value of the ADF statistic is greater than the critical value read on the table, the unit root hypothesis cannot be rejected; the series is not stationary,
- Otherwise, the assumption of presence of a unit root is rejected; the series is stationary. Table 1 presents the results.

Table 1: ADF Test Results

Variables	Level	First Différence	Conclusion
laxvaluep	-2.309	-4.546***	I(1)
Lgcf	-2.569	-3.614 **	I(1)
lgdpcapitaconst	-1.023	-4.330***	I(1)
lactpop	-2.241	-1.719	NS

*** (**) means that the unit root hypothesis is rejected at 1% (5%)

I (0): Level stationary; I (1): stationary in first difference.

The results show that the null hypothesis of unit root presence cannot be rejected for the variables used in the model. All these variables become stationary in first difference with the exception of the active population which remains non stationary even in first difference. As a result, it is possible to study cointegration of these long-term variables.

4.2- The results of the cointegration test

To study the long-term relationship between variables, the Johansen (1988) cointegration test is applied to the model to determine the existence of a long-term relationship between variables. If the Max-Eigen trace statistic and statistic are greater than the 5% critical values, the null hypothesis of no co-integration cannot be accepted. Table 2 presents the results.

Table 2: Johansen (1988) cointegration test results

Number of cointegration relationships	Trace Statistic	5% Critical Value	MaximunEigenvalueStatistic	5% Critical Value
r*=0	79.8982	68.52	32.7017	33.46
r= 1	47.1966	47.21	25.5998	27.07
r= 2	21.5968	29.68	13.2599	20.97
r= 3	8.3369	15.41	6.0001	14.07
r= 4	2.3367	3.76	2.3367	3.76

* indicates the rejection of the null hypothesis of non-cointegration at 5%

Considering these results, the null hypothesis that there is no cointegration relationship between the four variables (r = 0) is rejected at the 5% threshold by the trace statistic. On the other hand, the hypothesis of at most one cointegration vector (r ≤ 1) cannot be rejected because the trace and Max-Eigen statistics report values lower than their critical values. As a result, it can be noted that there is a cointegration relationship between variables implying a long-run equilibrium relationship between agricultural exports and economic growth in Burkina Faso.

4.3- Results of the Vector Error Correction Model (VECM)

The cointegration relationship gives us the ability to estimate anVector Error Correction Model using the system approach proposed by Johansen (1990). Table 3 presents the estimation results of this model.

Table 3: Results of the Vector Error Correction Model (VECM)

Endogenous variable = real GDP per capita	
L1. D_lgdpcapitaconst _ce1	-0.4734218***
	(-4.02)
LD. lgdpcapitaconst	0.1071127
	(0.65)
LD. laxvaluep	0.0215115**
	(2.24)
LD. lgcf	0.0418291
	(1.45)
LD. lactpop	-0.8600741
	(-0.69)
_cons	-0.0349043
	(-1.12)

*** (**) Significant at 1% (5%).

The values in parentheses are the z-statistics of the normal distribution

Table 4: Results of Jarque- Bera test for normally distributed disturbances

Lag	chi2	df	Prob> chi2
1	24.2952	16	0.08325
2	13.2887	16	**0.65154**

H0: no autocorrelation at lag order

In view of the results of Jarque- Bera test for normally distributed disturbances, it can be noted that the model is globally adequate. Indeed, the probability of Kidheux associated with the delay of two period shows is high. As a result, we cannot reject the H0 hypothesis of the absence of autocorrelation of second-order errors.

In addition, the coefficient of the error correction term (L1.D_lgdpcapitaconst _ce1) is negative and less than 1. It is significant at the 1% threshold. This coefficient indicates the speed of adjustment. This confirms the existence of a long-term relationship between agricultural exports and economic growth in Burkina Faso because 47.34% of deviations from equilibrium are corrected in the long term.

We also note that the coefficient associated with agricultural exports is positive and significant at the level of 5%. Indeed, an increase in agricultural exports of 1% results in a real GDP per capita increase of 0.02% in the long term. This result confirms the export-led growth hypothesis. Indeed, the agricultural sector occupies a fundamental place in Burkina Faso's exports. The sectoral composition of exports has long been dominated by agricultural exports, which are used as foreign exchange for the purchase of capital and investment goods to support the country's economic growth. This result corroborates those found by Noula et al. (2013) which show that banana and coffee exports positively affect GDP growth in Cameroon.

The coefficients associated with other variables such as gross fixed capital formation and labor force are not significant. This result is contrary to our expectations because theoretically these variables are expected to positively affect economic growth. This paradoxical result could be explained by threshold effects. Indeed, the current level of these variables may be considered low enough to start the country's economic growth. In addition, the intersection of these variables with other variables such as the quality of institutions can better explain this

result.

The results of the VECM give us long-term influence without precision on the meaning of causality. For the sense of causality, we will use the Granger test (1988). The table 'presents this result.

Table 5: Result of the Granger causality test

NullHypothesis (Ho):	F Statistic	Prob.
laxvaluep does not Granger Cause lgdpcapitaconst	7.00*	0.0720
lgdpcapitaconst does not Granger Cause laxvaluep	7.73	0.1022

* Significant at the 10% level

In view of this result, we cannot accept H0 at the 10% threshold that exports do not cause long-term economic growth. As a result, we note that in Burkina Faso, the sense of causality ranges from exports to economic growth.

5. Conclusion and policy implications

This paper analyzed the relationship between agricultural exports and economic growth in Burkina Faso. In fact, it reviewed previous research on the issue before focusing on the situation in Burkina Faso. To conduct the analysis, we started from a Cobb-Douglas neoclassical production function that we analyzed empirically on the basis of data in a time series covering the period 1970-2018. After studying the order of integration of the variables, we found using the cointegration test of Johansen (1988) that the different variables are cointegrated; hence the application of a Vector Error Correction Model. The results of this model show that agricultural exports affect Burkina Faso's economic growth in the long run. We also found that the others in the model, that is, the labor force, gross fixed capital formation, do not significantly influence the country's economic growth.

Given these results, it is important for Burkinabe policy makers to support the export policy of agricultural products in order to boost its economic growth. Decision-makers could, for example, support agricultural producers by organizing them into a cooperative to facilitate exports of their products. Overall, this sector should receive special attention from public decision-makers by allocating the necessary funding for its development. Thus, innovation in the agricultural sector must be a priority. It must integrate the use of improved seeds and more profitable production techniques for producers to increase agricultural surplus for export. The state could also adopt export subsidy policies and negotiate with agricultural producers' trading partners to provide them with more income.

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