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Response of cereal supply in Burkina Faso to the introduction of agribusiness

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ABSTRACT
Since 1990, cereal production in the former Sissili, Burkina Faso, has experienced sustained growth, which some consider extensive despite the introduction of agribusiness around 1995. Therefore, this study was, conducted to identify the determinants of this growth and the impact of the agrobusiness introduction on cereal supply. For this purpose, the Nerlove production function was used to identify the determinants of production of the main cereals using time series data. In addition, the breakpoint in average tests of Alexandersson on these series were applied to detect the changes induced by the introduction of agribusiness. According to this study, the production of different cereals depends on areas planted, rainfall, past production and not price. In addition, the main cereal (corn) exploited by agribusiness men has not experienced a average-break in its yield. Finally, the price does not influence the quantities produced and reflects that production is always subsistence and not profit-oriented despite the introduction of agribusiness.

Anahtar Sözcükler:
Cereal
Supply response
Nerlove Model
Standard Normal
Homogeneity Test
Former Sissili

Burkina Faso’daki ticari tarım işletmelerinin tahıl sektörüne girişinin arz duyarlılığı

ÖZET
Burkina Faso’da eski Sissili’de 1990'dan beri tahıl üretimi artmaktadır. Bu üretim artışının nedeni 1995 yılından itibaren büyük işletmelerin artışı ve gelişimi olarak düşünülebilir. Bu çalışma, bu büyümenin belirleyicilerini tanımlamak ve tarımsal işletmelerin büyüme üzerindeki etkisini belirlemek için yapılmıştır. Bu amaçla, zaman serisi verileri kullanılarak belli başlı tahılların üretiminde etkili olan faktörleri belirlemek için Nerlove üretim fonksiyonu kullanılmıştır. Ayrıca bu zaman serileri üzerinde Alexandersson’un ortalama testlerdeki kesme noktası, tarımsal işletmelerden kaynaklanan değişiklikleri belirlemek için uygulanmıştır. Bu çalışmaya göre farklı tahılların üretimi fiyata değil, ekilen alan, yağış ve geçmişteki üretime bağlıdır. Buna ek olarak, temel ürün olan mısır üretiminde üreticiler mısır veriminde bir ortalama değeri elde edememişlerdir. Sonuç olarak, fiyat üretim miktarını etkilememekte, büyük işletmelerin sektöre giriş yapmasına rağmen üretim hala kâr odaklı olmayıp, geçimlik üretim şeklindedir.

Keywords:
Tahıl
Arz Duyarlılığı
Nerlove model
Standart normal
homojenlik testi
eski Sissili

1. Introduction

Burkina Faso's economy is strongly dominated by agriculture, which employs nearly 80% of the working population and contributes 32% to the Gross Domestic Product (GDP). Cereal crops such as millet, sorghum and maize are predominant with 78.69% of the area sown (Burkina Faso, 2015a). However, they face enormous production constraints such as irregular rainfall, non-fertile soil, and low utilization of agricultural inputs, low productivity of traditional cultivars, and the adverse effects of predators (FIDA, 2001). Despite all these constraints, agricultural production has almost grow linearly in some cases and exponential in others since 1990s (Kaboré et al., 2015). Total production of millet, maize and sorghum increased by 116.78% between 1990 and 2014. The relative performance of cereal production was achieved in the context of the coexistence of family farming and agribusiness created by the National Council of the Revolution (NCR) to encourage large-scale exploitation in order to achieve productivity gains and food security.

NCR believes the economic theories of the 1960s that agricultural growth was a preliminary for economic growth and its take-off the economy (Rostow, 1960). Indeed, by the productivity gains it saves, it is able to feed a growing population, ensures the exports necessary to the balance of foreign trade and allows the meeting of the necessary conditions for industrial development episode. The NCR acted effectively by providing agricultural areas with basic infrastructure and technical supervision of farmers through village groups and cooperatives, which achieved food self-sufficiency at the time. Unfortunately, the outline of the mutation was quickly short-circuited by the advent of the Agricultural Structural Adjustment Programs (ASAP), which reduced supervision and support for farmers, and substituted individual ownership to collective ownership. With the adoption of the Land and Agricultural Reorganization (LAR) Act in 1996, the government reintroduced the concept of land title to definitively destroy kolkhozes and collective ownership and give place to individual ownership and agribusiness.

