Adoption of Private Standards Required by Retailers: Which benefits for exporters?

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Abstract

Based on recent development of international economics, this paper aims at evaluating to what extent private standards impact trade, and more precisely trade of French agri-food firms. Our paper explores an original "handmade" database identifying French agri-food firms which are certified with the International Food Standard – IFS– and/or the British Retail Consortium standard – BRC. From this dataset, one can analyse the characteristics and the export behaviour of certified firms compared to that of the non certified ones. First we look at the data and test whether a certification such as BRC imply export orientation of the firm. To ensure the impact of certification on export orientation, we compare certified firms to their matched counterpart with the same productivity. Then we propose a modification of Chaney's model (2008) and estimations to test for the impact of certification on trade costs faced by certified firms to access EU markets. Our preliminary results show that certification clearly impacts French firms. In the case of BRC certification, we especially show that French certified firms significantly decrease their entry costs to access EU markets.

Keywords: Private Standards, Trade costs, International Trade
JEL Classification:

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1 Introduction

Nowadays, food markets in developped countries are increasingly dominated by retailers. Because of high market shares, retailers play a non negligible role in shaping the agri-food system. As underlined by Fulponi (2006) their position closer to consumers has been a catalyst for them to apply quality and safety management standards to food production and distribution processes. In the food safety area, many retailers report standards much higher than those set by government (called public standards) and develop specific tools called private standards. These standards are imposed by retailers to all their suppliers, impacting thus the whole supply chain. They are supposed to be voluntary, contrary to public ones that are mandatory; they are set by retailers but because of increasing market shares of retailers, they sometimes become "de facto" (Henson, 2008). Actually, contrary to public standards which are adopted at the national level and applied by all trading partners in the country, private requirements are part of a commercial agreement between two parties and only interested firms get certified for these requirements. Thus, in order to measure the impact of private standards on trade, it is necessary to work at firm level and not at sectoral or product level. In other words, and in an international trade perspective which is the scope of this paper, the adoption of a specific certification could improve market access for certified firms to specific destinations where retailers are non negligible actors. Certification appears as a comparative advantage for certified exporters.

What is the impact of certification on market access of certified firms? According to the litterature dealing with international standards (Zaibet and Bredhal, 1997; Anderson et al., 1999; Verwaal and Donkers, 2001, 2002; Den Butter and al., 2007), it appears that the adoption of a standard by a firm can impact its export behaviour through a decrease in trade costs (especially transaction costs or costs to search for a network...) leading to advantages for exporting firms. In their paper, Den Butter et al. (2007) for instance propose the example of the adoption of a standard size for containers. Because of this standardization, containers do fit on all appropriate ships and vessels, trains and trucks at any location in the world. This adoption has lead to a substantial reduction of transaction costs. The common acceptance of the standard and its surrounding infrastructure was essential for the productivity gains of such standards.

Several other papers deal with certification strategy of firm through surveys. For instance Anderson et al. (1999) focus on the ISO9000 certification in the USA and study the reason why firms choose to comply with such a certification. One of the relevant motivation for manager to adopt this certification, is to reduce costs and improve product

quality by adopting standard product designs appropriate for a variety of customers. Particularly this standardisation leads to a reduction in costs of transaction to contract with various partners.

In this paper, we aim at testing the hypothesis that the adoption of private standards decrease trade costs to access specific markets. To do so, we use the new developments in international economics that give more room to the firm in the analysis of trade and especially the model of Chaney (2008). In his paper, he shows that there exists a productivity threshold, specific to each foreign market, above which firms with a higher productivity may enter the market. The threshold depends on the characteristices of the destination market, especially through the fixed or variable costs components. Our aim is to show evidence that certified firms have a better access to some specific markets, because of a reduction in trade costs.

Because of data restrictions, we lead our analysis on French exporters in the agri-food sector in the context of the Single European Market. In the European Union (EU), the agri-food sector is subject to both a lot of regulations and an ongoing harmonisation process among EU members. But in parallel with the pressures of European and international authorities to harmonise public standards, there also exists a rise of private food schemes. Based on the analysis of two standards (the International Food Standard – IFS and the British Retail Consortium standard – BRC, certification required by reuropean retailers), this paper aims at measuring to what extent these certifications impact trade, and more precisely exports of French agri-food firms. These two certifications are two representative schemes required by european retailers as a quality guarantee of the product they buy in term of process and attributes.

At our knowledge only few papers focus on IFS and/or BRC certifications. The paper by Shulze et al. (2008) is one of the first dealing specifically with IFS certification and surveying certified firms. Firms are mainly certified because of retailer requirements. Detailed results show heterogeneity in the evaluation of IFS certification. 40% of respondent (out of 389 firms surveyed) appear as satisfied with IFS and judge the benefits of certification higher than its costs (29% feel unconcerned, and 30% are dissatisfied). The impact of certification on export performance is not explicitely treated.

In this paper we will specifically test the following assumption: French certified firms benefit from a reduction in trade costs (in variable or fixed costs) to access some European markets. This assumption will be tested using an original handmade dataset and estimating a model developed from the theoretical one proposed by Chaney (2008).

The remainder of the paper is structured as follows. The second section presents

our handmade dataset dealing with firms certified with IFS and/or BRC and the main empirical intuitions about their characteristics. The third part proposes an extension of the structural frame developed by Chaney (2008) where we introduce a reduction of trade costs for certified firms. The empirical analysis that follows focuses on the access for French exporters to different European markets. This analysis validates our assumption dealing with a reduction in trade costs for certified firms to access some markets.

2 Stylized Facts

2.1 Data

Our paper focuses on French agri-food firms in 2007, it gathers information collected from different database.

