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Information Spillovers and the Choice of Export Destination: A Multinomial Logit Analysis of Spanish Young SMEs

Francisco Requena Silvente
Juana Castillo Giménez

ABSTRACT. Does having more firms around exporting to a particular destination improve the chances of exporting to that destination (e.g. through information spillovers)? We answer this question implementing a multinomial logit model of whether a firm exports to a particular country. To identify the source of information spillovers, we construct indicators of geographical concentration of exporters selling to a specific destination: within industry, multinationals and across industries. In our application with data for Spanish new small sized firms, only within-industry agglomeration of exporting domestic firms significantly affects the probability of small sized firms exporting to the same destination. The significance of localisation economies is robust to a barrage of controls including destination specific characteristics, gravitational factors (distance and level of development), firm heterogeneity (size) and regional differences.

KEY WORDS: export destination, information spillovers, multinomial logit.

JEL CLASSIFICATION: F10, F23, L10.

1. Introduction

Which countries do firms export to? The literature provides three potential answers to this question. The first stream of literature is traditional trade theory predicts that firms will export to countries that have a comparative disadvantage with respect to the domestic country. Second, a considerable empirical literature based on gravitational models predicts that firms will export to large countries in order to enhance the scale of production and to close countries in order to reduce transport costs. Finally, anecdotal evidence and case studies show that many entrepreneurs start exporting to a particular destination after observing other firms' exporting experience. This paper investigates the factors behind the firms' export destination decision of Spanish exporters. In particular, we aim to identify the source, and quantify the effect, of information spillovers generated by other local firms in the individual choice of export location by new small and medium sized manufacturing firms.

From the perspective of a firm, export activity can be viewed as a learning process, wherein firms gradually became familiar with overseas markets and operations. Acquisition of sufficient information on foreign markets and operations is crucial for a firm's export decision (Leonidou and Katsikeas, 1996). Beside macroeconomic conditions, the high uncertainty surrounding international markets compared to the domestic market reflects firm's limited knowledge of international business and overseas market characteristics. Case studies show that firms start exporting to close destinations and they export to more distant destinations as they accumulate more experience (Weidersheim-Paul et al., 1978; Tesar and Tarleton, 1982). However, the physical proximity to certain markets can be altered by destination characteristics or by firm-specific factors. A firm may bypass several geographically close countries because their size does not justify the amount of investment required to initiate export operations (Dalli, 1994). Moreover, light exporters are more likely to choose "soft" countries with relatively low entry barriers and more stable macroeconomic environment (Bonacorsi, 1992). Finally, inter-firm

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Francisco Requena Silvente and
Juana Castillo Giménez
Departmento de Economía Aplicada II
(Estructura Económica)
Facultad de Ciencias Económicas y Empresariales,
Av.de los Naranjos s/n, Edificio Departamental Oriental
University of Valencia
46022, Valencia
Spain
E-mail: francisco.requena@uv.es

communication or personal contacts may change the perception about the profitability and risk of some geographically remote destinations (Cavusgil, 1984; Reid, 1984).

The contributions of this paper are twofold. Firstly, unlike a substantive literature at export participation or export performance at firm level (Aitken et al., 1997; Becchetti and Rossi, 2000; Malmberg, 2000; Sjöholm, 2000), we examine the destination choice decision. By doing so we are able to focus our analysis on the importance of information spillovers. If the benefits from geographical concentration lead exporters to sell to the same destination, it is more likely that these benefits are generated by information spillovers rather than by a skilled labour pool, by demand/supply linkages or by well-developed transport infrastructure. In addition, we identify the type of firm that generates the *local information spillovers* among new young exporters. Identifying the source of information spillovers is a necessary and valid component of our research since the empirical literature concerning the source of agglomeration effects has to date provided little guidance as to whether *localisation economies*, the presence of *MNEs* or *urbanisation economies* are the main type of agglomeration affecting export supply and intensity. For example, Becchetti and Rossi (2000) found that *localisation economies* only affected Italian export supply and intensity. Aiken et al. (1997) found that agglomeration effects in Mexico were related to the presence of *MNEs* only while Sjöholm (2000) did not in Indonesia. Finally, Malmberg (2000) found *urbanisation economies* as the only source of agglomeration effects among Swedish exporters.