Land liberalization has been a therapy of the shock for peasant agriculture, which was in a state of change under the impulse of the great family producers and the agricultural market. The gregarious movement and expropriator of the lands of the agribusiness men gave rise to a land raid and its hoarding. Indeed, in 2011 alone in Ziro province, there were already 190 new actors, the majority of whom were just coming in and had 6,474 hectares of land, of which 2,512 hectares were exploited (GRAF, 2011). The rest of the land neither exploited nor lent to the despoiled peasants is therefore inactive holdings or a hoarding of the rural land by the agribusiness men.

Despite the larger idling fertile land, the cereal output in the former Sissili has grown exponentially over the period 1990-2015, which deserves attention to its factors. Most of the literature describes it as extensive because it is done by increasing the factors of production mainly by the cultivated areas (Kaboré et al., 2015; Dai et al., 2004; Nicholson, 2005) and not by an improvement in yields.

The objective of this study is to estimate the reactions of the cereal supply to any change, and more specifically to the introduction of agribusiness in the area.

2. Material and Method

2.1. Study area

The former-Sissili is located in the center-west of Burkina Faso and borders with Ghana. Until 1995, it was made up of a single province of which Leo was the chief town. It stretched over 12,275 km^2. Its division into the provinces of *Ziro* (5,139 km^2) and *Sissili* (7,136 km^2) emanates from the national decentralization process which began in 1993 and culminated in 1995 to the erection of fifteen new provinces from the most crowded departments of their origin province. The annual growth rate of the population was 3.1% and it was estimated 334,544 inhabitants in 2015. The region was well watered (Ouedraogo, 2003) with average rainfall well above 800 mm. Traditional cereals such as sorghum, maize and millet account for more than 80% of tons production and also account for more than 86% of the land sown. Sorghum was the most important cereal crop with an average production of 67,100 t and occupied 53.54% of the area sown. It is followed by maize which had an average production of 51,273 t and occupied 23.69% of the land. However, maize was the most productive speculation with an average yield of 1.81 t ha^{-1} followed by sorghum 1.04 t ha^{-1} and finally millet with 0.85 t ha^{-1}. But less than 10% of farmers produce because it is risky as evidenced by its coefficient of variation for corn, millet and sorghum were 90.97%, 33.83% and 29.66%, respectively. Therefore, the productive character of maize is, however, fully demonstrated only under conditions of adequate water supply and fertilization, which are more stringent than for millet and sorghum. Although, market-oriented farms could reduce the associated risk by investing in them and making larger profits in view of the profitability of the corn.

2.2. Analytical Approaches of Nerlovian Model

Neoclassical economic theory makes a fundamental difference between the supply and the production function. It relates the quantity of goods offered at a given price, which an economic agent or group of economic agents decides to sell. While production is a function of the inputs used and their combination. But the production, supply and even consumption functions of a subsistence agriculture are closely related and make it difficult to separate specification. There is a series of interferences of producers' decisions to produce, sell and consume. At the same time, producers are also consumers of what they produce. In fact, producers do not act separately as producers or consumers. The choices in these two areas are necessarily made simultaneously (Fraval, 2000) under the constraint of limited resources for which a permanent compromise exists between consumption and productive expenditure or investment. The agricultural producer is then sensitive to variations in the traditional parameters of supply, production and consumption. This distinction should only be considered as a necessary instrument for classification. In this respect, the contribution of Nerlove (1956, 1958) to the modeling of this behavior is very broad (Kaghoma, 2009), integrating supply and production elements into the same supply function. This is why this model is most commonly used in analyzes of the agricultural supply response (Janssen and Perthel, 1990; Sadoulet and DeJanvry, 1995).

In this study, the chosen function is estimated in a usual form in the econometric models of farmers' reaction to prices. First, by taking the lessons of the models inspired by the work of Nerlove (1967, 1979, 2002), we included producer price, the price of the previous year assimilated to a variable of price anticipation, and delayed production as an explanatory variable in the model. The real price was calculated by deducting the nominal price by the consumer price index. At the same time, the area planted by other cereals influences the overall level of production of the target cereal and therefore it was considered as explanatory variables. Finally, a natural variable influencing production and rainfall heights in the region was also introduced as an explanatory variable. The adjustment was calculated over the period 1990-2015 using data from the General Directorate for the Promotion of the Rural Economy/Ministry of Agriculture, Hydraulics and Fishery Resources (DGPER/MAHRH), the National Institute of Statistics and Demography (Burkina Faso, 2000; 2009; 2011; 2014; 2015b) and the Department of Agricultural and Food Statistics and Forecasting (DPSAA) for area, yield and production data; the National Society for the Management of Food Security Stock (SONAGESS) (Burkina Faso, 2013; 2015a) for the prices.