First, from the official website of the two standards [1], we collect the list of the 842 agri-food French firms that are IFS (or/and) BRC certified in 2007. This list only indicates the name of the certified firms.

In order to have information on the firm, we use data provided by the French National Institute of Statistics (INSEE). These data are collected in an annual survey (Enquête annuelle d'entreprises-EAE) which is compulsory for all firms located in France with more than 20 employees or with total sales of over five million Euros. This survey collects a wide range of variables including the main activity of the firm (NACE code), total sales, the number of employees, the value added, the stock of capital, investment and accounting data.

Moreover, in order to catch the export orientation of the firm, we merge these data with the register of French Customs. The latter identifies all French exporters whatever their size and the destination of their exports per product (at the 8-digit level of the combined nomenclature) by value and quantity.

Among the 842 firms labelled as certified on the IFS or BRC website, only 574 are included in the EAE dataset. One can suppose than the others are small firms and thus not covered by the survey. In the rest of the paper we will pay our attention on these 574 firms and will compare them to other agri-food firms covered by the EAE. Among these 574 firms, 172 have both IFS and BRC certifications, 76 have only BRC and 326 have only IFS.

[1] http://www.ifs-certification.com/ and http://www.brc.org.uk/

When we merge this dataset with the file of French customs, it results that 78% of the 574 certified firms are exporters. Looking at non certified firms, 62% of the 2942 agri-food firms are exporting firms.

Table 1 about here

If the certification is considered by the firm as a prerequisite for exporting, one can be puzzled by the relative high number of certified firms which do not export. Regarding the IFS certification, one can understand that such certified firms are non exporters since this standard may be also required by French retailers. But, as BRC certification is specific to British retailers, why some BRC firms do not export? Certified firms do not export but are likely in link on domestic market with firms processing food for British retailers, hence they do not appear in the French customs database.

Certified firms mainly belong to five sectors of activity : processing and preserving of meat and meat products; processing and preserving of fruit and vegetables; processing of dairy products; manufacture of other food products (bread, cacao, tea, coffee..); manufacture of beverages. Hereafter we focus on these five sectors only.

Table 2 about here

2.2 Certification and export orientation of the firm : some empirical evidence

The new international economics litterature underlines the link between the export performance of a firm and its level of productivity. As underlined before, certified firms are proportionnaly more export oriented than non certified firms. The question that can be raised is that of whether certified firms are more export oriented because of their level of productivity or because of reduced trade costs to access some foreign markets due to their certification.

In order to answer this question, and in order to be sure that we measure the role of certification (and not that of productivity), we compare the sample of certified firms to firms with the same level of productivity. If for a given level of productivity, certified firms are more export oriented than non certified, then we can conclude that certification enhances the export strategy of the firm.

To this end, we use the Propensity Score Matching methodology with the Mahalanobis metric matching. The propensity score has been introduced by Rosenbaum and Rubin

(1983 cited in d'Agostino, 1998). This score is the conditional probability to be certified given the firm's characteristics. Once two firms (one certified and one non certified) are matched with the same propensity score, then we can compare their export behaviour and test whether certified firms are more export oriented than their matching counterparts. The choice of the characteristics used to match firms is of huge importance. After several tests, we finally choose to match firms according to their total Factor Productivity (TFP) computed following the now well-known methodology proposed by Olley and Pakes (1996)[2]. As this TFP is a global image of the firm we did not use other covariates in the matching. From this matching, we identify in 2007, among non certified firms, firms which have the same productivity as certified firms. In the matching procedure, we permit some firms to be matched with several certified firms. Hence the number of certified firms and their matched conterparts are not exaclty the same.

Table 3a and 3b about here

Table 3a highlights for BRC firms their high level of productivity. There are among the most productive firms. But we must be cautious with this result. At this step we cannot conclude about any causality between certification and productivity. A dynamic analysis comparing the productivity levels before and after the year of adoption would be needed to conclude. Nevertheless, one can see that among these high productive firms, BRC firms are much more export oriented than the others. Based on the mean export rate of exporting firms in each category, we show that export rate are significantly higher for BRC firms than for the other, even those with the same productivity level. There should exist a link between BRC certification and the access to foreign market by the firm. In comparison, this link is less marked for IFS firms (Table 3b). Despite their high level of productivity, they are not significantly more export oriented than the others. This result could be explained by the fact that French retailers also require IFS certification. Thus IFS certification appears as less linked to the export strategy of the firm than BRC certification. It is worth noting that the sector manufacture of beverages appears is very

[2]The Total Factor Productivity (TFP) at the firm level is estimated here by using the now well-known Olley-Pakes (1996) method. Based on the estimation of a Cobb-Douglas production function, the procedure accounts for two biases : simultaneity and selection bias. The simultaneity bias arises because productivity is known to the firms (but not to the econometrician) when they choose their input levels. The selection bias results from the relationship between productivity shocks and the probability of exit from the domestic market. The production function is based here on the value added of the firm and two variables are taken into account : the number of employees and the capital stock of the firm used in the production process by the firm.

specific. In this sector and for both certifications, certified firms are less productive than unmatched firms. But even though, BRC firms remain more export oriented than the other. This result is certainly due to the high heterogeneity of this sector with firms producing sodas (most likely certified to supply retailers) and firms producing AOC wine (most likely non certified firms producing under their own label).

3 Theoretical framework : export costs and certification

Our theoretical framework is based on Chaney's model (2008) which accounts for firm heterogeneity and shows that there is a selection process at entry to foreign markets. Due to the presence of exporting costs, only the most productive firms are able to bypass these costs and thus to export. Consequently, Chaney shows that there exists a productivity threshold, specific to each foreign market, above which firms whith a higher productivity may enter the market. In Chaney, this threshold is unique per market. Here, we assume that at entry to a given market, two threholds may co-exist : one for certified firms ; another one for non certified firms.

