Export dynamics and information spillovers: evidence from Spanish firms

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Abstract

This paper investigates the determinants of a firm's export decision and focuses on the identification of spillovers from neighbouring firms. We use a panel of Spanish firms that started to export to at least one of 95 countries over the 2000-2006 period. Detailed data on the location of firms as well as on the destinations of their exports allows us to analyze the presence of spillovers across firms exporting to different countries. Results show evidence of information spillovers, i.e. new exporters acquire valuable information from other local firms on foreign consumer tastes, product standards or customs administration in a particular market. However the selection of the most productive firms to the most difficult markets decreases the impact of spillovers on firms exporting to these countries.

J.E.L. classification: F1, R12, L25

Keywords: export decision, export market, agglomeration, spillovers.

I. Introduction

Individual relationships among trading partners are extremely valuable and can determine the success or decline of a firm in any type of business. The information acquired through each interaction is seen, by both buyers and sellers, as an investment, which will bring future benefits. The need for information among business partners is probably more pronounced in the case of international transactions. The export success of a firm (and ultimately a country) will depend on the quality of its business relationships. Through repeated interactions, exporters will acquire valuable information on reliability in terms of the credit and delivery of their trading partners. It will also provide knowledge of the functioning of foreign market tastes, custom administrations, product quality, standards, certification and design. This information created by the business relationship may spill over to other exporters. Exporters may use other exporters, who have had direct experience

with potential clients, as a source of information and reputation, as previous export activities generate a better understanding of how foreign markets work as well as how reliable potential customer are. The export success of a firm in some markets may generate demonstration effects for other firms, which become aware of potential opportunities in foreign markets. Social networks (i.e. export promotion agencies) or ethnic networks (immigrants) may facilitate the transmission of these information spillovers in various ways: helping to match buyers and sellers across borders; creating market similarities; easing the transmission of these flows across borders; and serving as a deterrent for opportunistic behaviour (Rauch, 1999; Rauch and Trindade, 1999).

This paper builds on the existing literature analysing the existence and nature of export spillovers among exporters. Using a uniquely detailed dataset comprising Spanish exports at the product, firm and destination country level over the period 1997-2006, we analyse the impact of geographical agglomeration of exporters on the decision where to export by individual firms. To do so, we adopt a theoretical framework in which exporting firms face multiple destinations, each one with its idiosyncratic characteristics. Therefore our empirical model includes both firm heterogeneity and sunk cost heterogeneity across destinations. We focus in particular on a commonly accepted and important component of sunk costs: the acquisition of information regarding foreign markets. The identifying hypothesis that we use is that the firms that most easily collect information should encounter fewer barriers to entry. With this underlying hypothesis, first we examine whether sunk costs differ across export destinations. Second, we investigate how the presence of nearby exporters' activity influences the decision of Spanish firms to start exporting to a given country. Third, we check if firms that posse more information (or of higher quality, or obtained at lower price), because they are more exposed to information spillovers, are able to overcome more easily the difficulty to export to more difficult destinations due to higher sunk costs.

The contribution of the paper is twofold. First, we build our analysis on a unique data-set comprising Spanish firm-level exports by 4 digits-products and by destination country over the period 1997-2006. Second, we explore the impact of export spillovers on the firm decision about where to export.

The results indicate heterogeneity of sunk costs by groups of export destinations. We also find that export spillovers help to predict the destination of exports by new exporters. However, different groups of countries show different magnitudes of the effect of proximity to exporters. Controlling for the number of exporters to each country eliminates most of the spatial concentration effect: the selection of the most productive firms to the most difficult markets potentially hides any visible effect of spillovers on firms exporting to remote markets.

The paper is structured as follows. Section (2) summarises previous studies that link export activity and spillovers. Section (3) exposes the theoretical setting. Section (4) describes the main characteristics of the explanatory variables. Section (5) contains the firm-level estimation results and section (6) the results concerning the aggregate level analysis. Section (7) concludes.

II. Literature review

The empirical literature on the export behaviour of individual firms has now explored various determinants of the export decision, most of which have been incorporated in the new trade models with heterogeneous firms (Melitz, 2003; Helpman, Melitz and Yeaple, 2004). Hence, a high productivity lowers the cost of selling abroad (Bernard, Eaton, Jensen and Kortum, 2003; Bernard and Jensen, 1999; Bernard and Wagner, 2001) and allows overcoming the fixed cost of exporting (Roberts and Tybout, 1997). Size (Aw and Hwang, 1995) as well as R&D or innovations also favour selling on foreign markets (Sterlachini, 2001; Wakelin, 1998). Next to these traditional factors, other determinants of individual export behaviour have been put forward, that emphasize the impact of the presence of local exporters or multinationals on firm performance at exporting. The underlying assumption of export spillovers is that the export specific knowledge of firms that are experienced on foreign markets can benefit nearby firms and allow them to start exporting to a given market. The empirical evidence of the presence of export spillovers is mixed:

Aitken, Hanson and Harrison (1997) find that the probability that Mexican plants export is positively linked to the presence of multinational firms in the same state, but uncorrelated to proximity to overall exporters. The empirical evidence for other developing

countries show similar conclusion. But there is also evidence in developed countries; for the UK, Greenaway et al (2002) find that domestic firms learn to export from multinationals. Roberts and Tybout (1997), Bernard and Jensen (1999), Clerides et al. (1998) and Clerides and Kassinis (2001) found that imitation fails to play a significant role in the decision to start exporting by previously non-exporters. These authors argue that firms will not start exporting simply because it worked for others. Other empirical papers find that agglomeration economies play a positive role on export performance of local firms, although there is no consensus about the type of agglomeration behind such benefits. Lautanen (2000) analyses the reasons that generate interest for exporting among managing directors of small exporting firms in Finland and, he finds that the major stimulus comes from inter-firm transmission of information, but not always from firms in the same industry. Becchetti and Rossi (2000) find strong evidence of the positive impact of industrial districts (also called localisation economies) on both the probability to export and the export intensity of Italian small-medium sized firms in 1995. In contrast, Malmberg (2000) observe that localisation economies are not important among Swedish exporters in 1990, while urbanisation economies have a large positive effect on the firms' volume of exports.

Aitken et al. (1997) show that the export decision of local Mexican firms after the trade liberalisation in 1985 is positively affected by the specific export activities of multinationals, while there is no evidence of spillovers from the geographical concentration of local export activity. Sjöholm (2000) find opposite results for Indonesia since the decision to export in 1996 by previously non-exporting establishments in 1995 is significantly affected by firm-level foreign. For the US Bernard and Jensen (2004) find no role for spillovers from nearby exporters or from same-industry exporters, while Koenig (2005) finds strong evidence of spillovers from local exporters to new exporting firms in France over the period 1986-1992. For the period 1998-2003, Koenig et al (2007) find that the number of local exporters in the same industry influences positively the volume of exports to a given country.

Using Spanish data Barrios, Görg and Strobl (2003) studied the presence and magnitude of export spillovers on Spanish exporters, for two different destinations: OECD countries versus the rest of the world. They find an increasing impact of spillovers in the OECD countries and no impact for the rest of the world. More recently Requena and

Castillo (2007) find that the probability of exporting to a specific destination by new exporters is positively linked to the presence of nearby exporters from the same industry, but uncorrelated to proximity to multinationals or nearby domestic exporters from other industries.

II. Empirical Model

We adapt the Roberts and Tybout (1997) approach to model a multi-period export decision for entry and exit into specific export markets in the presence of sunk costs. To enter, exit or re-enter a specific export market, a firm has to incur in some costs associated to sell in this specific market. In each period t a firm decides to export to a specific market c if the increment to the expected gross profits associated with exporting there is positive (participation condition). That is, the decision to export a specific destination is a dynamic discrete choice that depends on previous decisions of the firm. The expected gross profits depend on exogenous firm characteristics (x_{it}), destination characteristics (d_{ct}), macro conditions (m_t) and previous export experience in country c (Y_{ict-h}). Empirical models of trade with heterogeneous firms that analyse the (unobserved) sunk cost in the individual export decision estimate the presence of a sunk cost by using the past export status of the firm. A positive coefficient on past export status assesses the existence of a sunk cost. The profit maximising firm makes its export entry decision based on expected profits from exporting, now and in the future, taking into account the fixed costs of entering each new market. As a novelty of this paper is that we treat separately each individual export market. We assume that exporting experience does not impact the cost function of the firm. The costs we want to analyse are any costs that may be involved in entering the export market, for example in marketing, setting up distribution networks, etc. These costs are assumed to be sunk and are incurred in full if the firm has left the export market for any period of time.

The export participation decision for firm i to destination c at year t is expressed by

$$y_{ict}^{*} = m_t + d_{ct}'j + x_{it}'b + \sum_{h=1}^{T} g^{hc} y_{ict-h} + a_{ic} + u_{ict}, t = 2,...,T, \text{c} = 1,...\text{C} \;\; and \;\; i = 1,...,N \quad (1)$$

$$y_{ic1}^{*} = l'z_{ic} + h_{ic} \quad \text{where} \;\; t = 1, \text{c} = 1,...\text{C} \;\; and \;\; i = 1,...,N$$

In the first equation y_{ict}^{*} denotes the unobservable firm propensity to export to destination c. A firm is observed to be an exporter to destination c when the profitability of

its action crosses a threshold (zero in this case), that is, if $y_{ict}^* > 0$. The variable a_i is a firm-specific time-invariant component in the error term (capturing the *unobservable firm heterogeneity*), and u_{ict} is the unobservable error term.