Finally, the rainfall series were collected from the General Direction of Meteorology from 1990 to 2015. The distribution of each variable over time was given by the annual average of Sapouy and Leo.

In order to analyze the supply response, production, yield and area sown were selected as endogenous variables (Mcclelland and Vroomen, 1988). In this study, we will analyze the response of cereal supply through production, which is as follows:

$$Q^*_t = \alpha_0 + \alpha_1 P^*_t + \alpha_2 Z_t + \varepsilon_t \quad (1)$$

Where: Q^*_t is the current production desired, P^*_t is the desired current price, Z_t is other exogenous variables influencing output, ε_t is the term of the perturbation is a white noise.

The production, effective or expressed at time t, is Q_t, whereas the desired production, planned or targeted, or the optimized production in the environment of t, is the unobservable variable Q^*_t of the price P_{t-1}. The adjustment process then describes the route by which Q_t progressively approaches Q^*_t, namely:

$$Q_t - Q_{t-1} = \delta\left(Q^*_t - Q_{t-1}\right) + U_t \text{ with } 0 \leq \delta \leq 1$$

$$Q_t = (1-\delta)Q_{t-1} + \delta Q^*_t + U_t$$

The coefficient δ determines the adjustment speed. If δ = 0, then there will be no adjustment at all, and if δ = 1, equation (2) reduces to $Q_t = Q^*_t$, which means that the output is fully adjusts to the long-term target value and that the balance is achieved. After the elimination of Q^*_t, the model of partial adjustment of production can be written in equivalent form:

$$Q_t = a + b\delta \sum_{i=0}^{\infty}(1-\delta)^i P^*_t + \sum_{i=0}^{\infty}(1-\delta)^i U_{t-1} \quad (4)$$

Q_t converges to its long-term optimal production if and only if $\sum_{i=0}^{\infty}(1-\delta)^i$, tends to 1, that means $|1 - \delta| \leq 1$ so $0 \leq \delta \leq 2$. The condition according to which the adjustment coefficient δ must be between 0 and 1 (Hossein and Cummings 1977) is therefore necessary but not sufficient since it is also satisfied when δ is between 0 and 2.

The Nerlove expectation coefficient γ is a proportion of the difference between the actual price of the previous period and the expected price in the previous period.

$$P^*_t = P^*_{t-1} + \gamma(P_{t-1} - P^*_{t-1}) \text{ with } \quad (5)$$

$$0 \leq \gamma \leq 1$$

$$P^*_t = (1-\gamma)P^*_{t-1} + \gamma P_{t-1} + \vartheta_t \quad (6)$$

P^*_{t-1}= the real price expected by the producer in the previous period, P_{t-1} = real price in the previous period. Thus, in each period, the producer revises the notion of the desired real price which is proportional to the difference between the current price of the last period and the price previously desired (LeBihan, 2004). If $\gamma = 0$, the expected prices are completely disconnected from the actual prices. On the other hand, if $\gamma = 1$, producers make "naive" expectations since they assume that the price of the current period will be equal to the price of the previous period (Dieng, 2006).

2.3. Specification of Empirical Model

By substituting (1) and (6) into (3), we arrive at the reduced form of the expectations model:

$$Q_t = \alpha_0\delta + (1-\delta)Q_{t-1} + \delta\alpha_1(1-\gamma)P^*_{t-1} + \delta\alpha_1\gamma P_{t-1} + \delta\alpha_2 Z_t + \omega_t \quad (7)$$

Since P^*_{t-1} is not observable, they can be eliminated from (7).

$$Q_t = \alpha_0\delta + (1-\delta)Q_{t-1} + \delta\alpha_1\gamma P_{t-1} + \delta\alpha_2 Z_t + \omega_t$$

This results in the simplified logarithmic form of Nerlove:

