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Food Safety, Market Power and Private Standards: An Analysis of the Emerging Strategies of Food Operators

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ABSTRACT

Together with expected implications on food safety, the European Regulation 178/2002 has important consequences shaping the agrifood sector. This regulation gives latitude to operators in front of specific food safety objectives and promotes self-control. Private standards are a way of addressing this problem. The paper shows that as soon as producers and retailers have different private standards, a problem of coordination among operators has to be solved. This coordination is important for the sanitary aims but involves strategic aspects too. The coordination problem is tougher when the standards developed by producers and retailers can be considered as two substitutes, even if each operators considers that a coordination of their practices shall be reached.

Keywords: private standards, food safety, operators responsibility

1 Introduction

The European Union has developed a regulatory framework on food safety with the European Regulation 178/2002. Simultaneously growing consumers' exigencies on food safety can be perceived. The European Regulation 178/2002 sets rules and procedures in the matter of food safety that, in many aspects, are novelties. The operators' responsibilities and the mandatory traceability set by this regulation and put into practice since January 2005 are good examples of these regulatory innovations. These dispositions have important implications on the practices developed to ascertain food safety. The 'traditional' procedures indeed have been judged insufficient in front of the new regulatory exigencies and after the experience of sanitary crises (Codron et al., 2005). In this context, the aim of this paper is to evaluate the consequences of such dispositions on the collective strategies developed by the operators within different situations. For that, the study focuses on voluntary private standards developed by both retailers and producers in order to meet (and often to exceed) the requirements of the European regulation[1]. The study shows how the B2B relations with emphasis on process management can be considered as determining elements for the recent private standards schemes. These standards aim at the control of both the products quality and the characteristics of the processes. They impose specific practices to the operators of a food chain once adopted.

Private quality and safety standards for agrifood products are a recent issue for the economic analysis. The literature has considered these standards as a major change in the role of agrifood standards (see Busch, 2002) not limiting them to their informational role but underlying their strategic dimension. The impacts of private standards on the organization of agrifood systems and on prices (Bazoche et al., 2005) have therefore been a major point of interest in the economic literature. Here, the case of developing countries that can hardly meet the new requirements of private standards has been considered, although

[1] See OECD (2006).

cases where these countries succeed in taking advantage of these schemes have also been presented (Jaffee, Masakure, 2005). Farina et al. (2005) have studied for example the impact of private standard on concentration and product differentiation in the milk sector in Argentina. Berdegué et al. (2005) have shown how the raise of supermarket chains in Central America has pushed the use of private standards (on quality and safety) for fresh fruits and vegetables, in a context of quasi-absence of public standards. Their article presents the organizational changes in the food chain that have been implied by such a transformation. If applied studies have been developed, the theoretical analysis of vertical relations within a food chain in order to understand the dynamic of private standard has received little attention in the economic literature. A traditional way to capture this problem has first been explored using asymmetric information between upstream and downstream operators. The analysis in that field has presented inspection and liability as devices permitting under certain conditions to fix the problem of moral hazard appearing on safety effort of upstream operators (See Hirschauer, 2004; Starbird, Amanor-Boadu, 2007 for recent contributions). The importance of third party certification has also been underlined in this informational context (Hatanaka et al., 2005). Another way to understand how private standards emerge, focusing on strategic behaviors, has been presented by Giraud-Héraud and al. (2009). These authors has established the conditions under which, with the aim of imposing a stringent safety standards on upstream suppliers, a group of downstream operators (retailers) can cooperate in a context where the safety of the foodstuff depends mainly on the investments of upstream operators. The present paper is in keeping with this approach, but instead of supposing that private standards can emerge from the downstream operators only, it supposes that upstream operators can also try to impose their private standard to the food chain. This paper uses indeed results of a recent study on private standards schemes realized by Egizio Valceschini and Laure Saulais for the French Ministry of Agriculture[2] in which such 'producers standard' (ISO, NQS etc.) were analysed together with 'retailers standards' (BRC, IFS etc.). On that base, the paper analyses, more specifically, the emerging situation of 'competition in private standards' that shapes the agro-food system between a private standard developed by producers and a standard driven by retailers. Specifying the objectives fulfilled by retailers and producers when implementing private voluntary standard, the paper tries to understand the economic incentives of such strategies. It shows that under the cover of food safety the different operators seek to maintain (or to enhance) their market power in the agricultural production and distribution chain. Because a question of coordination is addressed through the 'competition in private standards', game theory is used in order to present a basic formalization of this situation.

