Location and export performance of the French firms in the agrifood sector.

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1 Introduction

The total trade deficit of France was of more than 50 billions euros in 2009. When this same year, the French agrifood sector had a positive trade imbalance amounting to 3.7 billions euros and accounted for 7% of total French exports. The export performance of this sector is a central issue for French policy makers. In 2007, the then French Minister of Agriculture expressed his will to see the dynamism of the French agrifood sector resulting in a higher level of its export capacities.

In more details, at the firm level, 65% of French agrifood firms employing more than 20 people were exporters in 2006. Nevertheless this average level hides some severe regional disparities, the exporting firms are highly unevenly distributed on the territory.

Though some recent papers studied the impact of international trade on firms location (Bagoulla, Chevassus, Daniel, & Gaigné, 2010 ; Behrens, Gaigné, Ottaviano & Thisse, 2006 ; Okubo, Picard & Thisse, 2010) few is known on the role of the location of activities on the performance of firms to export.

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The papers studying that issue have mainly focused on spatial externalities. This literature initiated by Chevassus-Lozza & Galliano (2003) assumes that the proximity to other exporters will make the access of foreign markets easier due to a decrease in the costs for accessing this market through cost sharing or experience transfers on exports, in other words there are export spillovers. Numerous papers did show that the number of exporters located geographically close to a firm will increase its probability to export or the value of its exports (Chevassus-Lozza & Galliano, (2003), Koenig (2009), Koenig, Mayneris & Poncet (2010) and Aitken, Hansen & Harrison (1997)). However firms do not choose their location randomly, a sorting bias must be taken into account. First as shown recently in economic geography by Behrens, Duranton & Robert-Nicoud (2010), the most productive firms tend to agglomerate, these firms having a higher probability of being exporters and on average higher level of exports (Melitz, 2003 ; Chevassus-Lozza Gaigné, Le Mener, 2011). Besides some regions are specialized in production that are particularly competitive on the international markets, and the higher number of exporters in this region will then be explained by this specilization. Then in Koenig, Mayneris & Poncet (2010), the estimation of probability to export and level of exports are made in two distinct stages, that may generate a selection bias. These biases must be considered, in order to estimate the real impact of export spillovers on export behavior of firms.

Our paper aims at estimating the impact of export spillovers in taking into account the different bias what may occur. This question is a central issue for policy makers, because it can allow to better understand how economies of scale in the export can affect the export behavior of firms and help the policy makers to develop strategies to help firm to access international market.

The paper is organized os follows, we second and third part prensent repectively the theoretical and empircical model, used for our estimation, the data is presented in the forth parts and in a last part, the results of our estimation are described.

2 Model

We consider a world with J countries, when two countries trade the origin country will be labeled i and the destination country j ; each one being made up of R regions, labeled r. Labour is the only production factor, consumers are endowed individually with one unit of labour. They are mobile between regions, immobile between countries and can only consume and work in the region where they live.

2.1 Demand :

Consumer preferences in country j are given by a CES utility function over a continuum of varieties v. The set of available goods in country j will be denoted θ_j,

$$U = \left[\int_{\theta_j} q(v)^{1-\varepsilon} dv \right]^{\frac{1}{1-\varepsilon}}$$

The nominal demand of a consumer in country j for a variety v can be expressed as follows

$$q(v) = E_j P_j^{\sigma-1} p(v)^{-\varepsilon} \tag{1}$$

Where P_j is the consumer price index in j, E_j represents the aggregate expenditure of country j and ε is the constant elasticity of substitution between goods.

2.2 Supply :

The firms are under monopolistic competition and produce a continuum of varieties, each firm produces a single variety using the only production factor (the labour) under increasing return to scale. When producing, a firm located in the region r of country i incurs fixed costs, f_{ir}, that are the same for all firms located in this region and a marginal cost $\frac{1}{\varphi}$, with φ the productivity of the firm which is specific to each firm. Moreover the infrastructure being different in each regions, a specific regional trade cost is included, τ_{ir}, expressed as an iceberg costs. Then, when a firm exports it faces supplementary costs an international trade cost, τ_{ij}, which is also an iceberg costs ; and a fixed trade cost for serving country j from i : f_{ij}. These costs are all expressed in terms of labour.

The labour needed by a firm located in region r of the country i to serve a country $j \in [1; J]$ is :

$$l_{irj}(\varphi) = \frac{\tau_{ir}\tau_{ij}}{A_{ir}\varphi} q_{irj}(\varphi) + f_{irj}$$

A_{ir} expresses the agglomeration economies effect that may diminish the marginal cost to produce a unit of final good, indeed when firms gather they can share information, infrastructures and skilled labour. The quantity of input necessary to produce one unit of final goods will then decrease.And the costs of production will not be the same in all regions. This is taken into account through this factor.

In the case $j = i$, we have $\tau_{ii} = 1$ and $f_{iri} = f_{ir}$ and $l_{ir}(\varphi) = \frac{\tau_{ir}}{A_{ir}\varphi} q_{ir}(\varphi) + f_{ir}$.

These costs are all expressed in terms of labor. Then the total cost function for a firm producing in i and selling its production in $j \in [1; J]$ equals

$$C_{irj}(\varphi) = \frac{\tau_{ir}\tau_{ij}w_{ir}}{A_{ir}\varphi} q_{irj}(\varphi) + f_{irj}w_{ir} \tag{2}$$

With w_{ir} the nominal wage of workers in region r of country i. The total profit of a firm is defined as follows :

$$\pi_{irj}(\varphi) = p_{irj}(\varphi) q_{irj}(\varphi) - c_{irj}(\varphi)$$

In maximising profit, we get the price a firm set when selling its production in country j :

$$p_{irj}(\varphi) = \frac{\varepsilon}{\varepsilon - 1} \frac{w_{ir}\tau_{ir}\tau_{ij}}{\varphi A_{ir}} \tag{3}$$

What allows us to express the firm revenue :

$$
\begin{aligned}
s_{irj}(\varphi) &= p_{irj}(\varphi) q_{irj}(\varphi) \\
&= E_j P_j^{\varepsilon-1} \left(\frac{\varepsilon}{\varepsilon - 1} \right)^{1-\varepsilon} (\tau_{ir} \tau_{ij} w_{ir})^{1-\varepsilon} \varphi^{\varepsilon-1} A_{ir}^{\varepsilon-1} \qquad (4)
\end{aligned}
$$

2.3 Zero cutoff profit condition

When entering production a firm draws its productivity level from a productivity distribution function $g(\varphi)$. However as we presented above, there exist fixed costs that firms incur to produce (f_{ir}) and export (f_{irj}), a threshold productivity will then be necessary to produce or export profitably. If the productivity the firm drew is under the productivity threshold it exits the market, since the firm will not produce with an expected negative profit. Then, when it produces, its productivity will have to be higher than the exportation productivity threshold for the firm to export to a given market.