(2)

$$Q_t = \beta_0 + \beta_1 P_{t-1} + \beta_2 Q_{t-1} + \beta_3 Z_t + U_t \quad (9)$$

With : $\beta_0 = \delta\alpha_0$, $\beta_1 = \delta\gamma\alpha_1$, $\beta_2 = (1-\delta)$, $\beta_3 = \delta\alpha_1$, $U_t = \omega_t$ (3)

Taking into account all the current areas (S_t) of cereals and precipitation (R_t), the final linear logarithmic function deviates:

$$Q_t = \beta_0 + \beta_1 lnP_{t-1} + \beta_2 Q_{t-1} + \beta_3 S_t + \beta_4 R_t + U_t \quad (10)$$

$\beta_2 = (1-\delta)$ then δ=$1-\beta_2$ which makes it possible to deduce the adjustment coefficient from the coefficient of Q_{t-1} in the estimated model. But the price expectation coefficient can only be calculated on the basis of a long-run equilibrium assumption.

The production function to be estimated will be presented in this form:

$$\log(Q_t) = a_{i0} + a_{i1}\log(P_{t-1}) + a_{i2}log(Q_{t-1}) + a_{i3}\log(CoAR_t) + a_{i4}\log(SoAR_t) + a_{i5}\log(MiAR_t) + a_{i6}\log(Ra_{it}) + U_{it} \quad (11)$$

Where: Qit= current productions of cereal i; $a_{i0}, a_{i1} \ldots a_{i6}$= cereal i anticipation elasticity of Nerlove; P_{it-1}=the real price of the previous year of cereal i; Q_{it-1}= lag one productions of cereal i; CoARt, $SoAR_t$, and $MilAR_t$= the respective current areas of corn, sorghum and millet; Ra_{it}= the precipitation height at period t; U_{it}= the disturbance which is a white noise.

2.4. Detection of Breaking Points

Following the Nerlove model, homogenized time series are analyzed with the XLStat 2016 software to detect fracture and trend. A "break" is a change in the probability distribution of the random variables whose successive realizations define the time series studied (Khodja and Lubes, 1996; Salarijazi, et al. 2012). It allows to identify a rupture time separating two homogeneous periods (Khodja and Lubes, 1996). In this case, it will be necessary to distinguish between periods with and without agribusiness. The parametrics tests of Alexandersson (1986) were applied.

The Standard Normal Homogeneity Test (SNHT) was developed by Alexandersson (1986) for detecting a change in a series of precipitation. The test is applied to a series of ratios comparing observations of a measuring station to the average of several stations. The ratios are then centered-reduced. The series of matches here Z_i standardized ratios.

$z_i = \frac{x_i - \bar{x}}{\mu}$ With x and μ the average and variance of "n" observed values, and σ is their standard-type biased (divided by n). The SNHT test is derived from the ratio of maximum likelihood.

The test statistic is:

$K_T = max\{a\bar{z_1}^2 + (n-a)\bar{z_2}^2, 1 \leq a \leq n-1\}$

$\bar{z_1}$ *and* $\bar{z_2}$ are averages of Z_i before and after movement. The value of a is the likely point of break. The null and alternative hypotheses are defined by:

H0: The T variables Z_i follow a N (0,1), i = 1, ..., T

$$\text{H1}: \begin{cases} \text{Zi}\sim\text{N}(\mu_1, 1) \text{ pour i} = \text{and1}, \ldots., \text{aand} \\ \text{Zi}\sim\text{N}(\mu_2, 1)\text{pour i} = \text{anda} + 1, \ldots., \text{T} \end{cases}$$

When there is a breakdown, we proceed to an incremental analysis of the situation in this series to detect the nature and extent of change due to the introduction of agribusiness. The magnitude of the change was fortified by the test of Mann-Kendall (Kendall, 1942; Henry, 1945; Hirsch and James, 1984) for detecting linear trend of the series.

3. Results and Discussion

3.1. Determinants of Production

Most time series, attempt to present a trend through time, and are non-stationary. Before the estimation of the production function by the ordinary least squares method, it is necessary to determine the statistical properties of each series and their Durbin-Watson (DW) statistics. These properties are recorded in Table 1.