The paper is structured as follows. In the first section the key points of the European regulation inciting the operators to create private standards are presented. In the second section the different private standards schemes that have emerged are presented and compared. The third section considers situations where standards driven by producers and retailers are potentially in competition.

2 Traceability and operators' responsibilities in the European Regulation 178/2002

The European Regulation 178/2002 sets rules and procedures in the matter of food safety that aim at creating a harmonised food safety system for the European Communities. This regulation is a continuation of the White paper on food safety of the Commission of the European Communities that sets aims and steps in matter of food safety for the European legislation. The operator's responsibilities and the mandatory traceability set by the European Regulation 178/2002 and put into practice since January 2005 are novelties in the European regulation and have strong implications on the different operators' strategies.

The mandatory traceability is described in article 18 of the European Regulation 178/2002. The main obligations traceability forms for operators are the following. The mandatory traceability asks that food and feed business operators shall be able to identify any person, or business client, from whom they have been supplied with a food or to whom they have supplied a food. This system of traceability has been called "one step backward and one step forward" for that reason. The information shall be registered at each stage of production on specific documents. The traceability required by the European Regulation 178/2002 is therefore drawn up step by step. It is never demanded that information on the content of a food, its origin etc. goes through the production process and the distribution chain towards the market. The information produced at a stage of production/distribution can be confined at this stage. As a consequence, the production process cannot be traced. The traceability request concerns products only and it is the transactions between the different operators of a production process that form its base.

Articles 17, 19 and 20 of the European Regulation 178/2002 set responsibilities for food and feed business

[2] Available at http://agriculture.gouv.fr/sections/publications/etudes/

operators. In the European legislation a producer is liable for damage caused by a defect in his product (Directive 85/374/EEC extended to agricultural raw materials by the Directive 99/34/EEC). The new operator's responsibilities concern 'food safety procedures' rather than products' safety. They apply to all stages of production, processing and distribution of food and feed and fix operators' obligations concerning food withdrawal, information, and cooperation with public authorities.

The responsibilities presented in articles 19 and 20 cover three distinct fields. The first one is the withdrawal of products from the market. This operation is placed under the control of the operator who suspects harmful effects on health. Instead of waiting for authorities' intervention, the operators are intended to act on their own initiative. This pro-active behaviour is completed with an obligation to inform authorities. This obligation of information forms the second field of responsibilities. It is important to note that this obligation appears only once private initiative on risk management has been taken. If the product has reached the consumers, the operators have to inform the consumers 'of the reason for its withdrawal'. Finally, operators are expected to collaborate with authorities on action taken to avoid or reduce risk, and shall not 'prevent or discourage any person from cooperating' with authorities.

These articles on responsibilities can be seen a major change in the European Regulation. They essentially implement a transformation of the respective positions of the governments and the operators in the risk management. The main result is that it is business operators' responsibility to ensure and to verify that the requirements of the regulation are met. The idea of self-control is indeed the basis of the operators' obligations. This idea of self-control appears in the first part of article 17 on responsibilities. This latter article states that 'food and feed business operators … shall ensure that foods or feeds satisfy the requirements of food law which are relevant to their activities and shall verify that such requirements are met'. The self-control takes therefore the form of a conformity inspection requirement. This idea is the opposite of the traditional one for which the control is exercised by authorities. According to the European Regulation 178/2002, the control lies first with operators. In accordance with this requirement, articles 19 and 20 point out the crucial role of operators' beliefs and private information. It is on the ground of these elements that operators' actions are intended to be initiated without waiting for authorities' actions: 'If a food business operator considers or has reason to believe that a food which it has imported, produced, processed, manufactured or distributed is not in compliance with the food safety requirements, it shall immediately initiate procedures to withdraw the food in question from the market and inform the competent authorities thereof'.