These thresholds are defined at the zero profit condition, it yields

$$
\pi_{irj}(\underline{\varphi}_{irj}) = 0 \quad \Longleftrightarrow \quad \frac{s_{irj}(\underline{\varphi}_{irj})}{\varepsilon} - f_{irj} w_{ir} = 0 \qquad (5)
$$

so that the productivty threshold will be defined as

$$
\underline{\varphi}_{irj}^{\varepsilon-1} = \frac{\varepsilon \left(\frac{\varepsilon}{\varepsilon-1} \right)^{\varepsilon-1} f_{irj} w_{ir}}{E_j P_j^{\varepsilon-1} (\tau_{ir} \tau_{ij} w_{ir})^{1-\varepsilon} A_{ir}^{\varepsilon-1}} \qquad (6)
$$

When we have $j = i$ we get the productivity threshold to produce for firms located in the region r of the country i.

$$
\underline{\varphi}_{ir}^{\varepsilon-1} = \frac{\varepsilon \left(\frac{\varepsilon}{\varepsilon-1} \right)^{\varepsilon-1} f_{ir} w_{ir}}{E_i P_i^{\varepsilon-1} (\tau_{ir} w_{ir})^{1-\varepsilon} A_{ir}^{\varepsilon-1}} \qquad (7)
$$

If a firm draws a productivity lower that $\underline{\varphi}_{ir}$ it immediately exits the market, since its expected revenue, will not be high enough to cover the costs of production.

2.4 Free entry condition

There is a free entry of firms on the market, when a firm enter production it pays a fixed cost of entry which will be afterwards sunk, this entry cost is denoted f_e. As only positive profit firms produce, the average profit of firms $\overline{\pi_{ir}}$ will be positive. Hence, firms will agree to pay this sunk cost f_e only if it is covered by their expected profit in case of successful entry, meaning if it draws a probability higher than the productvity threshold to produce. So at the equilibrium, since we have a free entry of firms, the average expected profit is absorbed by the sunk costs, we will have :

$$\left[1 - G(\underline{\varphi}_{ir})\right] \overline{\pi_{ir}} = w_{ir} f_e \tag{8}$$

With $G(\varphi)$ the cumulative distribution function of the productivity. $1 - G(\underline{\varphi}_{ir})$ gives the probability that an entrant draws a productivity higher than the entry productivity threshold.

where $\overline{\pi_{ir}} = \sum_j \overline{\pi_{irj}}$ and

$$\overline{\pi_{irj}} = \int_{\underline{\varphi}_{irj}}^{\infty} \pi_{irj}(\varphi)\mu_{irj}(\varphi) d\varphi \tag{9}$$

$\mu_{irj}(\varphi)$ is the conditional distribution of the productivity only for productivities higher than the exportation productivity threshold. In other words, $\mu_{irj}(\varphi) = \frac{g(\varphi)}{[1-G(\underline{\varphi}_{irj})]}$ if $\varphi > \underline{\varphi}_{irj}$ and 0 otherwise.

In plugging (6) into (4) we get

$$\frac{s_{irj}(\varphi)}{\varepsilon} = \underline{\varphi}_{irj}^{1-\varepsilon} f_{irj} w_{ir} \varphi^{\varepsilon-1}$$

We assume that our productivity follows a Pareto distribution on $[1; +\infty[$, we have $1-G(\underline{\varphi}_{irj}) = \underline{\varphi}_{irj}^{-\gamma}$ with γ, the shape parameter of the Pareto distribution, which is a measure of the dispersion of the productivities in the econonomy, if it is high the distribution of the pruductivities will be highly spread out. Finally we have (see Appendix A.1. for detailed calculation) :

$$\overline{\pi_{irj}} = \frac{\varepsilon - 1}{\gamma - \varepsilon + 1} f_{irj} w_{ir} \tag{10}$$

Therefore, (8) and (10) imply

$$\frac{\varepsilon - 1}{\gamma - \varepsilon + 1} \sum_j f_{irj} \underline{\varphi}_{irj}^{-\gamma} = f_e$$

By using the labour market clearing (see Appendix A.2) we obtain the mass of firms in region r

$$M_{ir} = \frac{L_{ir}(\varepsilon - 1)}{\varepsilon \gamma \underline{\varphi}_{ir}^{\gamma} f_e} \tag{11}$$

L_{ir} is the quantity of labour in region r and by plugging (11) in the price index (see Appendix A.3) and replacing it in (6) we get :

$$\underline{\varphi}_{irj} = K.A_{ir}^{-1} w_{ir}^{\varepsilon/\varepsilon-1} \tau_{ir} \tau_{ij} f_{irj}^{1/\varepsilon-1} E_j^{-\frac{1}{\gamma}} \Omega_j \tag{12}$$

with $K = \left[\frac{\varepsilon-1}{f_e(\gamma-\varepsilon+1)}\right]^{\frac{1}{\gamma}}$ and $\Omega_j = \left[\sum_l \sum_k L_{lk} \left[\frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{-\gamma} (f_{lkj} w_{lk})^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}\right]^{1/\gamma}$

2.4.1 Spatial externalities

Economies of agglomeration A_{ir} expresses the agglomeration economies effect, we assume that $A_{ir} = \rho M_{ir}^{\delta}$, with $\delta > 0$. The higher δ is, the lower the marginal cost of production will be for a given number of firms located in r. These economies benefit to all firms in region r.

If more firms set up in region r, A_{ir} raises and, in turn, decreases the cut-off productivity (equation 12). Each supplementary firm setting up in r reduces the marginal cost of production for all the firms. *However, the number of firms adjusts negatively to lower cut-off productivities (equation 11).*

If we replace A_{ir} by its expression in equation 12 using 11 in the particular case $i = j$, we get :

$$\underline{\varphi}_{ir} = \left(K_1 \Psi_{ir} f_{ir}^{1/\varepsilon-1} E_i^{-\frac{1}{\gamma}} \Omega_i \right)^{\frac{1}{1-\gamma\delta}} \tag{13}$$

with $K_1 = K\rho^{-1} \left[\frac{(\varepsilon-1)}{\varepsilon\gamma f_e}\right]^{\delta}$ and $\Psi_{ir} = L_{ir}^{-\delta} w_{ir}^{\varepsilon/\varepsilon-1} \tau_{ir}$

We can see through equation 13, that the variation of $\underline{\varphi}_{ir}$ will depend on the sign of $\frac{1}{1-\gamma\delta}$. If $\delta > \frac{1}{\gamma}$ an increase in the total expenditure of country i or a decrease in the fixed cost of the region r will increase the productivity threshold for entering the production (when they decrease productivity thresholds if there is no economies of agglomeration). Only the most productive firms will be able to settled down in this country, the least productive firms will be excluded from this region. We'll have an agglomeration of productive firms in region r of country i, since the marginal cost of production will be particularly low, and that region will be attractive for all firms and in particular for highly productive firms. That could explain the sorting of firms that was empirically observed, with highly productive firms gathering in the largestWhen markets.δ is big enough, there is a sorting of firms, the most productive ones setting down in the most attractive region.