The world consists of N asymmetric countries producing goods that only involve the labour factor. All countries have access to the same technology. Countries differ in size and labour productivity (w_n). There are $H+1$ sectors; sector 0 produces a single homogenous good. The H other sectors produce a continuum of differentiated goods. In each country, consumers maximize the utility obtained from consuming goods from the $H+1$ sectors: they dispose of a set Ω_h of sectors h (determined in equilibrium) and consume q_0 quantity of good 0 and $q_h(\omega)$ quantity of variety ω of sector h. The utility function can be expressed as:

$$U \equiv q_0^{\mu_o} \prod_{h=1}^{H} \left(\int_{\Omega_h} q_h(\omega)^{\frac{\sigma_h - 1}{\sigma_h}} d\omega \right)^{\frac{\sigma_h}{\sigma_h - 1}\mu_h}$$ where $\mu_0 + \sum_{h=1}^{H} \mu_h = 1$ and $\sigma_h > 1$ is the elasticity of substitution between two varieties of good h and μ_0 is the preference coefficient of the subjacent Cobb-Douglas function for the homogenous good, μ_h is the preference for the differentiated good h.

Hereafter, we only consider sector h (in our case the agrifood sector) as the other sectors are analogous. For the sake of simplicity, we drop the sector subscript h from the equations; and we focus on one exporting country, France.

Each firm draws a random unit labor productivity φ from a common distribution $g(\varphi)$. As in Chaney, we consider that φ is Pareto distributed with shape parameter γ (with $\gamma > \sigma - 1$)

To deliver products to country j, French firms face various trade barriers that generate fixed or variable costs.

Fixed costs comprise all costs due to product compliance (label, packaging, etc), due to the marketing or advertising strategy in order to provide the market, but also all costs induced by entering into local distribution networks.

Among the costs induced by the local distribution networks, one can include those due to the requirements imposed by retailers. From the above review of literature, one can deduce that these requirements impact fixed costs in two opposite ways. First, firms which implement the certification have to bear costs of certification (f_{c_0}); but, once the certification is implemented, firms are able to supply retailers. One can suppose then that certification reduces the fixed cost at entry of the exporting market.

It results that fixed costs at entry of a market are not only market specific but also depend on whether the firm is certified or not: for non certified firms, fixed costs at entry of market j are f_j; for certified firms, fixed costs are $f_{c_0} + f_{cj}$where f_{cj} are the remaining fixed costs at entry of market j once the certification cost is paid.

As a result of the above discussion, we have $f_{cj} < f_j$

Moreover, the certification will be profitable if and only if $f_{c_0} + f_{cj} \leqslant f_j$

Finally, fixed costs at entry to market j may be summarized as follows:

$$F_{jk} = [f_j (1 - I_k^c) + f_{c_0} I_k^c + f_{cj} I_k^c] \tag{1}$$

where $I_k^c = 1$ if the firm k is certified, and $I_k^c = 0$ otherwise

Variable costs depend on the exchanged quantity of the product and are included in the model as iceberg-type costs. They are supposed to be market specific. Usually, variable costs include transportation costs (proxied by distance), tariffs. From the above literature, one can see that certification impacts transaction costs. One can suppose that these transaction costs are fixed costs but also part of variable costs. The higher the exchanged volume, the lower the transaction costs. As for fixed costs, variable costs depend on the exporting market j but also on whether the firm is certified or not: for non certified firms variable costs at entry of market j are τ_j; for certified firms, variable costs are τ_{cj}(with $\tau_{cj} < \tau_j$). Thus, variable costs at entry to market j may be summarized as follows:

$$T_{jk} = [\tau_j (1 - I_k^c) + \tau_{cj} I_k^c] \tag{2}$$

The total cost of producing and selling q_{jk} units of good to market j for a firm k with labour productivity φ_k is:

$$c_{jk} = \frac{wT_{jk}}{\varphi_k} q_{jk} + F_{jk} \tag{3}$$

where w is the labour price prevailing in France

Each firm k faces a residual demand curve with constant elasticity σ. Thus, the optimal price fixed by a firm k in country j is a constant mark-up (equal to $\frac{\sigma}{\sigma-1}$) over the marginal cost:

$$p_{jk} = \frac{\sigma}{\sigma - 1} \times \frac{wT_{jk}}{\varphi_k} \tag{4}$$

With firms choosing optimal prices, and the consumer demand derived from the utility function, exports (x_{jk}) by a firm k to country j are:

$$x_{jk} = p_{jk} q_{jk} = E_j \left(\frac{p_{jk}}{P_j} \right)^{1-\sigma} \tag{5}$$

where E_j is the total expenditure in country j in the agri-food sector and P_j is the CES price index of country j.

Firms that are able to export to country j are those that are able to bear market entry costs. A firm will export only and only if its profits ($\pi_{jk} > 0$) are positive with

$$\pi_{jk} = (p_{jk} \times q_{jk}) - c_{jk} \tag{6}$$

Using equations (5 and 3), the profit expression becomes:

$$\pi_{jk} = \frac{E_j}{\sigma} \left(\frac{\sigma}{\sigma - 1} \frac{wT_{jk}}{\varphi_k} / P_j \right)^{1-\sigma} - F_{jk} \tag{7}$$

Chaney (2008) shows that the price index P_j of the importing country may be written as:

$$P_j = \lambda_1 E_j^{\frac{1}{\gamma} - \frac{1}{\sigma-1}} \theta_j \tag{8}$$

with λ_1 being constant and

$$(\theta_j)^{-\gamma} \equiv \sum_{n=1}^{N} (Y_n/Y) \times (w_n \tau_{nj})^{-\gamma} \times (f_{nj})^{-(\frac{\gamma}{\sigma-1} - 1)} \tag{9}$$

with (Y_n/Y) is the share of country n in total world output.