The participation decision does not depend on the firm exporting background if sunk costs are zero. Though, testing whether g^{hc} are jointly equal to zero allows for testing for the importance of sunk costs in the decision to export to destination *c*. If they are significantly different from zero then it is possible to analyse the rate of depreciation of export market experience. Testing whether g^{hc} are jointly equal across (some) destinations allows for evaluating the importance of previous exporting experience to specific destinations. For example, we can check whether entry is similar across destination within the euro-zone after 2002. Finally, testing whether some $g^{hc'}$ $c' \neq c$ are different from zero when we examine the decision to export to destination *c* indicates 1) there is a ranking of destinations – first more popular/easier markets and then more difficult/costly markets; 2) the possibility to learn from other local exporters depends on the accessibility to the destination; very difficult markets will have few exporters (the most productive ones) so they will not reach the critical mass of transactions needed to generate export spillovers.

By assuming that u_{ict} is independent normal distributed with mean zero and variance s_u^2, the first equation is the random effects probit model. An extended version of this model includes as an additional vector of regressors, $\bar{x}_i$, the means of all the firm specific time-varying covariates, which allows for relaxing the assumption of independence between the firm specific unobservable effect and the time-varying characteristics (Chamberlain, 1984).

The second equation accounts for the initial condition problem. The initial condition problem arises when the start of the observation period does not coincide with the start of the stochastic process generating individuals' "first" exporting experience. Technically the problem occurs if y_{i1} is correlated with the unobservable term, a_{ic} (Heckman, 1981a), that is, $corr(a_{ic}, h_{ic}) = r$.

To estimate the two-equation model I use a two-step method suggested by Orme (1997) in the spirit of Heckman's standard sample selection correction method.[1] The random effect probit model, under the specification of $a_{ic} = dh_{ic} + w_{ic}$, is given by

$$y_{ict}^{*} = m_t + d_{ct}j + x_{it}'b + \sum_{h=1}^{T} g^{hc} y_{ict-1} + d h_{ic} + w_{ic} + u_{ict} \qquad for\ t>=2 \qquad (2)$$

Now this equation has two firm-specific random error components h_i and w_i. Assuming a bivariate distribution of (h_{ic}, a_{ic}), $E[w_{ic}|y_{ic1}]=0$ but $E[h_{ic}|y_{ic1}]=e_{ic}$, where $e_{ic} = \frac{(2y_{ic1}-1)f(l'z_{ic})}{\Phi((2y_{ic1}-1)l'z_{ic})}$. If u_{it} is assumed to be orthogonal to the regressors x_{it}, w_i can be treated as the usual time-invariant error component in the random effects probit model provided the unobservable error component, h_i, can be corrected for. Since that e_i is a generalised error in the "initial condition" probit equation, h_i can be replaced by its conditional expectation in (2) so we can estimate the random effect probit model equation with an additional regressor, e_i, and so under the assumption of normality we obtain the following reduced form model:

$$y_{ict}^{*} = m_t + d_{ct}j + x_{it}'b + \sum_{h=1}^{T} g^{h} y_{it-1} + d\hat{e}_{ic} + w_{ic} + u_{ict} \qquad for\ t>=2 \qquad (3)$$

A test of the null hypothesis that $corr(a_{ic}, h_{ic}) = r = 0$ is given by the t-statistic of the coefficient of the additional regressor $\hat{e}_{ic}$.[2]

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[1] This method has been implemented recently by Arulampalam et al. (1998) to study unemployment persistence in the UK labour market and Requena (2005) to analyse the export participation decision of UK SMEs.

[2] Unfortunately, the assumption of a bivariate distribution for (h_{ic}, a_{ic}) implies that the variance of w_{ic} (the new error component that enters the random effects probit model specification) is not constant. Orme (1997) shows, using Monte-carlo simulations, that heteroskedastic ity produces inconsistent parameter estimates that disappear for small values of r. Moreover, the condition of "small r" is also required for $\mathrm{var}(w_{ic}) \cong s_a^{\,2}$. By imposing a factor analytical structure in the error term, that is, the correlation between successive errors for the same individual is a constant, $r = corr(w_{ic} + u_{ict}, w_{ic} + u_{ict-1}) = s_a^{\,2} / s_a^{\,2} + s_u^{\,2}$ t = 2,...,T so r is the proportion of the variance attributed to the unobserved individual heterogeneity in the to tal variance of the error term. By normalising $s_u^{\,2} = 1$, then an estimate of r is approximated by $d\sqrt{(1-r)/r}$ where d is the coefficient associated to the probit generalised error variable