Table 1. Synthesis of unit root tests

Variables	Sorghum		Corn		Millet	
	ADF	DW	ADF	DW	ADF	DW
Production	-5.24	1.99	-1.30	2.54	-5.95	2.02
Corn area			-0.69	1.86		
Millet area					-4.04	2.16
Sorghum Area	-3.74	1.87				
Rains	-4.48	2.01				
Price	-1.74	1.78	-4.48	2.18	-3.97	1.93
Critical Values	-3.61					
Production (First difference)			-6.68	2.08		
Corn area (First difference)	-5.02	2.10				
Price (First difference)	-4.82	2.06				

The DW results of all variables being close to 2, there is no autocorrelation of orders 1 or 2 in the model. However, the Augmented Dickey-Fuller Test (ADF) indicates the presence of unit root at level for variables such as sorghum producer price, area and corn production that we stabilized by making the first difference.

The results of the Nerlove production functions of the three cereals studied show that the productions of all these cereals are strongly determined by the variables of rain and areas planted. Indeed, all cereals have a significant t-statistic at 1%. The maize yield is also strongly determined by the level of its past production as well as the area occupied by millet, with significant t-statistics at 1%. On the other hand, only the production of millet seems to be determined by the cobweb phenomenon with significant t-statistics at 10%.

Given that the coefficients of the short-term elasticities reflect the magnitude and the nature of the responses of the production to any shock on any of the variables we can say that the production of the three cereals reacts positively to an increase of the rainfall and the area planted. Indeed, when the level of rainfall in the study area is increased by 1%, the production of sorghum, maize and millet increases respectively by 0.59%, 0.84% and 0.84%.

If all things are equal, a 1% increase in the cultivated area of each cereal leads to an increase of 0.97%, 1.19% and 0.77%, respectively, in the production of sorghum, maize and millet. However, the negative sign between the elasticity of production of sorghum and maize compared to the area of millet reveals that the two cereals are competitive on the agricultural areas of millet because these two cereals have higher yields than those of the millet which is 0.85T ha^{-1}. This increases the opportunity costs of millet production. In fact, the production of one hectare of millet instead of the other two grains causes the producer to lose 1.04 t of sorghum or 1.81 t of corn. However, the land does not have the same fertilizer which would increase the cost of opportunity if we took a land for the production of millet. In view of the increasing land pressure in the area, the land is becoming scarce, and as a result they are more and more affected by speculation with the highest yield. Hence the negative relationship between maize production and millet area. As a result, an increase in the agricultural area of millet of 1% leads to a drop in maize production of 0.39%.

This rationality of the producers is also felt in the coefficients of adjustment (1-δ) the stress is put on the adjustment of the production of the sorghum and especially that of the millet to allow the development of the maize. This justifies that the maize coefficient is zero, compared with 69% for sorghum and 106% for millet. Otherwise, millet and sorghum exceeded their optimal level of adjustment by 6% and 31%, respectively. The long-term elasticities in Table 2 show that this adjustment is did through the overfedures of millet and sorghum. If long-term sorghum acreage increases by 1%, its production will increase by 1.41% (against 0.97% in the short term), so that sorghum will react more proportionally to a variation in its long-term area. But, the millet will react less proportionately than in the short term because its production has already exceeded its optimal level of adjustment, and, like the adjustment factors, the long-run elasticities of maize are all nil. So, in the long-term, maize production will less depend on the variables present here. This may indicate the beginning of an intensification of its production, but the effects of which are not perceptible for the moment as well in the long-term elasticities as in the adjustment coefficient. A study of the impact of introducing the impact of agribusiness on cereal variables will shed more light on long-term adjustment factors and elasticities.

Table 2. Summary of Estimates of Cereal Production Responses under 1990-2015

Variables	Sorghum			Corn			Millet		
	Coefficients	t-Statistic	LTE[a]	Coefficient	t-Statistic	LTE[a]	Coefficient	t-Statistic	LTE[a]
D(log(CoArt))	0.21	0.94	0.30	1.19	5.64***	0	0.18	0.83	0.17
Log (MiArt)	0.03	0.27	0.04	-0.39	-3.01***	0	0.77	5.10***	0.73
Log (SoArt)	0.97	3.23***	1.41	0.34	1.18	0	-0.39	-1.34	-0.37
Log (Rai_t)	0.59	3.18***	0.86	0.82	3.25***	0	0.84	3.28***	0.79
Log (P_{t-1})	0.16	1.07	0.23	-0.14	-0.68	0	0.31	1.92*	0.29
Log (Q_{t-1})	0.31	1.72		1.03	10.97***		-0.06	-0.42	
α0	0.64	0.14		6.67	1.58		11.39	2.52**	
R2/R2 ajusted	0.67/0.55	-		0.96/0.95	-		0.67/0.56	-	
DW	1.59	-		2.45	-		2.01	-	

a: Long-Term Elasticities; Statistically significant: *** at 1%, ** at 5% and at * 10%