From eq (7), (8) and (9), one can show that there exist two productivity thresholds above which firms are able to export to j, depending on whether firm k is certified or not:

$$\begin{cases} \text{for non certified firms} : \overline{\varphi}_j = \lambda_2 \left(\frac{Y}{E_j}\right)^{\frac{1}{\gamma}} \left(\frac{w\tau_j}{\theta_j}\right) (f_j)^{1/(\sigma-1)} \\ \text{for certified firms} : \overline{\varphi}_j^c = \lambda_2 \left(\frac{Y}{E_j}\right)^{\frac{1}{\gamma}} \left(\frac{w\tau_{cj}}{\theta_j}\right) (f_{c_0} + f_{cj})^{1/(\sigma-1)} \end{cases} \tag{10}$$

with λ_2 being constant.

Because $\tau_{cj} \leqslant \tau_j$ and $f_{c_0} + f_{cj} \leqslant f_j$ then $\overline{\varphi}_j^c \leqslant \overline{\varphi}_j$

4 The empirical specification

4.1 The empirical model

The objective of our empirical model is thus to generate the productivity threshold to export to country j and to test whether this threshold is significantly lower for certified firms compared to non certified. To estimate the productivity threshold, we must first express the probability that a French firm k exports to market j. This is based on the dichotomous event (Y_{kj}) of zero versus positive exports toward country j.

For non certified firms, Y_{kj} is 1 if firm k exports to country j, and 0 otherwise:

$$\begin{cases} Y_{kj} = 1 \text{ if } \varphi_k > \overline{\varphi}_j \\ Y_{kj} = 0 \text{ if } \varphi_k \leq \overline{\varphi}_j \end{cases} \tag{11}$$

For certified firms,

$$\begin{cases} Y_{kj} = 1 \text{ if } \varphi_k > \overline{\varphi}_j^c \\ Y_{kj} = 0 \text{ if } \varphi_k \leq \overline{\varphi}_j^c \end{cases} \tag{12}$$

As we assume that the firm's productivity follows a Pareto distribution, we can express the probability that the productivity of a non certified firm k is above the threshold to enter market j:

$$P\left(Y_{kj} = 1\right) = \ P\left(\varphi_k > \overline{\varphi}_j\right) = \left(\overline{\varphi}_j\right)^{-\gamma} \tag{13}$$

and the probability that the productivity is below this threshold is:

$$P\left(Y_{kj} = 0\right) = P\left(\varphi_k \leq \overline{\varphi}_j\right) = 1 - \left(\overline{\varphi}_j\right)^{-\gamma} \tag{14}$$

The same holds for certified firms with $\overline{\varphi}_j^c$ as the threshold.

We estimate the probability using the maximum likelihood method. Given (13) and (14), we can compute the likelihood of our sample. Let D_{kj} be a dummy variable which is 1 if firm k exports to country j; I_k^c ramains the dummy variable indicating whether the firm is certified or not. This gives, considering the whole sample:

$$L = \prod_k \prod_j \left[\left(\overline{\varphi_j}\right)^{-\gamma}\right]^{(1-I_k^c)D_{kj}} * \left[1 - \left(\overline{\varphi_j}\right)^{-\gamma}\right]^{(1-I_k^c)(1-D_{kj})} \left[\left(\overline{\varphi_j^c}\right)^{-\gamma}\right]^{I_k^c D_{kj}} * \left[1 - \left(\overline{\varphi_j^c}\right)^{-\gamma}\right]^{I_k^c(1-D_{kj})} \tag{15}$$

It is worth noting that maximizing this likelihood enables us to compute and explain either the probability that a firm will export to a market or the values of the threshold($\overline{\varphi_j}$) as γ, the parameter of the Pareto distribution of the firm's productivity is known in our sample Here, we choose to work directly on the threshold.

The specification of $\ln\left(\overline{\varphi_j}\right)$ $\ln\left(\overline{\varphi_j^c}\right)$, according to 10 are:

$$\ln\left(\overline{\varphi}_j\right) = \ln\left(\lambda_4 \left(\frac{Y}{E_j}\right)^{\frac{1}{\gamma}} \left(\frac{w\tau_j}{\theta_j}\right) (f_j)^{1/(\sigma-1)}\right) \tag{16}$$

$$\begin{cases} \text{for non certified firms} : \ln(\overline{\varphi}_j) = \ln(\lambda_2 \left(\frac{Y}{E_j}\right)^{\frac{1}{\gamma}} \left(\frac{w\tau_j}{\theta_j}\right) (f_j)^{1/(\sigma-1)}) \\ \text{for certified firms} : \ \ln(\overline{\varphi}_j^c) = \ln(\lambda_2 \left(\frac{Y}{E_j}\right)^{\frac{1}{\gamma}} \left(\frac{w\tau_{cj}}{\theta_j}\right) (f_{c_0} + f_{cj})^{1/(\sigma-1)}) \end{cases} \tag{16}$$

Nevertheless, country fixed effects cannot be identified directly in equation (16). Actually, variables specific to the destination country (as size or potential supply) in the equation prevent us from introducing country fixed effects in the estimation. Hence, to solve this identification problem, we account for the nine agri-food sub-sectors (defined according to the French nomenclature, NAF 3-digit [3]) to which firms belong. Consequently, we express the demand addressed by country j to these sub-sectors and the potential supply of these sub-sectors on market j.