We model new firm's export destination decisions through implementing a rank-ordered, or generalised multinomial logit to account for the multiple destination sources that are ranked by sales volume chosen by single firms. Our central interest is in testing whether firms tend to export to countries where other local exporters have previous experience as information is cheaper and more reliable. Since there are a number of competing explanations for why firms export to specific destinations we control for these through the incorporation a host of *observable* factors that include 'gravitational factors' (relative development and transport cost), firm heterogeneity (size), and regional differences in revealed comparative advantage. We also include *unobservable* destination characteristics, such as institutional factors, exchange rates regimes, tariff and non-tariff system or membership of regional trade agreement, being captured via destination specific fixed effects.

Our study is based on a unique data-set that incorporates the export sales by product and country of destination of 454 SMEs – firms with less than 100 employees – set up between 1990 and 1994 and the full census of Spanish manufacturing exporters (with more than 20 workers) in 1988. Our interest on young SMEs is motivated on two grounds. First, because of the limitations imposed by size in terms of access to information and resources, these are the group of firms that are more likely to benefit from information spillovers and the effects of those spillovers are a central motivation of our research. A second, and more pragmatic, rationale is that, since the sample is of 'new born' firms which are typically small, it does not contain a sufficient number of large firms who enter start exporting in the sample period to allow us to juxtapose our findings against the complete population of firms.

To preview the key findings, the results confirm that geographical agglomeration of exporting firms selling to a particular destination significantly increases the probability of small-sized firms exporting to the same destination. The source of information spillovers is localisation externalities, that is, geographical concentration of domestic exporters of the same industry. The significance of localisation economies persists in spite of controls, which show how the probability to export to one particular destination is also (positively) affected by conventional gravitational factors – the level of development and distance of the destination country – by firm characteristics, such as firm size, and by regional factors, such as revealed comparative advantage.

The remainder of the paper is organised as follows. Section 2 briefly reviews the literature on agglomeration and export activity. Section 3 provides descriptive evidence on the destination choice by Spanish exporters and presents the empirical model. Section 4 reports the

econometric results. Conclusions are placed in Section 5.

2. Related literature: agglomeration, information spillovers and exports

Pioneering work by Marshall (1920) argued that firms in the same industry may be drawn to the same location because proximity generates positive externalities. Recent advances in Economic Geography have formalised, in general equilibrium models, the different sources generating positive spillovers: pool of specialised labour (Krugman, 1991), linkages (Fujita et al., 1999) and diffusion of information and technology (Glaeser et al., 1992; Henderson et al., 1995). The last one argues that in industrial areas with a high density of one or a few sectors, there exists a high level of communication and of interpersonal relationships among entrepreneurs. In such an environment, information and imitation may have direct or indirect effects on the decision of a firm about what to produce, where to locate production, and which destination markets to target.

In order to explain export behaviour, managerial attitudes toward exporting, risk perception and risk-aversion commonly perceived as are key factors. Interpersonal communication positively influences expectations about profitability and reduces risk perception. Proximity to other exporting firms reduces the need for information gathering and processing, since face-to-face contacts with other colleagues are perceived as a reliable and inexpensive information source. Perception of risk is greatly reduced because first-hand information is available about opportunities in a particular foreign market, the trends of demand, and major problems about exporting. Bilkey and Tesar (1975) presented examples in which entrepreneurs decided to start exporting because they learn about experiences from other entrepreneurs that have adopted exporting as a viable growth alternative. Bonacorsi (1992) observed that many new Italian firms in the eighties were set up by people with previous experience as employees in related industries, who often received support from their former employer who were in contact with foreign intermediaries. He also noticed that when demand in a particular foreign market was increasing, entrepreneurs felt that they could give information on export markets even to their local competitors, with the expectation that it will be reciprocated in the future, when needed. Many entrepreneurs strongly preferred personal and direct sources of information when they had to decide where to export. Finally, knowledge about foreign markets may be transmitted through other channels such as imitation as the high density of firms in concentrated areas leads to a high transparency in the behaviour of individual firms.