3.2. Impact of Agribusiness on Cereal Production

The SNHT test in Table 3 shows that, except for maize yield, millet production and yield all other variables in cereal production experienced a break in their average over the period 1995-2015; with a significance level not exceeding 1%. So the introduction of agribusiness did not have a significant impact on millet and maize yields as well as millet production. On the other hand, it has influenced all the variables of sorghum production and the other variables of millet and maize.

According to the Mann-Kendal test, there is an upward trend in sorghum and maize production with respective slopes of 177 and 263, but millet is down with a slope of -21. While the growing trend of sorghum is supported by its yield, maize is maintained by the area planted with a slope of 283 against 91 for its yield. The production of sorghum is more efficient than that of maize, which is based more on the spread of exploited surpluses than on improved yields. This extension seems to be to the detriment of the agricultural areas of millet as evidenced in Figures 1, 2 and 3.

In addition, the change in the average before and after average changes confirms the smooth growth of sorghum production. Indeed, its production, yield and area varied in almost the order of magnitude (52.35%, 35.27%, 26.26%).

On the other hand, the extensive character of maize production is evidenced by the incremental averages study which confirms that its yield has not changed (variation of average = 0%); however, its area and production grew by 255.87% and 298.65% respectively. In addition, the variation in average indicates that the production of millet is threatened in the region with a decrease of 32.60% of its occupied area. Its production was kept unchanged thanks to a productivity gain of 55% during the period to offset the loss in area.

Table 3. Result of breaking points in the mean, Mann-Kendall Trend Test and Average Variation

Cereals	Variables	SNHT's test		Tendance		Variation of average %
		Instant of break	P-value	S	P-value	
Sorghum	Production	2003	0.00	177	0.00	52.35
	Yield	2001	0.01	171	0.00	35.27
	Area	2008	0.01	65	0.16	26.26
Corn	Production	2001	0.00	263	0.00	298.65
	Yield	1996	0.19	91	0.05	0
	Area	2004	0.00	283	0.00	255.87
Millet	Production	2012	0.81	-21	0.66	0.00
	Yield	1998	0.08	135	0.00	55.11
	Area	1994	0.00	-209	0.00	-32.60