It is important to note that these articles on operators' responsibilities describe food safety objectives that operators should meet without specifying however the tools and the management practices to implement in order to reach them. They therefore give new responsibilities to food and feed business operators without specifying a precise implementation. This situation places business operators in what we could call a 'regulatory uncertainty'. The level of proof that operators are intended to be able to furnish rises, but the exact means to enforce in order to fulfil the regulatory requirement are not specified. The conditions under which operators' liability is committed are less precise as a consequence. This context creates incentives for the operators to develop strategies in order to manage their responsibilities and reputation. The private standards schemes are seen as the result of such strategies.

Another incentive for developing private standards is present in the European Regulation 178/2002. To understand it, one has to remark that all the requirements expressed by the articles on operators' responsibilities need products traceability. This is true in particular for the required capacity to withdraw products from the market. In this respect, the capacity to proceed to precise withdrawal of products has an economic value. Indeed, targeted withdrawal of products minimise the cost of the risk management in case of a sanitary crisis and the cost of maintaining a good reputation.

Contrary to the business operators' responsibilities, the means expected to the implementation of the mandatory traceability are precisely described in the European Regulation 178/2002. The field of application is specifically defined (every operators and every food and foodstuff is concerned) and the required practices are clearly expressed ('step-by-step traceability'). This traceability system can be considered as not very demanding however. Information registration only is indeed asked. No elaborated traceability system (implying harmonized and more developed practices through food chains) is required. Evaluating this system, Charlier and Valceschini (2006) have shown two results significant for the emergence of private standards. The first result shows that the information produced by this mandatory traceability cannot permit targeted withdrawals of products. The second result states that when some of the operators of a given production and distribution chain choose to implement stringent form of traceability (in order to be able to proceed to targeted withdrawals of products), a single operator can 'scramble' the information produced by these operators while compelling with the requirements of the mandatory traceability. This situation incites of course the operators of a same production and

distribution chain to implement a standard that would coordinate their traceability practices.

3 The emerging new private standards in agro production and distribution chains

The new regulatory exigencies imply a radical change for operators' activities. Operators simultaneously are given more latitude in their choice for food safety management tools and have to face growing responsibilities. In case of a sanitary crisis or a law suit operators are expected to prove the efficiency of the tools and procedures they chose in order to ensure food safety. In response to this change, 'traditional' private standard already in use have been developed and new private standards schemes have emerged with stronger implications for the agro food sector. These new standards include private standards developed by producers as well as private benchmarking schemes implemented by retailers. Both standards push the sanitary exigencies beyond the regulatory requirements.[3] Their aims are convergent: to increase the level of proof and consumers' trust on the one hand and the efficiency of risk management on the other hand. However, they often differ on the ways they are elaborated and on their strategic aims.

3.1 Classical collective standards

The classical collective standards that emerged before the new European regulation on food safety are based on large collective implementation. They are elaborated and negotiated by the different actors (both public and private) that are intended to use or to control them. From this point of view they are intimately linked with the idea of regulation, at the international level in particular. The ISO 22000 standard is a good example of such collective standards. More than 45 countries participated to its elaboration. Interestingly the consumers' trust crisis that has affected the agro food sector and the increasing operators' responsibilities are seen as important stimulus for the creation of this standard. The fact that the HACCP procedures became mandatory for every operator in the food chains (beyond raw products) is important too.

3.2 Producers' standards

The producers' standards concerning food safety are understood as a risk management strategy developed by producers operating in the same sector. They allow the producers to face the product liability and their new responsibilities. They are also considered by producers as a way to structure, coordinate and stabilise practices and organizations. As an example the RESEDA scheme (a network of professional and interprofessional institutions from the chain of animal feeding) aims at the harmonization of the practices in matter of food safety necessary to ensure the coherence between the firms operating at different steps of the same chain.