III. Data and methodology

One of the contributions of this paper is the construction of a new dataset that combines detailed information on exporting firms, their products and destination choices over a relatively long period of time, 1997-2006. The dataset is constructed by merging information from three different databases: (1) Directorio de Empresas Españolas Importadoras y Exportadoras, (2) Base de Datos de Comercio Exterior de Aduanas and (3) SABE (Sistema de Análisis de Balances Españoles). The first database is published jointly by *Trade Chambers of Spain* and *Inland Revenue*, covers the period 1997-2006 and contains detailed information on export status, volume of exports, products (4 digit NACE) and destination of exports at country level for 10.508 exporting firms, representing about 15 percent of all exporting companies. The second database is published by *Customs, Inland Revenue*, covers the period 1993-2006 and contains aggregated exports volume, value and number of transactions by industry (8 digit CN, 6 digit HS and 4 digit NACE), province and country of destination. The last database is published by Van Dick, covers the period 1995-2006 and contains information on the firm's accounts, main activity (4 digit NACE), shareholder capital distribution, location (province, NUTS III), asset value, number of employees, sales, income, profits, financial and labour expenditures.

In order to build the final dataset, we restrict the analysis in two aspects. First, we select firms operating in two types of activities (manufacturing and retail/wholesales), which are continuously operating throughout the years 1995-2006. The final database is an unbalanced panel of 588 Spanish firms that have started to export at some point during 2000 and 2002. Second, we select countries where at least one new exporter enters over the period analysed. The number of destinations is 95.

Finally, we compute the "gravity" and export spillovers variables. The distance variable is the distance between Spain and each market, based on "Great Circle Distance" (CEPII database). The GDP of the destination country comes from World Bank, World Develpment Indicators (data for Andorra, Cuba, Quatar and Taiwan comes from CIA Factbook). Combining distance and GDP we obtain the variable "access", measured as the ratio (distance/GDP). The export information spillovers variable is the total number of export transactions to a particular destination by firms exporting the same product (4 digits

NACE) and located in the same province (NUTS III) as the firm in year t-1. When a firm exports more than one product we select the most frequently exported one.

In the empirical analysis, we handle the potential presence of a sunk cost by replacing introducing the past export experience. We handle the "initial condition problem" by estimating the participation to a specific destination of all the firms that "start exporting", i.e. those firms that did not exported in 1997, 1998 and 1999 and started exporting in the 2000-2002 period and continue exporting at least one additional year. The behaviour of these firms can thus be described by a latent variable model in which Y_{ict} is an indicator function which takes the value one if the observed profit, plus the unobserved factors, is positive

$$Y_{ict} = \begin{cases} 1 & if \quad a Y_{ict-1} + X_{it-1}' b_1 + D_c b_2 + b_6 Z_{N(r,j)ct} + e_{ict} > 0 \\ 0 & otherwise \end{cases}$$

The firm-level variables (X_{it-1}) included in the equation are: (1) the apparent productivity of labour of the firm (measured as value added divided by the number of employees); (2) the individual wage (computed as total wages divided by the number of employees); and, (3) the size of the firm is measured by the number of employees. The effect of productivity and size is expected to be positive on the number of destinations a firm starts exporting to. In the case of the variable wage, its effect can be positive in the case a firm pays high wages to efficient workers, or negative if it captures the cost of labour.

The second set of variables (D_c) included in the participation equation is specific to the destination countries. We include a measure of distance between Spain and the final destination and a measure of demand capacity of market *j* (measured as the GDP of the destination country).

Finally, the last explanatory variable represents a measure of export and industry specific information flows that can informally spill over from local exporting firms to a firm facing the choice of starting to export to a given country. $Z_{N(r,j)ct}$ is measured by the number of firms (more specifically the number of transactions done by exporting firms) in the same industry *j* that are located in the same province *r* and that export to country *c* at time *t*. The expected impact of the spillovers variable on the probability that a firm starts exporting is more complicated, because it depends on the access cost to each destination

country. While we can expect the overall average impact of $Z_{N(r,j)ct}$ on the profit abroad and on the probability to export to be positive, the marginal impact of $Z_{N(r,j)ct}$ on the probability is ambiguous for two reasons. First, the marginal effect of $Z_{N(r,j)ct}$ on the profit abroad can be either positive or negative according to the shape of the relation between expected profits and trade costs (accessibility). Second, the coefficient obtained in the empirical results on the spillovers variable measures the marginal impact on the probability that a given firm starts exporting to a specific destination. Hence, it will be impacted by the amount of heterogeneity in the data.

Table 1 describe some key characteristics of the data set according to the destination country. Countries are ordered in decreasing order of the number of times firms started to export there (column 2). The third column represents the degree of accessibility to the destination, measured as the ratio between distance and GDP. The larger the statistic the more difficult is to access to this destination. There is a clear negative correlation between entry and accessibility (see Graph 1). The fourth column represents apparent labour productivity (sales per employee), according to destination countries. New trade models with heterogeneous firms show that high productive firms self-select into export markets. Our data provides some evidence in favour of the hypothesis that firms whose labour productivity is the lowest export to the most accessible countries, while average productivity of firms that started to export to the least accessible countries is the highest. The last column contains a description of the information spillovers variable. The variable corresponds to total number of firms in the province in the same industry that export to a specific country. Again the hypothesis that firms will benefit from other exporters´ experience exporting to a specific destination as they reduce entry costs by new exporters is supported by the positive correlation between number of firms that start exporting to a particular destination and the average number of transactions that local exporters do with each destination.