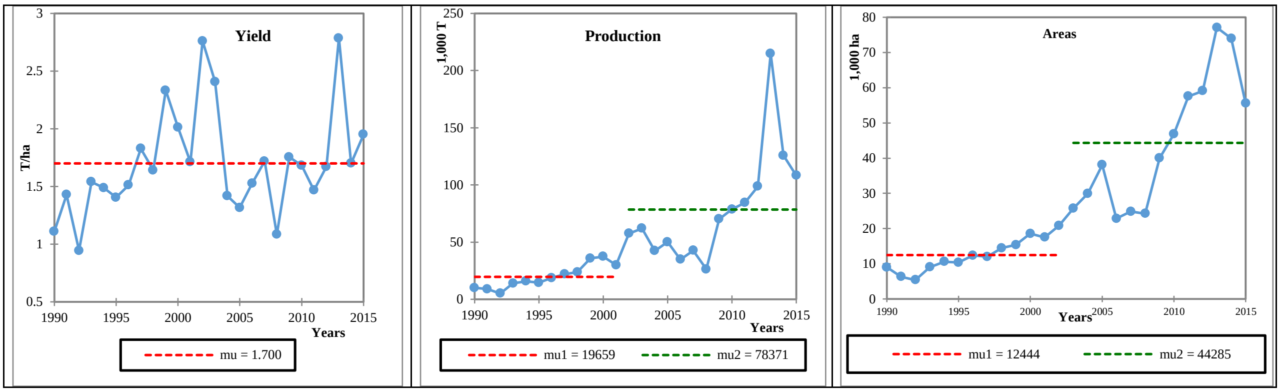

Figure 1. Breaking curves in the average of corn variables

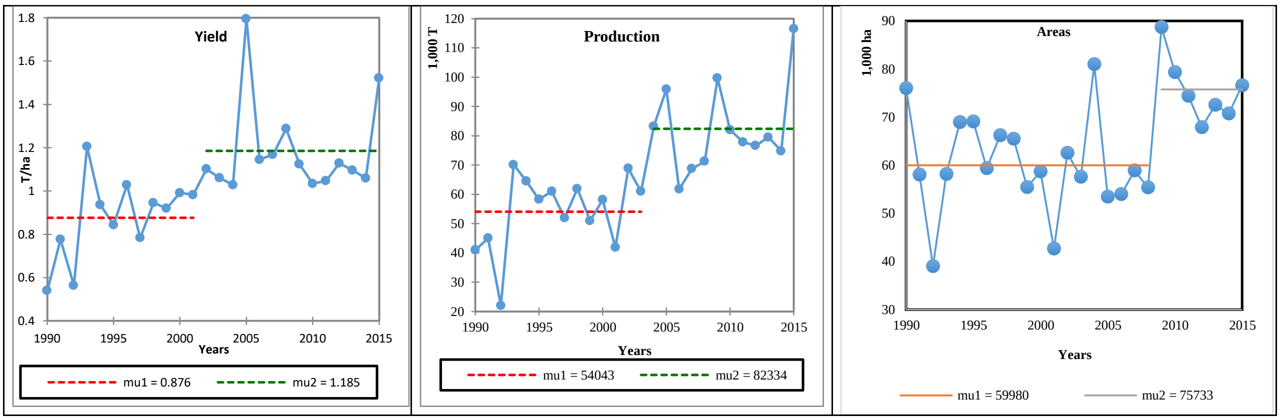

Figure 2. Breaking curves in the average of sorghum variables

However, work carried out in 2015 in north-central Burkina Faso (Kaboré et al., 2015) has produced almost the same results although there is no agribusiness production in the area. The only major difference is that all millet variables in their study area have been improved. This is understandable because the area is less prone to sorghum and especially maize because of poor soil and low rainfall. All in all, although the two zones are agro-ecological and agro-systemic opposed, the results are similar and cast doubt on the real impact of agribusiness on the qualitative change in the cereal production system in the former Sissili, the more so as the main cereal produced by agribusiness men, maize has not realized a productivity gain (Vas=0%) and its production remains particularly extensive. The changes observed in the former Sissili could then be part of a global process of change in the agricultural production system in Burkina Faso driven by new agricultural and land practices. Ultimately, the agribusiness men did not practice the expected intensive production systems but preferred the implementation of an extensive agriculture whose profitability is ensured mainly by the increasing extension of the surfaces (Carracillo and Delvaux, 2012). The return on capital for agriculture is low because of the inherent risk. So they prefer to invest in urban land, so the return on capital is strong and take advantage of the maximum rent in the short term for rural land.