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

ownership and import activity, without evidence of positive impact of spillovers from the regional presence of multinationals.

In this paper we examine the destination choice decision, as opposed to the decision or extent of export participation. If geographical concentration lead exporters to sell to the same destination, it is more likely that these benefits are generated by information spillovers rather than by a skilled labour pool, by demand/supply linkages or by good transport infrastructure. Second, we concentrate our attention on young exporters since the lack of a sophisticated marketing team makes it more likely they will be dependent on local information spillovers than their large counterparts. Third, we aim to identify the source of information spillovers that induce firms to share the same export destinations. Our approach follows Head et al. (1995) and Aitken et al. (1997) by separating various types of exporters located in the same area. The geographic concentration of export activity to one particular destination is split into three terms: province concentration of local exporters in the same industry, province concentration of multinationals in the same activity, and province concentration of the rest of export activities. The first is related to localisation economies (or industry-specific economies); the second captures economies generated by the proximity to a multinational company; the third reflects urbanisation economies (or agglomeration of firms irrespective of sector origin).[1]

3. Empirical model: data, hypotheses and variables

3.1. *Data*

The empirical analysis uses three data sets. The main data set consists on a sample of 454 small-sized exporting firms (less than 100 workers) set up between 1990 and 1994. The information was provided by Camerdata, a private marketing company, and consists on industry activity (3 digit NACE industry code), location (province) and sales (domestic sales and exports by country and by product using Combined Nomenclature four digits) for the year 1994.[2] Appendix Table A1 presents the distribution of firms by province, industry and size (employment).

The second data set consists on the census of manufacturing exporters in 1988. The data set provides information on the value of exports, broken down by product and country destination, for all Spanish exporters of manufactures that employ more than 20 staff and export above €60,000 in 1988. The data is based on firm records from Spanish Customs. Again, Camerdata completed the original data with information about total sales, employment by size range, ownership (foreign capital participation), industry activity (3 digit NACE industry code) and geographic localisation by province. The final number of firms with complete information was 5229. It is worth stressing that more than 55% of the firms employ less than 100 staff and that 9% of the firms have positive foreign capital participation. Moreover, a representative exporting firm sells six different types of products to eight different countries. Appendix Table A2 provides further description of the census.[3]

A third data set consists on aggregated export volume by province and industry activity from ESTACOM-ICEX database (Estadísticas de Comerio Exterior) for the year 1994.[4] Unfortunately we lack of information on export destination. We use the data to construct a measure of revealed comparative advantage for each Spanish province.

Table I shows the distribution of total export value by geographic area in 1988. The first half of the table demonstrates the preference of Spanish firms for EU countries (68% of firms' exports were marketed to the EU). Of the remaining market areas, North America has some significance for exporters (8.3%). The remaining geographic areas have less than 7% of Spanish exports each. The last two columns in Table I show the distribution of Spanish exports to those countries whose share in total Spanish exports was above 1%. The ranking of countries matches expectations: France, Germany, Italy, UK and USA are the five largest market destinations (65% of total firm's exports). The concentration of export value by destination is high since the first 10 countries represent 80% of total export value.

TABLE I
Distribution of Spanish exports sales, by geographic destination, in 1988

Geographic area	Percentage	Major destinations	Percentage
Developed countries	82.8	France	23.1
EU-12	67.8	Germany	14.4
Rest West Europe	4.1	UK	11.9
North America	8.3	Italy	9.2
Other devel. Countries	2.5	USA	6.6
		Portugal	5.5
Developing countries	17.1	Netherlands	3.8
Eastern Europe	2.1	Belgium	2.0
Africa	4.9	Morocco	1.7
LatinAmerica	3.0	Canada	1.1
Asia	6.2	Sweden	1.0

Source: Own calculations using Census of exporters (Camerdata, 1988). The "other developed countries" include Japan, Australia, New Zealand and South Africa.