< INSERT GRAPH 1 HERE> < Graph 1: Scatter plot of entry and accessibility>

< INSERT TABLE 1 HERE> <Table 1: Descriptive statistics: countries sorted by number of entries received in the first year>

Results

If there are export spillovers, then we can expect local country-specific exporting firms to impact positively the decision to start exporting to a given country. However, in order to be sure that the spillovers variable does not capture a false intuition, we have to control for the other variables that can result in the same positive relationship between local exporting firms and the decision to start exporting. Indeed, there are other possible reasons why local firms could appear to favour exporting. First, exogenous characteristics of places such as first nature advantages (natural advantages) or second nature advantages (transport infrastructure) attract a large number of firms, among which there will be a large number of exporting firms. If not controlled for, these comparative advantages of cities and regions could be misinterpreted in a positive influence of the presence of exporting firms on firms that start to export. In the following estimations, we thus use province level and industry level fixed effects to control for these factors.

Firm heterogeneity is the second factor that we want to control for in the estimations. A firm, because of its product, or the preferences of the manager, can match with a given country and start exporting to that country for no other reason than the characteristics inherent to the firm. In the following estimations, we thus use firm level characteristics to control for these factors.

Next we investigate whether the intensity of export spillovers varies with a measure of market accessibility. For that purpose countries are sorted in groups which represent a measure, although imperfect, of their accessibility. A variation of the coefficient on the spillovers variable between groups of countries indicates a larger/lower marginal impact of this factor in determining the probability that a firm starts exporting. Moreover, a change of spillovers according to countries allows to be sure that the observed phenomenon is due to an externality mechanism. Indeed, an exogenous advantage of some location would benefit to the export behaviour of all firms, whereas the presence of other exporting firms is

assumed to reduce the cost of exporting for firms in a different way according to where these firms consider exporting.

<Table 2: Probability to export to a specific destination the year the firm becomes an exporter>

Table 2 presents the results of estimating the probability to start exporting to a specific destination for the sample of new exporters. In column (1) the spillovers variable shows a coefficient that are positive and significant, equal to .049. We interpret this result as evidence of the presence of export spillovers from neighboring exporting firms, that is, interactions among firms benefit to the export decision when they are country-specific and when concentrated inside a given industry. The coefficient on variables other than spillovers has the expected signs. The firm level variables such as size, labour productivity and wage per worker influence positively the probability to start exporting. The destination specific variables such as economic size, contiguity and belonging to the European Union exhibit a positive significant impact. Distance to destinations exhibits a negative impact significant coefficient. When we add industry dummies in column (2), country dummies in column (3) and both sets of dummies in column (4), coefficients on the firm level variables and the spillover variable remain with the expected sign and they are significant. In the last two columns we check for robustness selecting two sets of firms. Column (5) shows the results when we select those firms that after becoming exporters continue exporting until 2006, reducing the sample of firms to 454 exporting firms. In column (6) we select only those firms that export regularly and operate in manufacturing industries. The sign and significance of the firm-level coefficients remains, and now the variable wage per worker variables becomes significant. Finally, the coefficient on spillover increases slightly until .053.

<Table 3: Dynamic export participation to specific group of countries>

The second step in assessing the existence of export spillovers is to investigate whether their intensity varies with a measure of market accessibility. To do so estimate a

dynamic probit so we allow new exporting firms to change their export destination portfolio. In Table 3, countries are sorted in groups which represent a measure, although imperfect, of their accessibility. A variation of the coefficient on the spillovers variable between groups of countries indicates a larger/lower marginal impact of this factor in determining the probability that a firm to export to each destination. More, a change of spillovers according to countries allows to be sure that the observed phenomenon is due to an externality mechanism. Indeed, an exogenous advantage of some location would benefit to the export behaviour of all firms, whereas the presence of other exporting firms is assumed to reduce the cost of exporting for firms in a different way according to where these firms consider exporting. According to Table 3, for the majority of countries the data show evidence of the presence of export spillovers from neighboring exporting firms, that is, interactions among firms benefit to the export decision when they are country-specific and when concentrated inside a given industry. Such interactions allow firm to acquire information from nearby firms in order to lower the cost of exporting to that market.

After controlling for sunk costs (past export experience), initial conditions (probability to export to each destination the year the firm becomes an exporter), firm characteristics (size, productivity, wage) and destination characteristics (distance and GDP), spillovers exhibit a positive and significant coefficient in all but four groups of regions. The four regions in which information spillovers are not statistically significant are: East Asia, Middle Asia, Latin American and Africa.