Export spillover As said in the introduction export spillovers may take place in the case of export, indeed when a firm is close to firms exporting to a country j, the share of information on this market will be easier decreasing the fixed cost to reach this country, to take that into account we express the fixed cost f_{irj} as a function of M_{irj}^{ν}, we have $f_{irj} = \xi M_{irj}^{\nu}$ for $j \neq i$ with $M_{irj} = \underline{\varphi}_{irj}^{-\gamma} \underline{\varphi}_{ir}^{\gamma} M_{ir} = \frac{L_{ir}(\varepsilon-1)}{\varepsilon\gamma \underline{\varphi}_{irj}^{\gamma} f_e}$

We finally get the general formulae for $j \in [1; J]$: :

$$\underline{\varphi}_{irj} = (K_1 \Psi_{ir})^{\frac{1}{1-\gamma\delta}} \tau_{ij} f_{irj}^{1/\varepsilon-1} E_j^{-\frac{1}{\gamma}} \Omega_j \left(f_{ir}^{1/\varepsilon-1} E_i^{-\frac{1}{\gamma}} \Omega_i \right)^{\frac{\gamma\delta}{1-\gamma\delta}}$$

.

Symplifying that equation of the productivity threshold for exporting for the region r in country

i to country $j \neq i$ we have:

$$\underline{\varphi}_{irj} = \left[(K_2 \Psi_{ir_2}) \tau_{ij} E_j^{-\frac{1}{\gamma}} \Omega_j \underline{\varphi}_{ir}^{\gamma\delta} \right]^{\frac{1-\varepsilon}{1-\varepsilon-\gamma\nu}} \tag{14}$$

With $K_2 = K_1 \xi^{\frac{1}{\varepsilon-1}} \left[\frac{(\varepsilon-1)}{\varepsilon\gamma f_e} \right]^{\frac{\nu}{\varepsilon-1}}$ and $\Psi_{ir_2} = L_{ir}^{\frac{\nu}{\varepsilon-1}} \Psi_{ir}$

We have $0 < \frac{1-\varepsilon}{1-\varepsilon-\gamma\nu} < 1$

3 Empirical Model

What we call export performance of a firm is composed of two elements, first it's probability to export to a given market (which is called the extensive margin) and the value of its export when it's an exporter (the intensive margin).

3.1 Extensive margin

A firm producing a variety v will export to a foreign market only if it is profitable, using the equations of the previous section we know that the profit function of a firm will be written :

$$\pi_{irj}(\varphi) = \frac{E_j P_j^{\varepsilon-1} \left(\frac{\varepsilon}{\varepsilon-1}\right)^{1-\varepsilon} (\tau_{ir}\tau_{ij} w_{ir})^{1-\varepsilon} \varphi^{\varepsilon-1} A_{ir}^{\varepsilon-1}}{\varepsilon} - f_{irj} w_{ir}$$

we create a variable $\chi_{irj}(\varphi)$,with $\chi_{irj}(\varphi) = 1$ if a firm of region r and having a productivity φ exports to country j and 0 otherwise. Then the probability a firm export will be equal to :

$$\Pr\left[\chi_{irj}(\varphi) = 1\right] = \Pr\left[\pi_{irj}(\varphi) + u_{irj} > 0\right]$$

with u_{irjk} an error term which contains all unobserved characteristics. For a firm k, the equation we estimate will be as follows :

$$\Pr\left[\chi_{kirj}(\varphi) = 1\right] = \Pr\left[\begin{array}{c} \alpha_0 + \alpha_1 prod_k + \alpha_2 firms_{ir} + \alpha_3 dist_{ij} + \alpha_4 demand_{jv} \\ +\alpha_5 exporters_{irjk} + \alpha_6 wage_{ir} + \alpha_7 employ_k + u_{irjk} > 0 \end{array}\right] \tag{15}$$

with $prod_k$ the productivity of the firm (we will use the total factor productivity to get a value of productivity), $dist_{ij}$ the distance between i and j this variable is used as a proxy of international trade costs; $demand_j$ the total demand of country j for the good; $exporters_{kij}$ the number of exporting firms in the surrounding of k, this variable will take several forms that will be explained below; $wage_{ir}$ the wage of labour in the region k is located; $employ_k$ the number of employees working for k, a high number of employees may show some internal economies of scale and lower costs of production; $firms_{ir}$ is the total number of firms in region r, it is a proxy for A_{ir}. All these variables are expressed in log.

3.2 Intensive margin

The intensive margin is the total value a firm exports to a country j. We know that the revenue of a firm will be $s_{irj}(\varphi) = E_j P_j^{\varepsilon-1} \left(\frac{\varepsilon}{\varepsilon-1}\right)^{1-\varepsilon} (\tau_{ir}\tau_{ij}w_{ir})^{1-\varepsilon} \varphi^{\varepsilon-1} A_{ir}^{\varepsilon-1}$. The estimated equation is

$$val_{irjk} = \beta_0 + \beta_1 prod_k + \beta_2 dist_{ij} + \beta_3 demand_{jv} + \beta_5 wage_{ir} + \beta_6 employ_k + \beta_7 firms_{ir} + e_{irjk} \quad (16)$$

3.3 Estimation method

We have two equations to estimate, we first look if a firm export to a country or not, and then the value it exports when it does. These two equations are not independant, and can not be estimated separatly, we perform a two stage estimation in order to take into account this selection bias. Heckman's procedure is chosen and the export spillover variable (i.e. the number of exporting firms in the surrounding of a firm) is used as a selection variable since it is an explainable variable in the selection equation but not in the level equation.

4 About the data

The database we use for our estimations gathers variables on firms characteristics, on firms export behavior and on their industrial surrounding. It was built using several data sources.