These considerations lead us to the following expressions for $\ln\left(\overline{\varphi}_j\right)$ and $\ln\left(\overline{\varphi}_j^c\right)$, where s refers to the sub-sector the firm k belongs to:

[3]The French nomenclature (NAF -3 digits) distinguishes nine agri-food sub-sectors: 151: meat products, 152: sea food products, 153: processed F&V, 154: oil & fats products, 155: dairy products, 156: processed cereals; 157: animal prepared feeds, 158: other foodstuffs, 159: beverage.

$$\begin{cases} \text{for non certified firms} : \ln(\overline{\varphi}_{j,s}) = \alpha_0 + \alpha_1 \ln\left(\frac{E_j^s}{Y^s}\right) + \alpha_2 \ln d_{kj} + \alpha_3 \ln\left(\Theta_j^s\right) \\ \qquad\qquad + \sum_j \alpha_4^j T_j * (1 - I_k^c) + \sum_s \alpha_6^s T_s \\ \text{for certified firms} : \ln(\overline{\varphi}_{j,s}^c) = \alpha_0 + \alpha_1 \ln\left(\frac{E_j^s}{Y^s}\right) + \alpha_2 \ln d_{kj} + \alpha_3 \ln\left(\Theta_j^s\right) \\ \qquad\qquad + \sum_j \alpha_6^j T_j * I_k^c + \sum_s \alpha_6^s T_s \end{cases} \tag{17}$$

4.2 The variables

-$\left(\frac{E_j^s}{Y^s}\right)$ is the market size to account for potential demand of importer**:** it is the share of j in total EU25 imports of sub-sector s (Comext database). To account for the potential endogeneity of this variable, we use the instrumental variables method. In addition to the exogenous variables (except distance), we choose the market size of the previous year (2003) and the population of the importing country. We expect the size of the importing country to reduce the value of the productivity threshold but to increase the export value

- d_{kj} is the distance from the head office of firm k to the capital of country j. It is a proxy for transport costs.

-$\Theta_j^s = \left(\sum_{n=1}^{N} (Y_n^s/Y^s) \times (1/\tau_{nj})^{\gamma}\right)^{-\frac{1}{\gamma}}$ is an indicator for the potential supply in country j. It is derived from the multilateral resistance index from anderson and vanWincoop (2004) (see Chevassus-Lozza and Latouche, 2010 for more details). This index accounts for the potential supply available to country j and is corrected for the proximity (in distance, language and common borders) between j and its potential partners.

-T_s are sub-sector fixed effects. These dummies allow sub-sector specificities and especially price differences to be taken into account

- T_j are importing country fixed effects that are intended to cover all the remaining costs. How can these country fixed effects be interpreted? Passing from Equation system 16 to Equation system 17 shows that these country fixed effects capture both remaining variable and fixed costs and remaining country-specific characteristics that have not been taken into account elsewhere and generate adaptation costs for the exporting firms.

Comparing these country fixed effects for the sample of certified firms with those for non certified firms are of particular interest in this study. The differentials in these coefficients should capture the impact of certifications in remaining trade costs (other than transport costs) to access european markets considering that we control for market size, distance, and proximity of the importing market to its potential suppliers.

5 Results

Table 4 presents our first results.In this estimation BRC firms include firms certified with only BRC; IFS firms are firms only certified with IFS. From the data, we observe whether the firm exports or not to a specific market. Knowing the distribution of the firms, we can deduce the productivity threshold to access this market and the impact of the variables of interest on this threshold.

Table 4 about here

Classical variables as distance and size of the importing country have the expected impact. A greater distance increases the costs to access to a market and hence the productivity threshold at entry to the market. On the contrary, the size of the importing country increases opportunities for French exporters and hence gives the opportunity for less productive firms to access the market. It decreases the productivity level needed to access this market. Our Potential supply index has also the excepted sign, but is not significant. An importing country benefiting from a high potential supply from its partners except France, will offer less opportunity for French exporters.

The country fixed effects are of special interest in our work. Remind that these fixed effects show the global image of remaining trade costs at entry to markets. Comparing certified firms to non certified firms gives an image of the impact of certification on trade costs. Figure 1 proposes a graphical representation of the country fixed effects.for 13 countries. The reference considered is the access of Belgium for non certified firms.

Figure 1 about here

Regarding BRC firms, results show that certification significantly reduces the remaining trade costs that firms face at entry to most of the markets. As expected the access to Great Britain is mostly impacted. Firms certified with BRC have a better access to the british market. The results show that the threshold to access Great Britain is lower for certified firms; in other words certified firms have to overcome a lower threshold. Hence, for a given level of productivity, certified firms have a higher probability to export to Great Britain and lots of other markets. Other firms (non certified or even IFS firms) are faced with significantly higher remaining trade costs, increasing the threshold compared to the threshold faced with by firms exporting to Belgium. and decreasing their probaility to export. Globally it appears that BRC firms improve their access to all markets (the

coefficients of country dummies for certified firms are most of the time lower than for non certified firms; the probaility to export is always higher).

Regarding IFS firms, table 4 and figure 1 show that the benefit of certification is less marked. Remaining trade costs are globally lower for IFS firms but remain greater than for BRC firms. Compared with access of non certified firms to Belgium, IFS certification improve the situation only to access Belgian market.

Considering the sample including the firms with double certification (i.e. we compare firms certified with only IFS to those certified with only BRC) decrease the comparative advantge of BRC firms over the IFS certification. We also run our estimation on the sample of certified and matched firms. It confirms the advantage of certification given a similar level of certification.

This shows that BRC certification is from french exporter's point a view an decisive characteristic of export strategy. This is not the same for IFS. As said previously, this result was expected since IFS is also requested by french retailers and becomes an decisive characteristic of domestic strategy.