When a producer standard is set by brand name manufacturers (see the 'Nestlé Quality System' for example) its aim is still to ensure the safety of the produced food but is also to reinforce the good reputation of the trademark. The private standard is seen as an important element to ascertain the consumers' trust in the trademark. Consumers' trust and food safety are therefore two concomitant determinants of the private standard strategy in that case.

3.3 Retailers' standards

Retailers' standards are conceived in order to organize the commercial relations between retailers and their suppliers. They are especially developed to ascertain the quality of products sold by retailers with private labels[4]. With the help of these private standards retailers make sure that sanitary and quality guarantees are met for products of their trademark. These private schemes shape the B2B relations with the suppliers on two essential points through contractual obligations. The retailers' standards define the buyers' exigencies in matter of food safety and quality and generally set the 'protocol' to observe in order to control the safety and quality measures. Their impact on the agro-food sector is enhanced by the fact that most of the product specifications used for private labels by the retailers are the outcome of private benchmarking schemes bringing together different retailers[5].

3.4 Producers' standards versus retailers' standards

[3] Other matters than food safety as ethics, environment, social clauses or animals' wellbeing can also be considered.
[4] See Bergès-Sennou, et al. (2004).
[5] See Dobson et al. (2003).

Producers' standards and retailers' standards have a common characteristic but differ on a major point. In both cases, the actors elaborate these private schemes on their own initiative. The private standards are therefore the result of a cooperative behaviour of a coalition of big retailers or of a network of producers in an agro-food chain. However, the producers' standards are conceived in order to manage operators' activities within a firm or a sector, whereas retailers' standards are specifically created with the aim of structuring the relations between a buyer and its suppliers.

These characteristics show that the two kinds of standards shape the agro-food sector in different ways. With detailed product specifications on the one hand and specified control protocol on the other hand, the retailers' standards inevitably concern the production processes and the control of the upstream operators' choices. For a supplier, retailers' standards can therefore imply additional investments and a decrease in his self-government. Furthermore, together with a decrease in the number of audits, private benchmarking schemes implemented by retailers amplify the 'pressure' on operators associated with an audit (since a failure means an important number of B2B relations jeopardized). On the contrary, private benchmarking schemes can be considered as increasing suppliers' flexibility since the required sanitary investments open the door to more business clients.

These elements show that producers and retailers standards can be considered as substitutes or as complementary. This result can be explained with the help of objective facts and justifications related to operators' strategies.

Producers and retailers standard can be seen as objectively concerning different aspects (production and distribution) of a same problem (food safety). In that perspective they appear as complementary. However, as soon as the increase in the 'formalized exigencies' (retailers standards) is seen as creating an 'accumulation' of norms that have the same aim (for example two different ways of doing traceability) or that may be incompatible (an organic label can be incompatible with sanitary requirements on pest control), the two private standards should be regarded as substitutes. A joint implementation would entail costs that could be avoided by choosing only one private scheme for the production and distribution chain.

Operators' strategies are also important in order to evaluate the respective position of the two private standards. The retailers' strategy of implementing private benchmarking schemes that include exigencies concerning the suppliers' production processes can be considered by producers as a menace to their market power and their autonomy. To counter this strategy, the producers can choose to develop their own standard. This can be seen as a collective response to retailers' benchmarking schemes in order to avoid a situation where the sanitary aims are used to provide an excuse for modifying the distribution of the market power. This response clearly places the producers standard as a substitute of the retailers standard. However, if producers believe that adopting the private retailers' scheme provides market opening for their output and that this advantage outweighs the loss of autonomy and market power, they will accept the retailers standard or choose, if necessary, to implement a complementary scheme.

4 The producers and retailers' coordination on private standards

The producers and retailers operating in the same production and distribution chain are considered in the model with the help of two representative agents *P* and *R*. These agents face the European Regulation on food safety and have to implement the mandatory traceability and the articles on operator's responsibilities. These regulatory dispositions and the consumers' attention on food safety incite the two agents to develop harmonized practices in matter of food safety through the production and distribution chain with the help of private standards (see section 2). To underline the importance of such coordination, the model supposes that when a coordination of the efforts in matter of food safety procedure is reached the buyer-seller relation creates an economic surplus *S*. On the contrary, when the agents fail to coordinate their efforts, this economic surplus is zero.