Our results are similar to those reported by Koenig (2005) using French data. In addition, the results are also consistent with the findings by Castillo and Requena (2007), who found strong evidence of export spillovers among the 12 most popular destinations of Spanish exports in the earlier nineties.

Conclusions

This paper analyses the determinants of the export dynamics of firms entering specific export markets, and emphasizes the impact of proximity to other exporters on the individual export behaviour, through the mechanisms of export spillovers. In a framework where firms face different destination markets, the paper shows evidence of the presence of export spillovers for all countries. However, the identification of the market-specific spillovers

effect is less clear-cut. At the aggregate level, the number of transactions of firms that export to remote and difficult markets appears more spatially concentrated. However, as access to markets becomes more costly, the number of firms exporting to remote and difficult markets decreases and so does the impact of spillovers for firms exporting to these countries.

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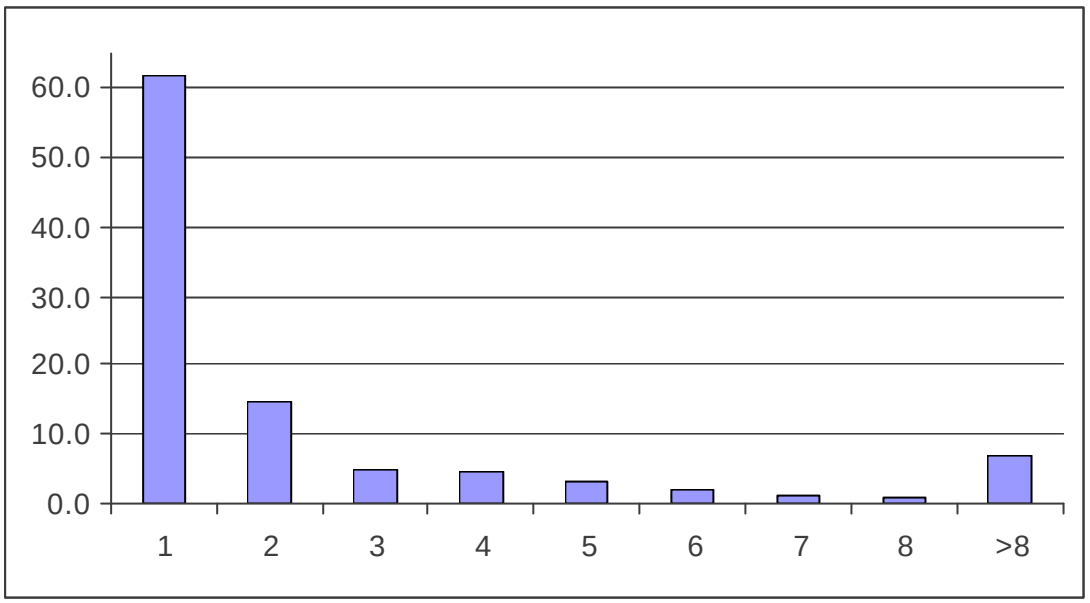
Graph 1 Number of countries that new exporters enter during the first year (N=864)



Graph 2. Popularity and accessibility of export destinations by new exporting (number of firms: 864)

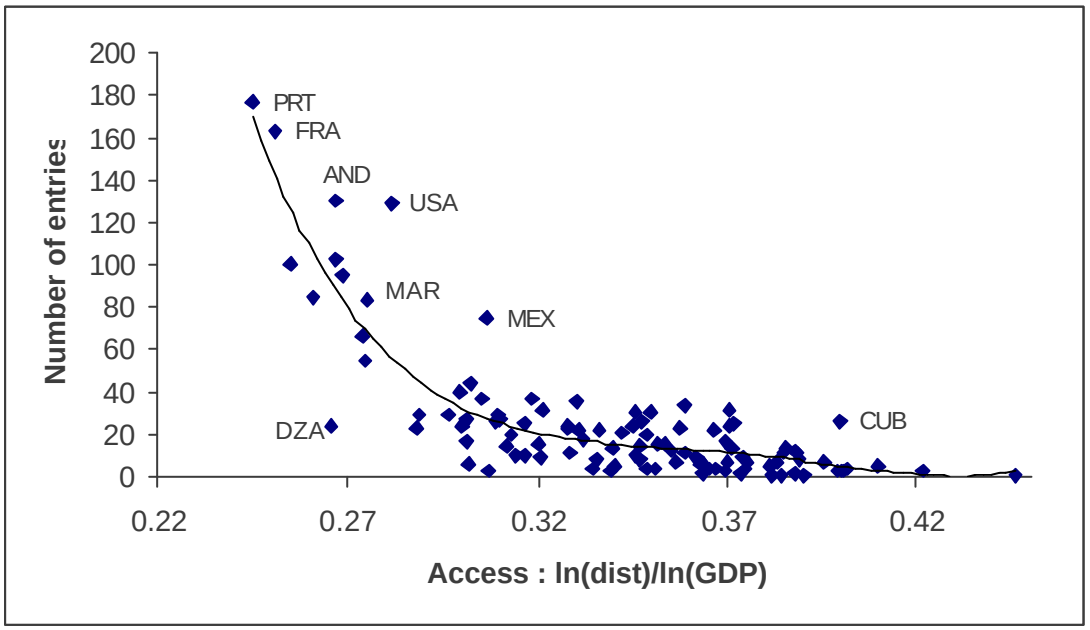


Table 1. Descriptive statistics. Average number of starters, total number of exporters, average productivity, access, industry spillovers. Top 50 destinations.