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6 Conclusion

Private standards imposed by retailers are of increasing interest in economics. The increasing market share of retailers in several countries (mainly EU countries) leads to an increasing volume of trade concerned by private standards. Regarding international economics literature, few studies (if none) do exist at our knowledge presenting an empirical analysis of the impact of private standards. Our paper is an original work leading to a first understanding of the way private standards impact trade.

Our study is based on the theoretical framework from the new international economics. Because certification is adopted at the firm level and depends on the international strategy of the firm, we need to work ate the firm level. In this respect the new international economics is a consistent tool.

Our analysis established a link between certification (IFS or BRC) and high productivity of the firm. For BRC certification, this link can be extended to a high export orientation. BRC firms are highly productive and compared to non certified firms with the same productivity, are much more export oriented. Regarding IFS, the export orientation of certified firms is not established. It is important to note that French retailers

are requiring IFS certification. Hence IFS appears also as a strategic tool on the domestic market and not only to export. It could be interesting to work on data from other EU countries, as countries from Central and eastern Europe (CEECs) in order to test the export orientation of firms certified with IFS. Some other authors already present IFS as a strategic tools for CEECs to export to EU markets (Gawron and Theuvsen, 2008).

From these first results, several research avenues can be defined. First it should be interesting to establish the causality between certification and productivity. Do certification increase productivity? Or, conversely, do only highly productive firm adopt certification? To answer these issues, we need to know the initial year of certification, in other words, we need to survey certified firms to gather data on dynamic certification impacts.

Second, private standards are often qualified as trade barrier. From our work, we can not give any evidence in favour or against such a qualification. Through certification we identify Freench firms that trade with or supply retailers. But do some firms supply retailers without any certifications? In other words we need some supplementary materials to test test whether the retailer network is accessible for non certified firms.or not. .

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References

[1] Aiken L.S and West S.G (1996). Multiple Regression: Testing and Interpreting Interactions. Newbury Park, CA: Sage Publications.

[2] Anderson S.W., Daly D., Johnson M.F., 1999. Why firms seek ISO 9000 certification : regulatory compliance or competitive advantage *Production and operations management,* 8(1)

[3] Anderson, J.E., and van Wincoop, E. (2004). Trade costs. *Journal of Economic Literature*, 42: 691-751.

[4] Chaney, T. (2008). Distorted gravity : The intensive and extensive margin of international trade. *American Economic Review* 98 (4): 1707-1721

[5] Chevassus-Lozza E., Latouche K. (2008). Heterogeneous firms and trade costs: a reading of French access to European agro-food markets. In revision for the *European Review of Agricultural Economics.*

[6] D'Agostino R.B., 1998. Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Statistics in medecine* 17: 2265-2281

[7] Den Butter F., Groot S.P.T., Lazrak F., 2007. The transaction costs perspective on standards as a source of trade and productivity growth. Tinbergen Institute Discussion Paper, TI 2007-090/3

[8] Fulponi L.(2006). Private voluntary standards in the food system:The perspective of major food retailers in OECD countries, *Food Policy*, 31(1),pp 1-13

[9] Garon J.C., Theuvsen L., 2008. certification schemes in the European Agrifood sector: Overview and opportunities for Central and Eastern Europe. Paper presented at the IAMO forum 2008.

[10] Greenaway D., Kneller R., 2007. firm heterogeneity, exporting and foreign direct investment. *The economic journal*, F134-F161, February.

[11] Henson, S.J. (2008). The Role of Public and Private Standards in Regulating International Food Markets. *Journal of International Agricultural Trade and Development,* 4 (1), 63-81.

[12] Henson S., Masakure O., Boselie D., 2005. Private food safety and quality standards for fresh produce exporters: the case of Hortico Agrisystems, Zimbabwe, *Food policy*, 30: 371-384

[13] Jaffee S., Masakure O.,2005. Strategic use of private standards to enhance international competitiveness : vegetable exports from Kenya and elsewhere, *Food Policy*, 30: 316-333

[14] Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71: 1695-1725.

[15] Minten B., Randrianarison L., Swinnen J .F.M., 2006. Global retail chains, international trade and developing country farmers : Evidence from Madagascar. Summer Symposium of the International Agricultural Trade research Consortium (IATRC): "Food regulation and trade: Institutional framework, concepts of analysis and empirical evidence", Bonn, 28-30 May 2006.

[16] Olley, G. S. and Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica* 64: 1263-1297.

[17] Schulze H., Albersmeier F, Gawron J.C., Spiller A., Theuvsen L., 2008. Heterogeneity in the Evaluation of Quality Assurance Systems: The International Food Standard (IFS) in European Agribusiness. *International Food and Agribusiness Management Review*, 11(3)

[18] Verwaal E, Donkers, 2001 Customs-related transaction costs, firm size and international trade intensity. Working paper, Erasmus research institute of management.

[19] Verwaal E. Donkers B., 2002. Firm size and Export Intensity: solving an empirical puzzle. *Journal of international studies*, 33(3): 602-613.

[20] Yassar M., Raciborski R. and Poi B. (2008). Production function estimation in Stata using the Olley and Pakes method. *The Stata Journal* 8: 221-231.

[21] Williamson O. E., 1985. The economic institutions of capitalism. New York: free press.

[22] Zaibet L., Bredhal M., 1997. Gains from ISO certification in the UK meat sector., *Agribusiness*, 13(4):375-384, 1997.