Table II shows that the choice of first destination by export value at firm level is quite selective. Using the sample of 5229 exporting firms in 1988, France is clearly the first destination chosen by both domestic firms and multinationals. The next most frequent first destination is Portugal among domestic exporters while Germany seems to be preferred by multinationals. In the sample, 50% of firms choose France, Germany or Portugal as a first destination.

Table II [column (3)] shows the distribution of first destination of exports for the sample of 454 new SMEs in 1994. The distribution of firms by first destination between all domestic-owned firms [column (1)] and the sample of new SMEs [column (3)] is a bit different. Saudi Arabia was one of the preferred destinations in the full sample but it disappears from the list of favourite destinations by SMEs. Portugal, Morocco, Tunisia and Algeria gain positions in the ranking, which suggests that the geographic proximity of the destination country is important for SMEs. Again the destination choice is quite selective: 437 out of 454 SMEs chose one of the 12 countries as first destination of exports.

3.2. *Hypotheses and variables*

Consider an SME that produces one good in the local market and sells part of the production abroad. There are several alternative markets and the firm has to decide one market to export to. We assume that the expected profits of exporting to country j by firm i is a linear function of factors affecting the destination choice,

$$\Pi_{ij} = I_{-ij}\alpha + z_j\gamma + x_i\beta_j + \theta_j + \varepsilon_{ij}, \quad i = 1,...,I,\ j = 1,...,J \tag{1}$$

where I_{-ij} measures the "mass" of information about destination j that other exporters located close to firm i have accumulated. Compared to large-sized firms, young SMEs have fewer resources to finance searching for new market opportunities; therefore, information from other firms could be the only available way to learn about profitable opportunities abroad. The variable z_j is a vector of observable attributes of the destination-country, the variable x_i is a vector of firm-specific characteristics and regional characteristics where the firm produces, θ_j is a vector of fixed-effects or destination-specific constants and e_{ij} is a random term denoting the unobservable (by the researcher) unique profit advantage to the firm i from selling in the country j.

We first describe I_{-ij}, the measure of "mass" of information about destination in equation (1). Firm location is defined at province level (there are 48 peninsular provinces in Spain).[5] The source of information available in one province about market opportunities abroad is captured by three types of agglomeration economies, each of them identifying a kind of exporting firms: domestic firms operating in the same industry, multinationals, and a mixed of domestic firms from different industries.

TABLE II
The *first* destination by sales value of Spanish firms

Sample of 5229 exporting firms in 1988						454 young exporting SMEs in 1994		
Domestic-owned companies (1)			Foreign-participated companies (2)			(3)		
	No. exporters	Ranking		No. exporters			No. exporters	
France	1289	(1)	France	119	(1)	France	163	(1)
Portugal	568	(2)	Germany	95	(3)	Portugal	75	(2)
Germany	492	(3)	UK	68	(4)	Germany	47	(3)
UK	403	(4)	Netherlands	44	(7)	UK	36	(4)
Italy	365	(5)	Italy	40	(5)	Italy	34	(5)
USA	354	(6)	Portugal	33	(2)	USA	29	(6)
Netherlands	127	(7)	Belgium	24	(8)	Morocco	17	(10)
Belgium	99	(8)	USA	23	(6)	Netherlands	12	(7)
Saudi Arabia	78	(9)	Denmark	19	(18)	Belgium	9	(8)
Morocco	64	(10)	Japan	16	(16)	Mexico	6	(11)
Mexico	56	(11)	Sweden	11	(15)	Algeria	5	(12)
Algeria	42	(12)	Canada	8	(24)	Tunisia	4	(20)
First 12 Destinations	3937		First 12 Destinations	465		First 12 Destinations	437	
All firms	4733		All firms	496		All firms	454	

Source: Own calculations using Census of Exporters (Camerdata, 1988) and new start-ups dataset (Camerdata, 1994). Columns (1) and (2) refers to 5229 exporting firms in 1988. Foreign-owned firms in column (2) – that we will refer as multinationals in the text – are companies with positive foreign capital participation. Column (3) refers to 454 SMEs in 1994, that were set up between 1990 and 1994.