4.1 sources

The French Annual Business Survey (Enquête annuelle entreprises-EAE) for agrifood sector is provided by the statistics services of the Minstry of Agriculture, it contains data on agrifood firms that employ more than twenty people. It gives us the accounting information of the firm, the activity it is specialized in (agrifood sector is subdivided in 9 activity subsectors) and its location. Information on firms exports are provided by the French custom services data which collects the export flows of each firm and the countries it trades with, the products it exports.are detailed at a 8 digit level. Besides, the Agrifood sector uses agricultural goods as input, however the agricultural production is not evenly spread on the French territory (grape is for example produced in some well defined area), the information on agricultural production of each département (a département is a French administrative area ; there are 96 of them in metropolitan France) is added.

Another French administrative area is used in this paper : *cantons*, which composed French *départements*. The Annual business Survey indicates in which *canton* a firm is located, and we furthermore know the time of road necessay between two given *cantons.* The surrounding of a firm will then be defined as all the *cantons* thant can be reach on road in less than one hour from the *canton* where the firm is located. Thus the region defined as r in our presvious sections will be a canton and all the cantons reachable in one hour on road.

Our final database gathers information on more than 1500 firms of the Agrifood sector for year 2006 representing in value almost 60% in value of total French export of Agrifood goods.

4.2 Variables :

Using section three, we build the variables we need to perform our estimations.

Productivity : $prod_k$ Bernard & Jensen (1999) showed that the most productive firms where more likely exporters. The productivity of each firm is calculated as a Total factor productivity (TFP) from the value added which is estimated from the method proposed by Olley & Pakes (1996) with de data of the Annual business survey.

the distance : $distance_{ij}$ This variable comes from the GeoDis dataset created by the CEPII, it's a geodesic distance. It will be used as a proxy of trade costs for exporting from France to a destination country.

Border : As shown in the literrature of trade costs and international trade, the proximity with the border of a foreign country make the trade with this country easier. A dummy variable *border* is integrated in our estimation, it equals 1 if the firm is located in a French Région (a Région, is a French adminstrative area, there are 22 Régions in metropolitan France, Régions are composed of départements which are composed of cantons).

Total value of import : $Demand_j$: to construct this variable we added all the importations of a given good in the country j from all its partner countries. this variable is used to proxy the demand in this country for this good. The CEPII's BACI dataset was used.

Agricultural production : The agrifood sector uses agricultural goods as inputs, however this agricultural production is far from being evenly spread on the French territory and the location of firms may depend on the place its inputs are produced. And as we explained above all goods of the French Agrifood sector don't have the same access to international markets. Thus the high exporting rate of firms in a region could be explained by a specialized agricultural production (the case of wine is particularly convincing). We have an input/output table for agrifood goods, which describes the agricultural goods necessary to the production of a final agrifood good (at a 4 digit level). We cnstruct a rate, that indcates the percentage of agricultural production for each sector that is produced in each French département.

Market Potential : This variable describe sthe access of local consumers for firms, for each French Région.

Number of exporting neighboring firms : A significant positive impact of the number neighboring firms will confirm an impact of export spillovers We construct three spillover variables. At first we consider the total number of exporting firms in the surrounding (the definition of "surrounding" is given in part 3.1.) A second variable only counts the number of exporting firms in the surrounding that belongs to the same agrifood subsector, and the third one only takes into account the firms that export to the same destination country. These three specifications of the spillover variable are tested separetely.

Moreover two fixed effects are added to take into account the specific effects of the subsector in which a firm is producing and its location.

4.3 Descriptive statistics

Informations on exporting firms are summarized in table 1, which was built from our dataset. We can see that on average the firms in our dataset are rather big, since they employ on average 171 workers (median value is only 60), they export almost 6 products (at a 6 digit level) to more than eleven foreign countries. In its industrial surrounding, each firm as on average 50 exporting firms, this number reduce to 10 when counting only the firms exporting to the same country and 5 for the same activity subsector.

Table 2 shows the great disparities existing between French Régions considering the ratio of exporters in the total number of firms, this rate is of 68% at the national level. For some regions, close to a border, like Alsace, this percentage is almost equal to 100% when for other landlocked regions, it equals only 50%. Besides, table 3 shows that this rate of exporting firms will highly depend in which industry the firms is specialized in, a firm producing beverages has higher probability to be exporters than one producing pet food. Agrifood industies will not have the same access to international markets.

Table 1 : Descriptives statistics of Agrifood exporting firms

Variables	Average	Std. dev.	min	max
# employees	171,13	353,946	4	3878
TFP	1,41	1,03668	0,01	11,04
# exported products	5,93	7,75	1	98
# partner countries	11,69	15,39	1	121
Export turnover	13782,5	54421,4	1	1113902
Export Value (in thousands Euros)	11256,1	42337,8	0,067	615017,44
# other exporting firms in the surrounding, same activity sector	5,6	9,71	0	55
# other exporting firms in the surrounding, same destination country	10,51	13,28	0	84
# other exporting firms in the surrounding	49,76	35,29	0	158

Table 2 : percentage of firms employing more than twenty people that exports per French administrative Régions. (Source : EAE)

REGION	% of firms that exports
Ile de France	72,17
Champagne Ardennes	72,58
Picardie	70,37
Haute-Normandie	58,93
Centre	70,00
Basse-Normandie	65,82
Bourgogne	69,23
Nord Pas de Calais	71,79
Lorraine	69,64
Alsace	91,45
Franche Comté	61,82
Pays de la Loire	60,43
Bretagne	64,77
Poitou Charentes	60,71
Aquitaine	63,74
Midi Pyrénées	58,75
Limousin	50,00
Rhône Alpes	66,79
Auvergne	58,70
Languedoc Roussillon	65,22
Provence Alpes Côtes d'Azur	66,92

Table 3 : percentage of firms employing more than twenty people that exports per Agrifood sector. (Source : EAE)

agrifood subsectors	% of exporters
Meat, preparations of meat	0,56
Fish, preparations of fish	0,76
Preparations of vegetables and fruits	0,80
animal and vegetable fats and oils	0,86
Dairy produces	0,69
products of the milling industry	0,70
Animal and pet food	0,47
Pastry, sugar and sugar confectionery	0,63
beverage and spirits	0,82

5 Results.

Feldman (1994) wrote "knowledge transverses corridors and streets more easily than continents and oceans”, proximity with other exporting firms helps firms to share knowledge and costs for accessing foreign markets, Exporters reduce the entry costs for other firms that intend to export, Several papers have already studied the impact of the industrial neighborhood of firms on their export performances. But the results are contradictory. Aitken, Hanson, & Harrison (1997), show that the multinational firms in Mexican states has a positive impact on exports of other firms located in the same state. Bernard & Jensen (2004) show that in the case of the United States that neighboring exporting firms have a negligible impact on the probability of exporting.