Country	N(cc)	mean(access)	mean(lpdtv)	mean(spillover)	Country	N(cc)	mean(access)	mean(lpdtv)	mean(spillover)
PRT	177	0.24	12.38	61	NOR	28	0.30	12.30	6
FRA	163	0.25	12.34	41	RUS	27	0.31	12.49	4
AND	130	0.29	12.14	23	CUB	26	0.40	12.31	4
USA	129	0.29	12.32	13	VEN	26	0.35	11.91	5
DEU	103	0.27	12.42	20	HUN	26	0.31	12.19	4
ITA	101	0.26	12.51	17	DOM	25	0.37	12.38	2
CHE	95	0.27	12.02	12	CAN	25	0.32	12.26	3
GBR	85	0.26	12.50	18	SGP	24	0.37	12.46	3
MAR	84	0.27	12.38	6	TWN	24	0.34	12.26	2
MEX	75	0.34	12.12	11	SAU	24	0.33	12.34	2
NLD	67	0.27	12.48	13	SWE	24	0.30	12.48	6
BEL	55	0.27	12.40	15	DZA	24	0.27	12.38	2
CZE	44	0.30	12.43	5	COL	23	0.36	12.19	1
POL	40	0.30	12.39	7	CHN	23	0.33	12.37	1
JPN	37	0.32	12.31	7	IRL	23	0.29	12.29	5
GRC	37	0.31	12.55	9	AUS	22	0.37	12.22	3
BRA	36	0.33	12.14	12	MLT	22	0.34	12.42	2
HKG	34	0.36	12.02	10	IND	22	0.33	12.49	1
CHL	32	0.37	12.17	14	KOR	21	0.34	12.52	1
ISR	32	0.32	12.30	8	KWT	20	0.35	12.21	3
ARG	31	0.35	12.38	3	FIN	20	0.31	12.55	5

Variables: cc = number of starting firms; Access=ln(distance)/ln(GDP); lpdtv=log((output-input)/employees); Spillover=number of firms exporting in the province (NUTS III = 50 units) in the industry (CNAE 4 digits = 247 units)

Table 2. Probability to export to destination j in the first year of exporting

	All firms	All firms	All firms	All firms	Regular	Manufacturing
	(1)	(2)	(3)	(4)	(5)	(6)
Spillover	0.049 ***	0.051 ***	0.047 ***	0.048 ***	0.053 ***	0.063 ***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
log employment	0.134 ***	0.176 ***	0.142 ***	0.184 ***	0.219 ***	0.288 ***
	(0.011)	(0.014)	(0.011)	(0.015)	(0.016)	(0.021)
log value added per worker	0.049 ***	0.060 ***	0.052 ***	0.063 ***	0.066 ***	0.102 ***
	(0.012)	(0.014)	(0.012)	(0.014)	(0.036)	(0.024)
log labour cost per worker	0.036	0.034	0.041	0.037	0.069 *	0.186 **
	(0.029)	(0.031)	(0.029)	(0.032)	(0.036)	(0.055)
log age	-0.152 ***	-0.179 ***	-0.156 ***	-0.185 ***	-0.198 ***	-0.256 ***
	(0.019)	(0.022)	(0.020)	(0.022)	(0.025)	(0.035)
dummy = 1 if no manuf	-0.396 ***	4.284 ***	-0.405 ***	4.225 ***	4.132 ***	
	(0.031)	(0.546)	(0.032)	(0.526)	(0.487)	
log DISTANCE	-0.276	-0.286 ***				
	(0.024)	(0.245)				
log GDP	0.106	0.111 ***				
	(0.009)	(0.009)				
Log GDP per head	-0.016	-0.013				
	(0.014)	(0.014)				
Contiguity	0.369 ***	0.374 ***				
	(0.057)	(0.058)				
Common language	0.428 ***	0.447 ***				
	(0.041)	(0.042)				
EU15	0.123 ***	0.129 ***				
	(0.025)	(0.026)				
Constant	-1.956 ***	-2.075 ***	-3.533 ***	-7.305 ***	-5.893 ***	-3.664 ***
	(0.266)	(0.469)	(0.345)	(0.428)	(0.462)	(0.437)
Industry dummies	NO	YES	NO	YES	YES	YES
Country dummies	NO	NO	YES	YES	YES	YES
N obs	55860	55860	55860	55860	43130	19570
N firms	588	588	588	588	454	206
N countries	95	95	95	95	95	95
Pseudo Rsq	0.173	0.196	0.199	0.223	0.236	0.249

Table 3. Probability to export to destination j after becoming an exporter. Analysis by groups of countries ranked by accessibility.