H_0 (1): [LOCALISATION] *The probability that a firm exports to a particular destination increases with the level of export concentration by other domestic exporters in the province of the same product to this destination*. Similar firms tend to benefit from being located close to each other. The concentration of many firms in related industries tends to enhance firm competitiveness by triggering not only flexibility and dynamics in general, but innovation and learning in particular. In regions with many firms in the same industry, there is a greater chance of contact with early exporters, more rapid circulation of information about export procurement, potential markets and risks. The literature on industrial-districts is particularly interesting in this context since the specific source of externalities is the concentration of very small sized firms of the same activity in well-defined geographic areas (Pyke and Sengenberger, 1992, for an overview).

H_0 (2): [MNE] *The probability to export to a particular destination increases with the concentration of export activity by MNEs in the province*. Multinational (MNEs) may act as a "hub firm" in a large-firm dominated hub-and-spoke industrial area. Aitken et al. (1997) and Sjöholm (2000) describe two channels used by domestic firms to benefit from the export activity of multinational enterprises. First, MNEs have multi-market presence so they have better information than domestic exporters about foreign markets, foreign consumers and foreign technology. Second, MNEs provide inputs not available in local markets, and arrange subcontracts or licenses with neighbouring local firms that directly or indirectly link these firms to foreign buyers.

H_0 (3): [URBANISATION] *The probability to export to a particular destination increases with the total number of firms in the province exporting to this particular destination, independent of the exported product*. Urbanisation economies accrue from the agglomeration of firms irrespective of sectoral origin. They are more related to the benefits of sharing basic assets, resources and institutions, which are regarded as public goods (e.g. transport infrastructure, information networks). In areas where similar firms are not close one to each other,

cities may have a central position in the system of information circulation facilitating access to specific valuable information.

Following Head et al. (1995) we measure the three sources of information spillovers (LOCALISATION, MNE and URBANISATION) counting the number of firms of one particular type exporting to the same destination, normalised by the total number of exporting firms in the province. To measure LOCALISATION economies we count the number of domestic firms in the province operating in the same industry and exporting to the same destination. To measure MNE economies we count the number of multinationals in the province operating in the same industry and exporting to the same destination. To measure URBANISATION economies we count those firms in the province exporting to the same destination. However, as other local export firms in the same industry have been included in the localisation economies, these have been excluded from the urbanisation economies in order to avoid double counting. Note that each firm in 1988 exported, on average, 6 different products (four digit TARIC nomenclature) to 8 different countries, as shown in Appendix Table A2. Therefore, the same firm can "spill-over" information on various young SMEs if it exports more than one product to many destinations or exports various products to the same destination.[6]

The observable destination-specific variables, z_j, in equation (1) are the level of economic development of the destination and the geographical distance to the destination. Gravity models of trade show that the volume of trade between partners is directly proportional to their level of economic development and inversely proportional to the geographic distance between them.

H_0 (4): [Geographic proximity] *The probability to export to a particular destination decreases with the physical distance from the production country to the destination country*. The geographic proximity of some foreign markets may contribute to change the perception towards these markets. For example, firms located near the frontier will treat neighbouring countries similar to other domestic regions. Indeed, transportation costs may be lower or similarities in demand stronger across neighbouring countries than within a country in some industries. Some evidence that this is the case has been provided by Minondo (2003) for the Spanish regions.