For France, Koenig (2009) sows that export spillovers have significant positive effect on the decision to start to export but only when the spillover is defined at a destination country level.Koenig, Mayneris, & Poncet (2010) find that the spillovers have a significant impact on the extensive margin but not the intensive margin, what would be coherent with our our theoretical model. This last result is moreover showed by Chaney(2008) who explains that a change in the fixed costs will modify the extensive margin but not the intensive one.

We use a heckman procedure for our estimation, we make a two stages estimation with a sélection equation (we look if a firm exports to a given country) and a level equation (the value a firm exports to a country). These estimation are performed for the three definitions of the export spillovers variable and are presented from left to right in table 4. The first part of the table 4 presents the result for the total number of neighboring exporting firms, the second part the neighboring firms exporting to the same destination, the third part the neighboring firms in the same agrifood industry.

Table 4 : Results of the estimation with Heckman procedure

VARIABLES	(1)		(2)		(3)	
	Sélection	**Export**	**Sélection**	**Export**	**Sélection**	**Export**
Productivity	0.169***	1.043***	0.129***	0.509***	1.090***	0.166***
	(0.00647)	(0.0596)	(0.00730)	(0.0251)	(0.0659)	(0.00646)
distance	-0.334***	-1.014***	-0.244***	0.0599***	-1.118***	-0.333***
	(0.00245)	(0.102)	(0.00289)	(0.0110)	(0.115)	(0.00245)
Total import	0.205***	0.891***	0.0971***	0.224***	0.954***	0.205***
	(0.00139)	(0.0629)	(0.00167)	(0.00721)	(0.0712)	(0.00139)
# employees	0.0956***	0.558***	0.0553***	0.252***	0.587***	0.0950***
	(0.00274)	(0.0319)	(0.00310)	(0.0111)	(0.0357)	(0.00274)
Border	7.408***	1.150**	-2.076	0.664	1.211**	7.377***
	(1.646)	(0.493)	(1.870)	(0.422)	(0.506)	(1.645)
maritime	2.981***	1.148***	-0.804	0.533***	1.213***	3.004***
	(0.604)	(0.228)	(0.686)	(0.176)	(0.239)	(0.604)
Agricultural production	2.100***	12.08***	1.170***	4.942***	12.64***	2.142***
	(0.194)	(1.208)	(0.225)	(0.813)	(1.285)	(0.194)
# exporters	-0.0711***					
	(0.00932)					
# exporters, same destination			0.237***			
			(0.00118)			
# exporters, same activity subsector					0.00957**	
					(0.00453)	
Constant	-193.9***	0	54.39	0	-191.4***	0
	(41.46)	(0)	(47.09)	(0)	(41.43)	(0)
Lambda	3.826***		-0.0534**		4.201***	
	(0.358)		(0.0254)		(0.406)	
Département fixed effect	Yes		Yes		Yes	
Activity subsector fixed effect	yes		yes		yes	
Observations			1,671,232			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We see that the export spillover effect are all significant, whatever the definition that is taken. This effect is very strong and positive when considering the firms exporting to the same destination country, having in this surrounding a supplmentary firm exporting to a given destination j, increases the probability for a firm to export there. This can easily be explained through the share of informations on this market. One can be surprised of the sign of the export spillover variable when considering all the export firms, this definition is very wide, and hide some disparities of size between firms, and the bigger a firm is, the higher its influence on the surrounding will be (Aitken, Hanson, & Harrison (1997)), we perform anew the estimates for our first specification with a spillover variable that counts the exporting firms only if they employ more than 150 people, its coefficient is then significatively positive and equals 0.15. In the case of our third definition the estimate is also positive and significant but is smaller.

The other variables have the expected signs, and are almost all significant.

6 Conclusions

In this paper we estimated the impact of export spillovers in controlling for several biaises that may occur concerning the impact of the location of the firm in adding variables that were describing the location of the firm. We show that the proximity of firms with exporters will increase their probability of exporting. These results confirm what has been presented in our theretical part. This level of the export spillovers will highly depend on the definition of spillovers, this effect is particularly high when it is defined destination specific level, or for great firms. This results are very important from a policy point of view, the experience sharing between neighboring firms may be a efficient lever in order to improve the export performance of the agrifood sector, the sharing experience should be destination specific and/or concern large firms.

7 Appendix A :

7.1 Expected profit

the average profit of a firm exporting to j is :

$$\overline{\pi_{irj}} = \int_{\underline{\varphi}_{irj}}^{\infty} \pi_{irj}(\varphi)\mu_{irj}(\varphi)d\varphi \tag{17}$$

With

$\mu(\phi) = \frac{g(\varphi)}{[1-G(\underline{\varphi}_{irj})]}$ if $\varphi > \underline{\varphi}_{irj}$ and 0 otherwise et $\pi_{irj}(\varphi) = \frac{1}{\varepsilon}s_{irj}(\varphi) - f_{irj}w_{ir}$

$$\begin{aligned}
s_{irj}(\varphi) &= E_j P_j^{\varepsilon-1}\left(\frac{\varepsilon}{\varepsilon-1}\right)^{1-\varepsilon}(\tau_{ir}\tau_{ij}w_{ir})^{1-\varepsilon}\varphi^{\varepsilon-1}A_{ir}^{\varepsilon-1} \\
\frac{1}{\varepsilon}s_{irj}(\varphi) &= \underline{\varphi}_{irj}^{1-\varepsilon}f_{irj}w_{ir}\varphi^{\varepsilon-1}
\end{aligned}$$

so

$$
\begin{aligned}
\overline{\pi_{irj}} &= \int_{\underline{\varphi}_{irj}}^{\infty} \left(\underline{\varphi}_{irj}^{1-\varepsilon} f_{irj} w_{ir} \varphi^{\varepsilon-1} - f_{irj} w_{ir} \right) \mu_{irj}(\varphi) d\varphi \\
&= f_{irj} w_{ir} \left[\underline{\varphi}_{irj}^{1-\varepsilon} \int_{\underline{\varphi}_{irj}}^{\infty} \varphi^{\varepsilon-1} \mu_{irj}(\varphi) d\varphi - \int_{\underline{\varphi}_{irj}}^{\infty} \mu_{irj}(\varphi) d\varphi \right]
\end{aligned}
$$

we assume a Pareto distribution i.e.. $[1 - G(\varphi)] = (\varphi)^{-\gamma}$ and $g(\varphi) = \gamma(\varphi)^{-\gamma-1}$, that gives :