Table 1: Export status of French agri-food firms

	Non exporting firms		Exporting firms		Total	
Agri-food firms	1118	(38%)	1824	(62%)	2942	(100%)
Certified firms	127	(22%)	446	(78%)	574	(100%)
IFS firms	123	(25%)	375	(75%)	498	(100%)
BRC firms	59	(24%)	189	(76%)	248	(100%)

Table 2: Main activity of French agri-food firms

Number of firms in 2007	**Non certified firms [1]**		**Certified firms [2]**		**% of cert. firms [2]/[1]+[2]**
Processing of meat products	803	34%	109	19%	12%
Processing and preserving of fish	112	5%	28	5%	20%
Proc. and preserving of F&V	108	5%	58	10%	35%
Manufacture of oils and fats	25	1%	3	0%	7%
Manufacture of dairy products	179	8%	115	20%	39%
Manuf. of grain mill products	86	4%	19	3%	18%
Manuf. of prepared animal feeds	193	8%	4	1%	2%
Manufacture of other food prod.	556	23%	166	29%	23%
Manufacture of beverages	307	13%	72	13%	19%
Total Agri-food Sector	**2369**	**100%**	**574**	**100%**	**19%**

Source: EAE 2007 database

Table 3b: Productivity and export rates of agri-food firms according to their IFS certification status

Sector		**IFS firms (I)**	**Non IFS firms**	
			Matched (II)	**unmatched (III)**
Processing and preserving of meat products	Number	101	98	727
	Productivity	1.80	1.80	1.76
	Export rate %	9.29	11.72	9.21
Processing and preserving of fruit and vegetables	Number	50	48	85
	Productivity	1.85	1.85	1.75
	Export rate %	17.02	18.54	23.77
Manufacture of dairy products	Number	99	65	154
	Productivity	1.90	1.89	1.82
	Export rate %	15.32	9.91	15.17
Manufacture of other food prod.	Number	142	136	462
	Productivity	1.84	1.85	1.80
	Export rate %	15.80	19.10	18.32
Manufacture of beverages	Number	58	57	275
	Productivity	1.88	1.87	2.02
	Export rate %	24.56	21.28	28.96

Source: EAE 2007 and handmade database

Table3a: Productivity and export rates of agri-food firms according to their BRC certificatio

Sector		BRC firms (I)	Non BRC firms Matched (II)	Non BRC firms unmatched (III)
Processing and preserving of meat products	Number	23	23	866
	Productivity	1.31	1.31	1.08
	Export rate %	18.68	10.36	9.11
Processing and preserving of fruit and vegetables	Number	28	27	116
	Productivity	1.63	1.59	1.33
	Export rate %	25.99	19.48	20.97
Manufacture of dairy products	Number	66	44	196
	Productivity	1.73	1.72	1.38
	Export rate %	22.78	10.1	12.15
Manufacture of other food prod.	Number	77	73	583
	Productivity	1.55	1.54	1.32
	Export rate %	25.91	19.0	16.5
Manufacture of beverages	Number	39	37	307
	Productivity	1.83	1.83	2.22
	Export rate %	35.57	21.51	26.58

Source: EAE 2007 and handmade database

Table 3b: Productivity and export rates of agri-food firms according to their IFS certification status

Sector		IFS firms (I)	Non IFS firms Matched (II)	Non IFS firms unmatched (III)
Processing and preserving of meat products	Number	101	100	727
	Productivity	1.38	1.40	1.01
	Export rate %	9.29	8,34	9.62
Processing and preserving of fruit and vegetables	Number	50	49	85
	Productivity	1.56	1.52	1.30
	Export rate %	17.02	23.53	23.68
Manufacture of dairy products	Number	99	66	147
	Productivity	1.75	1.69	1.33
	Export rate %	15.32	11.64	14.58
Manufacture of other food prod.	Number	142	138	474
	Productivity	1.54	1.52	1.28
	Export rate %	15.80	17.63	18.52
Manufacture of beverages	Number	58	58	270
	Productivity	1.70	1.67	2.34
	Export rate %	24.56	16.10	29.73

Source: EAE 2007 and handmade database

Table 4 : Results of the ML estimation of the threshold (firms certified with only one certification/on TFP value added)

Variables	Impact of BRC certification Coef (Std dev)		Impact of IFS certification Coef (Std dev)	
Constant	-5,43*** (0.068)		-5.486*** (0.070)	
Importing country size[1]	-0.125*** (0.016)		-0.123*** (0.016)	
Distance	0.037*** (0.009)		0.047***(0.010)	
Potential supply of the competing countries	0.217*** (0.045)		0.199*** (0.045)	
Country fixed effects				
	BRC firms	**Non-BRC firms**	**IFS firms**	**Non-IFS firms**
Belgium	-0.195*** (0.020)	*ref.*	-0.081*** (0.016)	*ref.*
The Netherlands	0.047 (0.036)	0.226*** (0.018)	0.237*** (0.042)	0.20*** (0.018)
Germany	0.044 (0.033)	0.198*** (0.017)	0.173*** (0.028)	0.183*** (0.017)
Italy	0.026 (0.052)	0.183*** (0.020)	0.159*** (0.041)	0.162*** (0.021)
Great Britain	-0.052** (0.024)	0.273*** (0.020)	0.247*** (0.036)	0.249*** (0.020)
Ireland	0.031 (0.071)	0.513*** (0.036)	0.476*** (0.074)	0.472*** (0.037)
Denmark	-0.062 (0.052)	0.339*** (0.031)	0.308*** (0.061)	0.298*** (0.032)
Greece	-0.045 (0.075)	0.460*** (0.041)	0.438*** (0.078)	0.404*** (0.042)
Portugal	0.094 (0.090)	0.383*** (0.037)	0.184*** (0.059)	0.387*** (0.039)
Spain	-0.056 (0.037)	0.096*** (0.017)	0.018 (0.032)	0.085*** (0.018)
Sweden	-0.019 (0.061)	0.549*** (0.038)	0.509*** (0.077)	0.486*** (0.039)
Finland	0.095 (0.099)	0.619*** (0.049)	0.665*** (0.103)	0.551*** (0.050)
Austria	0.237** (0.093)	0.582*** (0.036)	0.571*** (0.078)	0.547***(0.037)
Malta	0.249 (0.158)	0.917*** (0.084)	0.940*** (0.163)	0.844*** (0.085)
Estonia	0.338** (0.161)	1.002*** (0.078)	1.063*** (0.170)	0.918*** (0.078)
Latvia	0.371** (0.160)	0.950*** (0.071)	1.313*** (0.199)	0.844*** (0.071)
Lithuania	0.327** (0.146)	1.036*** (0.073)	1.300*** (0.189)	0.921*** (0.072)
Poland	0.018 (0.076)	0.592*** (0.041)	0.593*** (0.087)	0.526*** (0.042)
Czech Republic	0.121 (0.090)	0.661*** (0.046)	0.834*** (0.110)	0.579*** (0.046)
Slovak Republic	0.455*** (0.150)	1.371*** (0.082)	2.005*** (0.312)	1.201*** (0.077)
Hungary	0.059 (0.093)	0.733*** (0.053)	0.678*** (0.103)	0.667*** (0.054)
Romania	0.439*** (0.150)	1.090*** (0.068)	0.974*** (0.135)	1.035*** (0.070)
Bulgaria	0.417** (0.169)	1.156*** (0.086)	1.135*** (0.175)	1.075*** (0.087)
Slovenia	0.484*** (0.167)	1.204*** (0.081)	1.513*** (0.221)	1.091*** (0.079)
Cyprus	0.239 (0.150)	0.942*** (0.081)	0.952*** (0.161)	0.858*** (0.082)
Sub sector fixed effects	Yes		Yes	
Nb of observations	36500		36500	
Log Likelihood	-16378.76		-16565.67	
Wald chi2(33)	14876.17		14918.53	
Prob>chi2	0.000		0.000	