	BORDER	EURO	Rest EEA	CEEA	OTHER OCDE	EAST ASIA	MIDDLE ASIA	LATIN AMERICA	AFRICA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Spillover	0.019 ***	0.033 ***	0.027 ***	0.030 ***	0.021 *	0.014	0.021	0.008	0.021
	(0.006)	(0.006)	(0.007)	(0.008)	(0.011)	(0.008)	(0.145)	(0.008)	(0.018)
Past export experience	2.689 ***	2.390 ***	2.463 ***	2.256 ***	2.156 ***	2.237 ***	2.423 ***	1.756 ***	2.364 ***
	(0.055)	(0.103)	(0.103)	(0.008)	(0.154)	(0.124)	(0.309)	(0.147)	(0.163)
log employment	0.065 ***	0.150 ***	0.056 *	0.065 **	0.097 ***	0.312 ***	0.192 ***	0.129	-0.056
	(0.024)	(0.031)	(0.031)	(0.035)	(0.021)	(0.108)	(0.055)	(0.105)	(0.055)
log value added per worker	0.126 ***	0.169 ***	0.076 *	0.089 ***	0.011	0.173 **	-0.067	0.138 *	-0.048
	(0.029)	(0.037)	(0.041)	(0.422)	(0.053)	(0.082)	(0.079)	(0.073)	(0.066)
log labour cost per worker	-0.005	0.026	-0.017	0.112	0.083	0.062	0.291	0.199 *	0.007
	(0.059)	(0.068)	(0.078)	(0.083)	(0.099)	(0.076)	(0.148)	(0.120)	(0.121)
dummy = 1 if no manuf	-0.170 ***	-0.393 ***	-0.284 ***	-0.316 ***	-0.297 ***	-0.027 ***	-0.112	0.021	0.068
	(0.058)	(0.074)	(0.083)	(0.084)	(0.111)	(0.007)	(0.141)	(0.093)	(0.129)
log DISTANCE	-0.387 ***	-0.207 *	-0.364 **	0.019	-0.131	-0.836 **	0.072	-0.285	-0.095
	(0.119)	(0.127)	(0.149)	(0.181)	(1.100)	(0.424)	(0.271)	(0.282)	(0.075)
log GDP	0.062 ***	0.141 ***	-0.013	0.102 ***	0.045	0.077 ***	0.244 ***	0.009	0.005
	(0.018)	(0.033)	(0.045)	(0.044)	(0.910)	(0.024)	(0.091)	(0.035)	(0.043)
Constant	-1.530 ***	-4.855 ***	0.243	-4.644 ***	-0.975	5.796 ***	-5.904 **	1.555	0.147
	(0.726)	(1.156)	(1.384)	(1.275)	(1.736)	(1.412)	(2.856)	(2.812)	(1.396)
residual (first equation)	-0.104	-0.003	0.159 *	-0.264 ***	-0.383 ***	-0.382 ***	-0.234 ***	-1.007 ***	-0.616 ***
	(0.080)	(0.061)	(0.088)	(0.100)	(0.118)	(0.078)	(0.105)	(0.142)	(0.130)
N obs	14216	11344	7310	11144	4975	14230	6644	14301	9752
N countries	4	7	5	7	4	10	6	9	8
Log Likelihood	-1493.6	-1555.5	-886.5	-880.6	-627.0	-1028.2	-333.4	-1364.5	-381.3

Notes: Selection for firms: those new exporters that export regularly over the period 2000-2006 (balanced panel). All regressions include the mean of the time-variant covariates (size, productivity and wage). Border=(France, Portugal, Morocco, Andorra), Euro (Germany, Italy, Belgium, Netherlands, Ireland, Greece, Finland, Austria), Rest EEA=(UK, Denmark, Norway, Sweden, Switzerland), CEEC=(Poland, Check Republic, Hungary, Romania, Russia, Ukraine, Turkey), Other OECD=(USA, Canada, Australia, New-Zealand, Mexico), Latin America=(Colombia, Venezuela, Ecuador, Peru, Brazil, Chile, Paraguay, Uruguay, Argentina), East Asia=(Japan, China, Korea, Singapure, Hong Kong, Taiwan, Malaysia, Thailand, Indonesia, India), Middle Asia (Israel, Jordania, Quatar, UAE, Lebanon, Cyprus), Africa=(Algeria, Tunisia, Egypt, Senegal, Kenya, Guinea Equatorial, South Africa). Standard error in parentheses. Symbol ***, **, * stands for significance at the 1%, 5% and 10% levels, respectively.