$$
\begin{aligned}
\overline{\pi_{irj}} &= f_{irj} w_{ir} \left[\underline{\varphi}_{irj}^{1-\varepsilon} \int_{\underline{\varphi}_{irj}}^{\infty} \varphi^{\varepsilon-1} \frac{g(\varphi)}{[1 - G(\underline{\varphi}_{irj})]} d\varphi - \int_{\underline{\varphi}_{irj}}^{\infty} \frac{g(\varphi)}{[1 - G(\underline{\varphi}_{irj})]} d\varphi \right] \\
&= f_{irj} w_{ir} \left[\underline{\varphi}_{irj}^{1-\varepsilon+\gamma} \int_{\underline{\varphi}_{irj}}^{\infty} \gamma \varphi^{-\gamma+\varepsilon-2} d\varphi - 1 \right] \\
&= f_{irj} w_{ir} \left[\underline{\varphi}_{irj}^{1-\varepsilon+\gamma} \int_{\underline{\varphi}_{irj}}^{\infty} \gamma \varphi^{-\gamma+\varepsilon-2} d\varphi - 1 \right] \\
&= f_{irj} w_{ir} \left[\frac{\gamma \underline{\varphi}_{irj}^{1-\varepsilon+\gamma}}{\gamma - \varepsilon + 1} \underline{\varphi}_{irj}^{-1+\varepsilon-\gamma} - 1 \right] \\
\overline{\pi_{irj}} &= \frac{\varepsilon - 1}{\gamma - \varepsilon + 1} f_{irj} w_{ir} \qquad (18)
\end{aligned}
$$

the average profit of a firm located in r will then be :

$$
\begin{aligned}
\overline{\pi_{ir}} &= \sum_j \overline{\pi_{irj}} \frac{[1 - G(\underline{\varphi}_{irj})]}{[1 - G(\underline{\varphi}_{ir})]} \\
&= \sum_j \overline{\pi_{irj}} \underline{\varphi}_{irj}^{-\gamma} \underline{\varphi}_{ir}^{\gamma} \\
\overline{\pi_{ir}} &= \frac{\varepsilon - 1}{\gamma - \varepsilon + 1} w_{ir} \underline{\varphi}_{ir}^{\gamma} \sum_j f_{irj} \underline{\varphi}_{irj}^{-\gamma} \qquad (19)
\end{aligned}
$$

7.2 Labour market clearing

the average number of employees per firm equals

$$
\bar{l}_{ir} = \sum_j \frac{[1 - G(\underline{\varphi}_{irj})]}{[1 - G(\underline{\varphi}_{ir})]} \overline{l_{irj}}
$$

$$\overline{l_{irj}} = \int_{\underline{\varphi}_{irj}}^{\infty} l_{irj}(\varphi)\mu_{irj}(\varphi)d\varphi$$

The average labour a firm need to produce and export for a country j :

$$\begin{aligned}
l_{irj}(\varphi) &= \frac{c_{irj}(\varphi)}{w_{ir}} = \frac{\tau_{ir}\tau_{ij}}{A_{ir}\varphi} q_{irj}(\varphi) + f_{irj} \\
&= \frac{\tau_{ir}\tau_{ij}}{A_{ir}\varphi} E_j P_j^{\varepsilon-1} \left[\frac{\varepsilon}{\varepsilon-1} \frac{w_{ir}\tau_{ir}\tau_{ij}}{\underline{\varphi}_{irj} A_{ir}}\right]^{-\varepsilon} + f_{irj} \\
&= E_j P_j^{\varepsilon-1} \left(\tau_{ir}\tau_{ij}\right)^{1-\varepsilon} \varphi^{\varepsilon-1} A_{ir}^{\varepsilon-1} \left(w_{ir}\frac{\sigma}{\sigma-1}\right)^{-\sigma} + f_{irj}
\end{aligned} \tag{20}$$

$$\begin{aligned}
\overline{l_{irj}} &= \int_{\underline{\varphi}_{irj}}^{\infty} \left[E_j P_j^{\varepsilon-1} \left(\tau_{ir}\tau_{ij}\right)^{1-\varepsilon} \varphi^{\varepsilon-1} A_{ir}^{\varepsilon-1} \left(w_{ir}\frac{\sigma}{\sigma-1}\right)^{-\sigma} + f_{irj}\right] \mu_{irj}(\varphi)d\varphi \\
&= E_j P_j^{\varepsilon-1} \left(\frac{\tau_{ir}\tau_{ij}}{A_{ir}}\right)^{1-\varepsilon} \left(w_{ir}\frac{\sigma}{\sigma-1}\right)^{-\sigma} \int_{\underline{\varphi}_{irj}}^{\infty} \varphi^{\varepsilon-1}\mu_{irj}(\varphi)d\varphi + f_{irj}\int_{\underline{\varphi}_{irj}}^{\infty} \mu_{irj}(\varphi)d\varphi \\
&= E_j \left(\frac{\tau_{ir}\tau_{ij}}{A_{ir}P_j}\right)^{1-\varepsilon} \left(w_{ir}\frac{\sigma}{\sigma-1}\right)^{-\varepsilon} \frac{\gamma\underline{\varphi}_{irj}^{\varepsilon-1}}{\gamma-\varepsilon+1} + f_{irj}
\end{aligned}$$

given that : $\underline{\varphi}_{irj}^{\varepsilon-1} = \frac{\varepsilon\left(\frac{\varepsilon}{\varepsilon-1}\right)^{\varepsilon-1} f_{irj} w_{ir}}{E_j P_j^{\varepsilon-1}\left(\tau_{ir}\tau_{ij}w_{ir}\right)^{1-\varepsilon} A_{ir}^{\varepsilon-1}}$

$$\begin{aligned}
\overline{l_{irj}} &= \frac{\gamma\left(\varepsilon-1\right) f_{irj}}{\gamma-\varepsilon+1} + f_{irj} \\
&= f_{irj}\left[\frac{\gamma\left(\varepsilon-1\right)}{\gamma-\varepsilon+1} + 1\right] \\
&= f_{irj}\left[\frac{\gamma\varepsilon-\varepsilon+1}{\gamma-\varepsilon+1}\right] \\
\overline{l_{irj}} &= f_{irj}\left[\frac{\varepsilon\left(\gamma-1\right)+1}{\gamma-\varepsilon+1}\right]
\end{aligned} \tag{21}$$

the number of firms exporting to j in r is

$$
\begin{aligned}
M_{irj} &= M_{ir}\frac{[1-G(\underline{\varphi}_{irj})]}{[1-G(\underline{\varphi}_{ir})]} \\
M_{irj} &= \underline{\varphi}_{irj}^{-\gamma}\underline{\varphi}_{ir}^{\gamma}M_{ir} \qquad (22)
\end{aligned}
$$