The surplus is shared between the seller (the producer *P*) and the buyer (the retailer *R*). The retailer earns a portion α and the producer earns a portion $(1-\alpha)$ with $\alpha \in [0;1]$. The sharing rule α depends on the market power of the two agents. When the implementation of a private standard is introduced in the analysis the sharing rule depends on the private standard chosen too. This underlines the preceding discussion pointing out that a private scheme, beyond its food safety objective, can influence the distribution of the market power.

The Figure 1 gives a graphical presentation of the surplus sharing. The payments of the two agents appear on the two coordinates axes. The line *ab* corresponds to the different possible ways to share the surplus among the agents *R* and *P*. A modification of α is therefore graphically presented as a move along the line *ab*. The zero point stands for the situation arising when the two agents fail to coordinate their choices

with a zero surplus as a consequence.

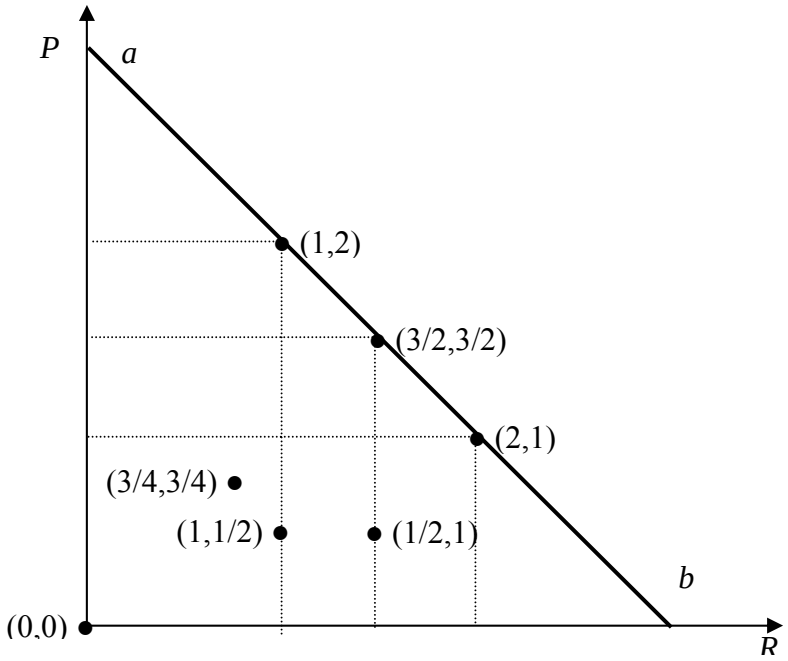

Figure .1
Surplus sharing (with $S = 3$)

Since the sharing rule depends on the agents' choices to enforce or not private standard(s) we have: $\alpha(r, p)$. The surplus share earned by the retailer is supposed to be greater when his standard is adopted by the production and distribution chain (the situation appearing when $r = 1$ and $p = 0$). In other words, the share $\alpha(r, p)$ is positively correlated with the difference between *r* and *p*.

Two situations are considered depending on whether the retailer's and the producer's standards are complementary or not. These situations are distinguished with the help of a parameter $\gamma = 0,1$. When the two standards are complementary ($\gamma = 0$), the agents will share the surplus in its entirety if and only if they implement the two complementary standards. If they fail to do so, they will share a portion β of the surplus only (with $\beta \in]0,1[$). Therefore, the portion $(1-\beta)$ of the surplus stands for the gain appearing with the implementation of the complementary standards. When the standards are not complementary but substitute ($\gamma = 1$), the portion $(1-\beta)$ of the surplus is zero. We therefore have:

$\beta(\gamma) = 1 \quad if \quad \gamma = 1$

and $\beta(\gamma) \in]0;1[\quad if \quad \gamma = 0$

The payment functions of the two agents can be written as following:

$\max(r, p)[\alpha(r, p)\beta(\gamma)S - \gamma \min(r, p)c + \min(r, p)\alpha(r, p)(1-\beta(\gamma))S]$ for the retailer.