Given the important role of distance, we undertook a detailed analysis of the transportation routes for firms in relation to their provincial location. The calculation of distance with trading partners is as follows. For France, Portugal, Morocco, we calculate the distance by road between the capital of each province to the frontier. For the border provinces the distance is zero. For other European destinations (Germany, UK, Italy, Netherlands, Belgium) and for Tunisia and Algeria, we use the road distance in kilometers from the capital of the province and the capital of the destination country.[7] For USA and Mexico, we use the geographical distance between Madrid and the capital of these countries. Measuring distance in that way takes into account border effects between some countries and some Spanish provinces.[8]

H_0 (5): *[Level of development]. The probability to export to a particular destination increases with the level of development of the destination country*. As rich countries will demand more manufacturing products, the choice decision should be positively affected by the *per capita* income of the destination country. The level of economic development of the destination country is measured by its income *per capita* relative to the income *per capita* of the province where the firm operates.[9]

We also allow for firm-specific characteristics and region-specific characteristics, x_i, to have different impact on the choice of export destination.

H_0 (6): *[Firm size] The probability that a firm will export to a particular destination is affected by the interaction between the country-specific characteristics and the firm-specific characteristics*. The choice of destination could be dependent on firm characteristics, which explain why some choices are more preferred than others. For example, some destinations may require a level of previous investment or knowledge such that only few firms may have enough resources to export to them. In the specification, we

include size (measured by total sales) as firm-specific attribute that may affect its decision to supply a particular market.

H_0 (7): *[Province comparative advantage] The probability that a firm will export to a particular destination is affected by [unobserved] sources of the comparative advantage of the province*. Due to factor abundance or superior technology, Spain will have a comparative cost advantage in the production of some goods relative to its importing countries. At the same time some provinces may have a comparative advantage in the production of those goods in which Spain shows a comparative cost advantage abroad. The result will be that most firms producing these goods will be located in specific locations and will export to the same destinations in which Spain has a comparative cost advantage. To control for that possibility, we include an export specialisation index of the province were the firm operates using ESTACOM-ICEX database.[10]

The final sample of SMEs in the regression analysis is 437, which are those whose first destination of exports are one of the following countries: France, Portugal, Germany, UK, Italy, USA, Morocco, Netherlands, Belgium, Mexico, Algeria and Tunisia. The rest of destinations have three or fewer firms exporting there. Given the independence from irrelevant alternatives assumption built into the logit specification, the reduction in the choice set should not affect the parameter estimates. Table III presents some descriptive statistics of the explanatory variables described above in our model.

4. Econometric issues and estimation results

In this section we present the econometric results of our empirical investigation. First, we test the seven null hypotheses above formulated. Second, we check whether the assumption of independence of irrelevant alternatives (IIA) holds by changing the number of possible destinations. Third, we experiment with alternative measures of agglomeration. Finally, we split the sample of SMEs into two groups, single-destination exporters and multi-destination exporters, in order to test whether the decision of exporting to one particular destination is independent of the choice of other destinations.

4.1. *Econometric specification*

An exporter will choose to export to a particular country if it will earn the highest possible profit. Formally, the jth country is chosen by firm i as the destination of exports if

$$\Pi_{ij} = \max(\Pi_{ik}, k = 1, ..., K) \tag{2}$$

If the firm-specific random terms $(\varepsilon_{i1}, \varepsilon_{i1}, ..., \varepsilon_{iK})$ are independently distributed, each with an Type I extreme value distribution, McFadden (1974) showed that the probability of a firm i to choose a destination j is

$$P_{ij} = \Pr\left(\Pi_{ij} > \Pi_{ik}, j \neq k\right) = \frac{\exp(I_{-ij}\alpha + z_j\gamma + x_i\beta_j + \theta_j)}{\sum_k \exp(I_{-ik}\alpha + z_k\gamma + x_i\beta_k + \theta_k)} \tag{3}$$

where P_{ij} is the population relative frequency of exporting to destination j. The estimates are obtained by maximising the likelihood function, $L(\alpha, \gamma, \beta_j) = \Pi_i \Pi_j P_{ij}$.