Then the toal demand of labour in r is :

$$
\begin{aligned}
L_{ir} &= \sum_j M_{ijr}\overline{l_{irj}} + M_e f_e \\
&= \sum_j \underline{\varphi}_{irj}^{-\gamma}\underline{\varphi}_{ir}^{\gamma}M_{ir}f_{irj}\left[\frac{\varepsilon(\gamma-1)+1}{\gamma-\varepsilon+1}\right] + M_e f_e \\
&= \underline{\varphi}_{ir}^{\gamma}M_{ir}\left[\frac{\varepsilon(\gamma-1)+1}{\gamma-\varepsilon+1}\right]\sum_j \underline{\varphi}_{irj}^{-\gamma}f_{irj} + M_e f_e
\end{aligned}
$$

$$
\frac{\varepsilon-1}{\gamma-\varepsilon+1}\sum_j f_{irj}\underline{\varphi}_{irj}^{-\gamma} = f_e
$$

$$
\begin{aligned}
L_{ir} &= \underline{\varphi}_{ir}^{\gamma}M_{ir}\left[\frac{\varepsilon(\gamma-1)+1}{\gamma-\varepsilon+1}\right] f_e\frac{\gamma-\varepsilon+1}{\varepsilon-1} + M_e f_e \\
L_{ir} &= \underline{\varphi}_{ir}^{\gamma}M_{ir}\left[\frac{\varepsilon(\gamma-1)+1}{\varepsilon-1}\right] f_e + M_e f_e
\end{aligned}
$$

$$
M_e = \underline{\varphi}_{ir}^{\gamma}M_{ir}
$$

$$
\begin{aligned}
L_{ir} &= \underline{\varphi}_{ir}^{\gamma}M_{ir}f_e\left[\frac{\varepsilon(\gamma-1)+1}{\varepsilon-1}+1\right] \\
L_{ir} &= \underline{\varphi}_{ir}^{\gamma}M_{ir}f_e\left[\frac{\varepsilon\gamma}{\varepsilon-1}\right] \qquad (23)
\end{aligned}
$$

$$M_{ir} = \frac{L_{ir}(\varepsilon - 1)}{\varepsilon\gamma\underline{\varphi}_{ir}^{\gamma} f_e} \tag{24}$$

7.3 Price index

$$\begin{aligned} P_{ir} &= \left[\int p(\omega)^{1-\varepsilon} d\omega\right]^{\frac{1}{1-\varepsilon}} \\ P_j^{1-\varepsilon} &= \sum_l \sum_k M_{lkj} \int_{\underline{\varphi}_{lkj}}^{\infty} (p(\varphi))^{1-\varepsilon} \mu_{lkj}(\varphi) d\varphi \end{aligned}$$

$$\begin{aligned} M_{lkj} &= \underline{\varphi}_{lkj}^{-\gamma} \underline{\varphi}_{lkr}^{\gamma} M_{lk} \\ M_{lk} &= \frac{L_{lk}(\varepsilon - 1)}{\varepsilon\gamma\underline{\varphi}_{lk}^{\gamma} f_e} \end{aligned}$$

$$\begin{aligned} P_j^{1-\varepsilon} &= \sum_l \sum_k \frac{L_{lk}(\varepsilon-1)}{\varepsilon\gamma\underline{\varphi}_{lkj}^{\gamma} f_e} \int_{\underline{\varphi}_{lkj}}^{\infty} (p(\varphi))^{1-\varepsilon} \mu(\varphi) d\varphi \\ &= \sum_l \sum_k \frac{L_{lk}(\varepsilon-1)}{\varepsilon\gamma\underline{\varphi}_{lkj}^{\gamma} f_e} \left[\frac{\varepsilon}{\varepsilon-1} \frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{1-\varepsilon} \int_{\underline{\varphi}_{lkj}}^{\infty} \varphi^{\varepsilon-1} \mu_{lkj}(\varphi) d\varphi \\ &= \sum_l \sum_k \frac{L_{lk}(\varepsilon-1)}{\varepsilon f_e} \left[\frac{\varepsilon}{\varepsilon-1} \frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{1-\varepsilon} \int_{\underline{\varphi}_{lkj}}^{\infty} \varphi^{-\gamma+\varepsilon-2} d\varphi \\ P_j^{1-\varepsilon} &= \sum_l \sum_k \frac{L_{lk}(\varepsilon-1)}{\varepsilon f_e} \left[\frac{\varepsilon}{\varepsilon-1} \frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{1-\varepsilon} \frac{1}{\gamma-\varepsilon+1} \underline{\varphi}_{lkj}^{-\gamma+\varepsilon-1} \end{aligned} \tag{25}$$

Given that :

$$\begin{aligned} \underline{\varphi}_{lkj}^{\varepsilon-1} &= \frac{\varepsilon\left(\frac{\varepsilon}{\varepsilon-1}\right)^{\varepsilon-1} f_{lkj} w_{lk}}{E_j P_j^{\varepsilon-1} (\tau_{lk}\tau_{lj}w_{ir})^{1-\varepsilon} A_{lk}^{\varepsilon-1}} \\ \underline{\varphi}_{lkj} &= \frac{\varepsilon^{1/\varepsilon-1}\left(\frac{\varepsilon}{\varepsilon-1}\right)(f_{lkj}w_{lk})^{1/\varepsilon-1}}{E_j^{1/\varepsilon-1} P_j (\tau_{lk}\tau_{lj}w_{ir})^{-1} A_{lk}} \end{aligned} \tag{26}$$

we have :

$$
\begin{aligned}
P_j^{1-\varepsilon} &= \sum_l \sum_k \frac{L_{lk}(\varepsilon-1)}{\varepsilon f_e}\left[\frac{\varepsilon}{\varepsilon-1}\frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{1-\varepsilon}\frac{1}{\gamma-\varepsilon+1}\left[\frac{\varepsilon^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}\left(\frac{\varepsilon}{\varepsilon-1}\right)^{-\gamma+\varepsilon-1}(f_{lkj}w_{lk})^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}}{E_j^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}P_j^{-\gamma+\varepsilon-1}(\tau_{lk}\tau_{lj}w_{lk})^{\gamma-\varepsilon+1}A_{lk}^{-\gamma+\varepsilon-1}}\right] \\
P_j^{-\gamma} &= \frac{E_j^{\frac{-\gamma+\varepsilon-1}{1-\varepsilon}}}{\gamma-\varepsilon+1}\frac{\varepsilon^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}}{f_e}\left(\frac{\varepsilon}{\varepsilon-1}\right)^{-\gamma-1}\sum_l\sum_k L_{lk}\left[\frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{1-\varepsilon}\left[\frac{(f_{lkj}w_{lk})^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}}}{(\tau_{lk}\tau_{lj}w_{lk})^{\gamma-\varepsilon+1}A_{lk}^{-\gamma+\varepsilon-1}}\right] \\
P_j^{-\gamma} &= E_j^{\frac{-\gamma+\varepsilon-1}{1-\varepsilon}}\frac{(\varepsilon-1)^{\gamma+1}}{\varepsilon^{\frac{\gamma\varepsilon}{\varepsilon-1}}f_e(\gamma-\varepsilon+1)}\sum_l\sum_k L_{lk}\left[\frac{w_{lk}\tau_{lk}\tau_{lj}}{A_{lk}}\right]^{-\gamma}(f_{lkj}w_{lk})^{\frac{-\gamma+\varepsilon-1}{\varepsilon-1}} \qquad (27)
\end{aligned}
$$