$\max(r, p)[(1-\alpha(r, p))\beta(\gamma)S - \gamma \min(r, p)c + \min(r, p)(1-\alpha(r, p))(1-\beta(\gamma))S]$ for the producer.

In these functions two operators, $\max(r, p)$ and $\min(r, p)$, appear. The operator $\max(r, p)$ ensures that in a situation where both agents choose to implement the regulation without developing a private standard ($r = p = 0$) that would coordinate their efforts, the surplus attached to private standard cannot be shared and the payments earned are zero as a consequence. The operator $\min(r, p)$ ensures that when the two standards are complementary (i.e. when $1-\beta(\gamma) > 0$), both standard have to be implemented ($r = p = 1$) in order to create the portion of the surplus attached to the standards' complementarities.

Two situations can be considered depending on whether the standards are complementary or not. These situations can be described with the help of two different games. An illustration is given with the following data:

$S = 3$, $\beta(0) = 1/2$, $c = 3/4$ and $\alpha(r, p) = \begin{cases} 2/3 & if \quad (r, p) = (1,0) \\ 1/3 & if \quad (r, p) = (0,1) \\ 1/2 & if \quad (r, p) = (1,1) \text{ and } \beta(\gamma) = 1 \end{cases}$

When the two private standards are not complementary ($r = 1$ and $\beta(\gamma) = 1$), the game is the following:

R \ P	$p=0$		$p=1$	
$r=0$	0	0	1	2
$r=1$	2	1	3/4	3/4

This kind of game, known as « battle of sexes », has multiple Nash-equilibria. This result comes from the fact that the agents put weight on two different conflicting things when choosing their strategies. They both give value to the coordination in standard (since this coordination allows the surplus to appear) but simultaneously prefer their own standards (since for each agent, the collective choice of his standard works in his favour in the sharing rule of the surplus). This situation of multiple Nash-equilibria underlines two important ideas concerning the agents' coordination. The first two equilibria, ($r=0, p=1$) and ($r=1, p=0$), correspond to two different issues for the agents' coordination in standard. Each agent prefers one of the two equilibria with opposed preferences however (each agent prefers the equilibrium corresponding to his own standard), but the two equilibria are equally appealing (both are Pareto-optimal). No straight convention can therefore appear in order to choose an equilibrium rather than the other one. This situation shows that when the private standards developed by retailers and producers are not complementary, a coordination of the agent is difficult to reach even if both agents attaches value to such a result. The third equilibrium involves mixed strategies. This equilibrium shows that every issue can appear as the game result. In particular the issues where the agents fail to coordinate (no standard is implemented or both standards are simultaneously developed implying useless costs).

In the case of two complementary standards ($\gamma=0$ and $\beta(\gamma)=1/2$) the game is the following:

R \ P	$p=0$		$p=1$	
$r=0$	0	0	1/2	1
$r=1$	1	1/2	3/2	3/2

This game has only one equilibrium: ($r=1, p=1$). This equilibrium shows that the standards' complementarities favour the agents' coordination. Both agents have indeed a strictly dominating strategy ($r=1$ for the retailer and $p=1$ for the producer respectively). Furthermore, the equilibrium is Pareto-optimal and gives the agents a maximum payment.

4 Conclusion

This paper shows that, together with expected implications on food safety, the European Regulation 178/2002 has important consequences shaping the agrifood sector. The fact that this regulation gives latitude to operators in front of specific food safety objectives and promotes self-control implies that a problem of coordination among operators has to be solved. The consistency of the different independent operators' choices concerning the possible means to achieve the sanitary requirements is at stake with the operators' coordination. This coordination is important for the sanitary aims but involves strategic aspects too. The distribution of the market power and the operators' autonomy (especially for the producers in their relation with retailers) depends on the private standard(s) used in the production and distribution chain. The coordination problem is tougher when the standards developed by producers and retailers can be considered as two substitutes, even if each operators considers that a coordination of their practices shall be reached.

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