[1] Instrumented variable

Note: (***)significant at 1%; (**) à 5%; (*) à 10%

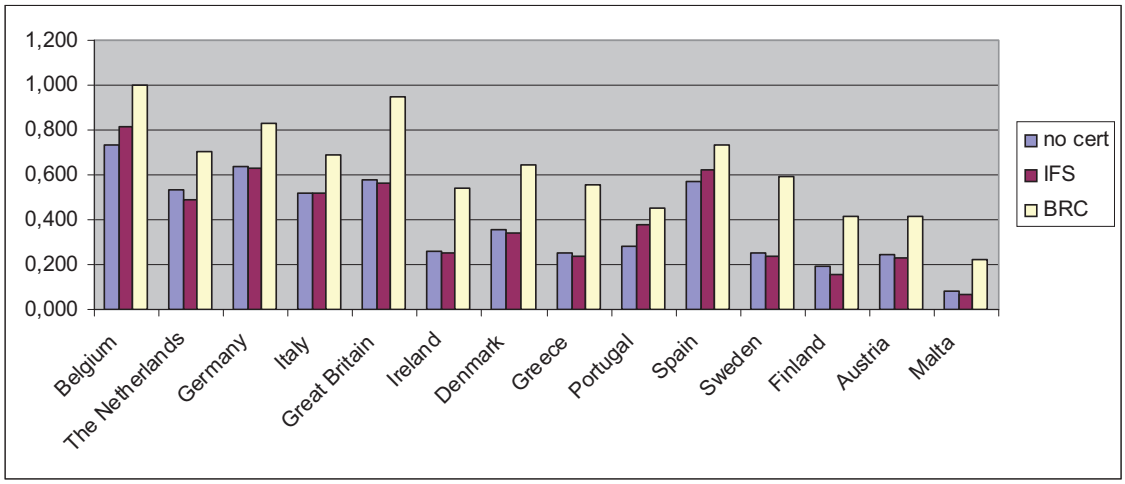

Figure 1a: Computed probability to export to some European countries according to the certification

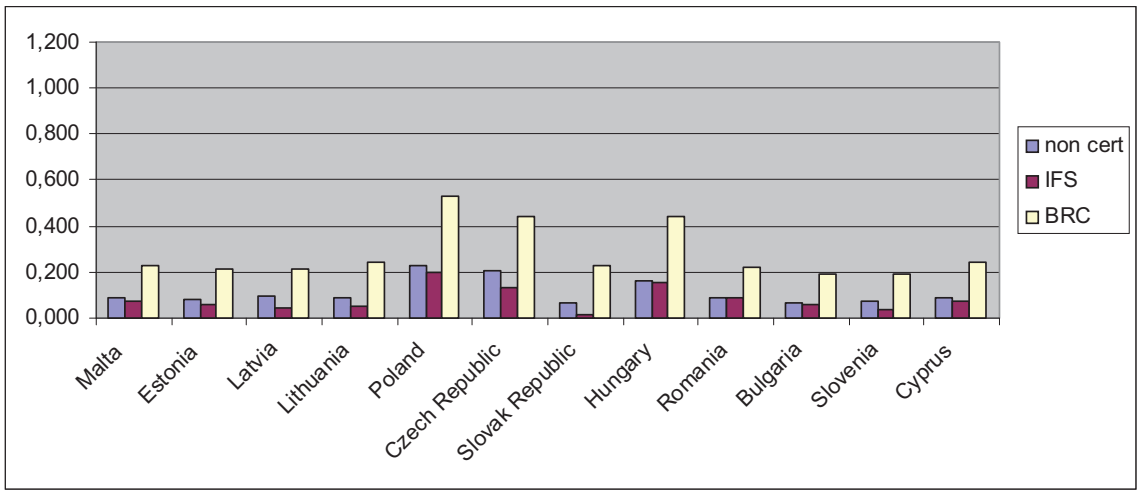

Figure 1b: Computed probability to export to some European countries according to the certification