7.3.1 Spatial externalities

$$
\begin{aligned}
\underline{\varphi}_{irj} &= K.A_{ir}^{-1}w_{ir}^{\varepsilon/\varepsilon-1}\tau_{ir}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j \\
&= K\left\{\rho\left[\frac{L_{ir}(\varepsilon-1)}{\varepsilon\gamma\underline{\varphi}_{ir}^{\gamma}f_e}\right]^{\delta}\right\}^{-1}w_{ir}^{\varepsilon/\varepsilon-1}\tau_{ir}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j \\
&= K_1\Psi_{ir}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j\underline{\varphi}_{ir}^{\gamma\delta}
\end{aligned}
$$

With $K_1 = K\rho^{-1}\left[\frac{(\varepsilon-1)}{\varepsilon\gamma f_e}\right]^{-\delta}$ and $\Psi_{ir} = L_{ir}^{-\delta}w_{ir}^{\varepsilon/\varepsilon-1}\tau_{ir}$

If $j = i$ then :

$$
\begin{aligned}
\underline{\varphi}_{ir} &= K_1^{1-\gamma\delta}\Psi_{ir}f_{ir}^{1/\varepsilon-1}E_i^{-\frac{1}{\gamma}}\Omega_i\underline{\varphi}_{ir}^{\gamma\delta} \\
&= \left(K_1\Psi_{ir}f_{ir}^{1/\varepsilon-1}E_i^{-\frac{1}{\gamma}}\Omega_i\right)^{\frac{1}{1-\gamma\delta}}
\end{aligned}
$$

$$
\begin{aligned}
\underline{\varphi}_{irj} &= K_1\Psi_{ir}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j\underline{\varphi}_{ir}^{\gamma\delta} \\
&= K_1\Psi_{ir}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j\left(K_1\Psi_{ir}f_{ir}^{1/\varepsilon-1}E_i^{-\frac{1}{\gamma}}\Omega_i\right)^{\frac{\gamma\delta}{1-\gamma\delta}} \\
&= (K_1\Psi_{ir})^{\frac{1}{1-\gamma\delta}}\tau_{ij}f_{irj}^{1/\varepsilon-1}E_j^{-\frac{1}{\gamma}}\Omega_j\left(f_{ir}^{1/\varepsilon-1}E_i^{-\frac{1}{\gamma}}\Omega_i\right)^{\frac{\gamma\delta}{1-\gamma\delta}}
\end{aligned}
$$

8 References

Aitken, B., Hanson, G. H., & Harrison, A. E. (1997). Spillovers, foreign investment, and export behavior. Journal of International Economics, 43(1-2), 103–132. Elsevier. Retrieved from http ://linkinghub.elsevier.com/retrieve/pii/S002219969601464X

Bagoulla C., E. Chevassus-Lozza, K. Daniel, & C. Gaigné (2010) Regional Production Adjustment to Import Competition : Evidence from the French Agro-Industry, American Journal of Agricultural Economics,vol. 92(4), pages 1040-1050.

Behrens, K., C. Gaigné, G. Ottaviano, & J.-F. Thisse (2006). Is remoteness a locational disadvantage ?, Journal of Economic Geography, Oxford University Press, vol. 6(3), pages 347-368.

Behrens, Kristian, Gilles Duranton, et Frédéric Robert-Nicoud. 2010. Productive cities : Sorting, selection and agglomeration. CEPR Discussion Paper. C.E.P.R. Discussion Papers. http ://ideas.repec.org/p/cpr/ceprd

Bernard, Andrew. B., & Jensen, J. B. (1999). Exceptional exporter performance : cause, effect, or both ? Journal of International Economics, 47(1), 1-25. doi :16/S0022-1996(98)00027-0

Bernard, Andrew B, et J. Bradford Jensen. 2004. « Why Some Firms Export ». Review of Economics and Statistics 86 (2) (mai) : 561–569. doi :10.1162/003465304323031111.

Bernard, Andrew B, J. Bradford Jensen, S. J. Redding, et P. K Schott. 2007. « Firms in international trade ». The Journal of Economic Perspectives 21 (3) : 105–130.

Chaney, Thomas. 2008. « Distorted Gravity : The Intensive and Extensive Margins of International Trade ». American Economic Review 98 (4) : 1707-1721. doi :10.1257/aer.98.4.1707.

Chevassus-Lozza E & Galliano D (2003) Export Spillovers, Firm Organization and Export Behaviour : Evidence from the French Food Industry. Regional Studies 37 : 147-158.

Chevassus-Lozza, E., & Latouche, K. (2011). Firms, markets and trade costs : access of French exporters to European agri-food markets. European Review of Agricultural Economics, 1-32. doi :10.1093/erae/jbr009

Helpman, E., Marc Melitz, et Y. Rubinstein. 2008. « Estimating Trade Flows : Trading Partners and Trading Volumes ». Quarterly Journal of Economics 123 (2) : 441–487.

Koenig, P. (2009). Agglomeration and the export decisions of French firms. Journal of Urban Economics, 66(3), 186-195. Elsevier Inc. doi :10.1016/j.jue.2009.07.002

Koenig, P., Mayneris, F., & Poncet, S. (2010). Local export spillovers in France. European Economic Review, 54(4), 622-641. Elsevier. doi :10.1016/j.euroecorev.2009.12.001

Korinek, Jane, et Patricia Sourdin. 2010. Clarifying Trade Costs : Maritime Transport and Its Effect on Agricultural Trade. Applied Economic Perspectives and Policy 32, no. 3 : 417 -435. doi :10.1093/aepp/ppq007

Melitz, Marc J. 2003. « The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity ». Econometrica 71 (6) : 1695-1725.

Okubo, T., Picard, P. M., & Thisse, J.-F. (2010). The spatial selection of heterogeneous firms. Journal of International Economics, 82(2), 230–237. doi :10.1016/j.jinteco.2010.07.003