So far we have assumed that firms export only to one destination and have modeled their choice. The model described above is known as a multinomial (conditional) logit model. However, firms usually choose more than one export destination. To account for that, we estimate a generalised McFadden choice model or rank-ordered logistic regression. This approach permits one firm choosing multiple destinations simultaneously conditional on establishing a preference ranking of alternatives. In our case we use export sales volume to rank preferred export destinations.[11] We also estimate a conditional logit model to test the hypothesis that the same decision weights are applied at the first choice and at the following choices using the Hausman specification test.[12]

It is important to emphasise that the rank-ordered multinomial logistic regression does not allow explanatory variables that are not directly related to the choices. In our case, it means that we cannot estimate a single parameter to capture the impact of firm-specific characteristics or source-location characteristics on the firm's probability to export a particular destination. To test the hypotheses H_0 (6) and H_0 (7) we need to interact these variables with a vector of destination-specific dummies under the assumption

TABLE III
Basic statistics of the explanatory variables in regression analysis

Explanatory variables	Mean	Std. Dev.	Min	Max
Destination export concentration: ln(1 + *n*)				
Localisation	0.774	1.089	0	4.788
MNE	0.126	0.333	0	2.197
Urbanisation	4.408	1.822	0	7.286
Destination export concentration: quotient index				
Localisation	0.058	0.734	0	47.162
MNE	0.021	0.119	0	3.245
Urbanisation	0.013	0.016	0	0.029
Other variables				
ln (distance province-destination)	6.489	1.427	3.433	9.166
ln (*per capita* GDP in destination)	9.055	0.601	7.577	9.715
Province specialisation index	0.085	0.352	0.001	32.371
ln firm size (sales)	5.379	1.606	0.693	10.542

Note: Export concentration indicators are constructed using two measures. First, we count firms, $\log(1+n_{rjk})$, where n is the number of firms in province r exporting product j to a destination k in 1998. Second, we use a quotient index (see equation (7) in main text) *Localisation* refers to domestic firms exporting the same product j, *MNE* refers to firms with foreign capital participation and *Urbanisation* refers to domestic firms exporting any product except j. The construction of the other variables is explained in the main text.

that these fixed effects are perceived as identical by all the exporters. Such fixed effects are introduced to capture institutional factors such as exchange rates, tariff rates or membership of a free-trade agreement that may play an important in the decision where to export. Thus firm heterogeneity and province comparative advantage are included in the model by interacting θ_j with x_j; this is the term that appears in equation (1) as $x_i\beta_j$. In addition, the inclusion of destination-specific fixed effects contributes to alleviate the possibility of self-selection bias in the empirical model since we include all the unobservable host characteristics that made destinations different one from each other but are perceived the same way for all the exporting firms in their locations.[13] Moreover, Train (1986) shows that the interaction between individual attributes and choice specific fixed effect contributes to improve the specification of the multinomial logit model as it reduces the risk of violation of the IIA assumption.

4.2. *Main results*

The results of the regression analysis using firm counts to measure agglomeration are displayed in Table IV. In the first three columns, the impact of each measure of spatial concentration of exporters is investigated in isolation from each other. If the error term is an independently drawn disturbance, the coefficient of each agglomeration measure shows the impact of information spillovers from different source on the destination choice. In column (1) the coefficient on LOCALISATION is positive and significant. That is, SMEs choose those destinations in which a relatively large number of other local exporters in the same industry are exporting. Column (2) shows that the presence of MNEs in the same province exporting to one particular destination has a negative impact on the destination choice by domestic SMEs, but the coefficient is not statistically significant. In column (3) the coefficient of spatial concentration of firms from other industries selling to a particular destination (URBANISATION) is not statistically significant on the choice decision of SMEs. When we put the three measures of export concentration together in column (4) the coefficient on LOCALISATION remains positive and significant (supporting the hypothesis H_0 (1)), while the coefficients on MNE and URBANISATION economies are not statistically significant (not supporting the hypotheses H_0 (2) and H_0 (3).