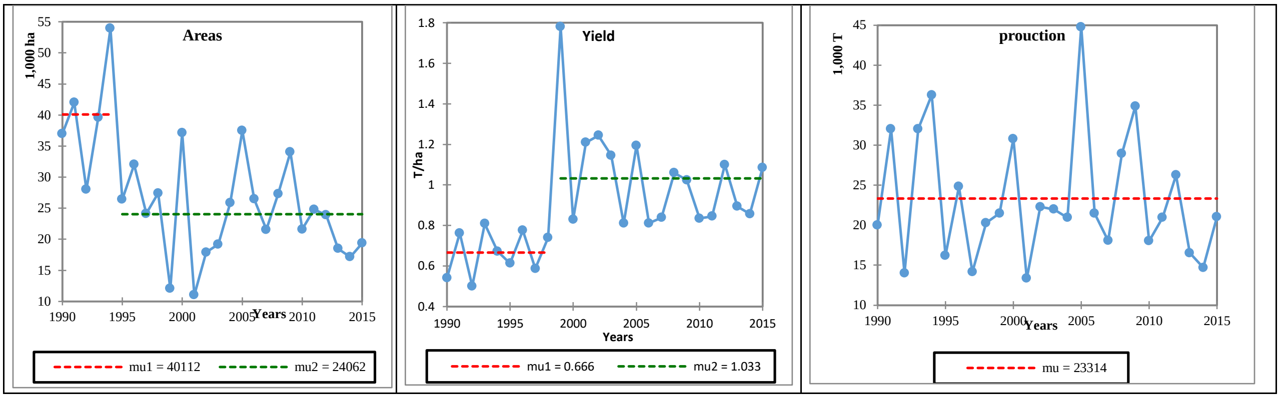

Figure 3. Breaking curves in the average of millet variables

The defenders of agribusiness have quickly made condemnation of the peasantry without giving it the means to defend itself. In this way, they have weakened the majority of small-scale producers and have undermined the momentum of agricultural transition begun before 1990 thanks to the agricultural groups and cooperatives set up by the NCR. Through their rational and self-managed system of operation, cooperatives had organized the peasant world into agricultural production and the provision of services such as supply, distribution of factors of production, marketing, accounting and financial management. In other words, they created the preliminaries for the revitalization of the agricultural sector as advocated by the economic theory of development (Rostow, 1960), which led to agricultural growth, which continues today. But the real motives of this political choice are, if not understandable, at least justifiable. As soon as the NCR is dissolved and replaced by the Popular Front, a so-called "restitution" program is put in place, so the objective is to completely remove all the remains of the NCR. From this point of view, the cooperative, as a collective agent, a center of decision and power, constituted a breeding ground for the resistance of the peasant masses which had to be checked. In addition, the anarchic privatizations of state societies and the generalization of private property under the structural adjustment program have led to the corruption and enrichment of certain senior officials and businessmen who needed safe places to place that capitals. Thus the land was one of those places of bleaching those funds of corruption. This is why, as soon as the 1996 LAR was adopted, wealthy and influential men, such as politicians, economic operators, senior private sector executives, all from the city, some of whom have no knowledge of agriculture, on rural lands to constitute reserve economies.

4. Conclusion

Although aggregate cereal production in the study area is increasing, it remains inefficient because it is based on the consumption of raw resources with a low investment contribution to boost its performance. Therefore, production is determined by the seeded area, precipitation, past production and price. As proof, all cereals commodities are positively correlated with the area seeded and rainfall. That means the other production factors are not fully used to improve yields in order to shift the production level towards production possibilities frontier although the introduction of agribusiness. In other words, after twenty years of introduction, agribusiness has not had the expected impact.

Contrary to what is admitted waste of resources is more pronounced in corn which has maintained unchanged its yields over the period 1990-2015 while millet is already in a situation of equilibrium and sorghum is almost there. This reveals, on the one hand, that agribusiness enterprises do not intend to invest heavily in agricultural production in order to realize the expected productivity gains but merely carry out extensive agriculture and, on the other hand, family farming is more willing to change than is commercial production.

Unfortunately, its extension is to the detriment of traditional agriculture and non-commercial cereals, especially millet, where there is evidence of competition on farmland between maize and millet.

The situation is more worrying in view of the large amount of fertile land hoarded by agribusiness enterprises who deprive smallholders of the means of production and subsistence. Although this has brought about changes in family farming, this can potentially compromise the agricultural balance in the study area and lead to significant social and environmental costs.

However, this attitude of producers in the region towards millet is economically positive because it reflects a rationalization in the allocation of limited resources given the poor performance of millet that involves producers place their resources where their profitability is highest. Indeed, millet has the lowest yields of all cereals even worldwide. In addition to Burkina Faso this economic value chain has difficulty assimilating agricultural extension services and there is no international market for millet. Elsewhere the African Union does not classify it as a strategic agricultural product in its agricultural policy.

Recommendations

- Promulgate a national agribusiness policy by redefining the specifications of the actors;
- Make an exhaustive inventory of agribusiness farms in the area of the former Sissili;
- To make an ecological, economic and social assessment of the introduction of agribusiness in Sissili;
- Conduct a trend analysis of the success parameters of the national agricultural policy to inform the subsequent decision-making process of agricultural policy.
- Evaluer les stocks de terres arables disponibles dans la et déterminer une superficie plafond à posséder par exploitation ;
- Define a deadline for the development of parcels owned by agribusinessmen
- Promote or encourage economic actors to invest in the most profitable value chains;
- Promote the public and private strategic partnership;
- Lead others socioeconomic to know if the attitude of agriculture removes rationality or a question of cognitive structure.

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