Column (5) includes 11 country-specific constants (France is excluded). After controlling for

fixed effects, the sign and significance of the coefficients measuring the three types of agglomeration does not change. The high value of the reported χ^2 statistic ($\chi^2_{11} = 89.6$) suggests that there are significant unobservable differences across destinations. Since we have excluded France, the negative sign of the destination-specific coefficients suggests that there are other (unobserved) factors making France more appealing than other destinations.

Column (6) introduces two destination-specific characteristics, distance and level of development. The coefficient of the distance to the destination shows a negative and significant impact on firms' choice decision as we expected, H_0 (4), but the coefficient of *per capita* income has an unexpected negative sign although it is not statistically significant, H_0 (5). The inclusion of these *gravity* variables has little effect on the three measures of export concentration: the coefficient on LOCALISATION economies remains positive and significant, while that on MNE and URBANISATION remains insignificant. There are benefits of being near other firms exporting to the same destination. However, the results indicate these benefits are only generated by other domestic firms operating in the same industry. Neither the proximity of MNEs nor the concentration of firms in other industries exporting to one particular destination has a significant impact on the decision of SMEs.[14]

Column (7) includes two additional variables, firm size and an export specialisation index of the province where the firm is located, both interacting with the destination-specific constants. We only report a single coefficient for each interaction term after imposing the restriction that the parameters are the same across destinations. The two restricted parameters are positive but statistically not significant. The χ^2 test for the null hypothesis of zero coefficients (the associated χ^2 values were 12.2 and 11.7, respectively, while the critical value at the 5% with 11 degrees of freedom is 19.6) indicates that we cannot reject the hypothesis that the variables *firm size* and *province comparative advantage* interacting with the destination-specific constants have no explanatory capacity on the decision about where to export. This leads to reject the hypotheses H_0 (6) and H_0 (7), and therefore, firm size and geographic concentration of one particular activity seems not to be directly related to the decision about where to export by SMEs, once we control for destination-specific agglomeration factors and other destination-specific characteristics such as geographic proximity.

The coefficients presented in Table IV are the marginal impact on odds ratios. A more intuitive interpretation of the magnitudes of the effects is given by considering the marginal effects or the elasticities. Since explanatory variables are expressed in logs, the elasticity of the probability of a particular exporter i choosing destination k with respect to any explanatory variable can be calculated as

$$\eta_{ik} = \frac{\partial \ln P_{ik}}{\partial \ln X} = \beta(1 - P_{ik}) \tag{4}$$

Summing overall the choices and firms we obtain the relationship between average probability elasticities and the coefficient estimate (Head et al., 1995),

$$\eta = \sum_i \sum_k \eta_{ik} = \beta \frac{K-1}{k} \tag{5}$$

Since K, the number of choices, equals 12 in the estimations, elasticities can be obtained by multiplying the estimated coefficient by 0.916. Using the estimates of column (7) in Table IV, the average probability elasticity indicates that for the average province, a 1% increase in the number of firms in some industry exporting to one particular destination would increase the likelihood of choosing this destination by other exporters in the same industry by 1.6%. Thus, we have shown that the coefficient that we interpret as evidence of export spillovers is highly statistically significant and seems to affect the choice decision of SMEs by a large percentage.

4.3. *Testing the IIA assumption*

The multinomial logit model imposes the "independence of irrelevant alternatives" (IIA)', which implies that the probability of choosing between two destinations is independent of the characteristics of a third destination. One way to check whether the IIA assumption is valid is to estimate

TABLE IV
Estimation of decision about where to export by SMEs in 1994

	(1) GMNL	(2) GMNL	(3) GMNL	(4) GMNL	(5) GMNL	(6) GMNL	(7) GMNL	(8) MNL	(9) MNL
Localisation	1.750*			1.813 *	1.772 *	1.792 *	1.757 *	1.672 *	1.511 *
	(0.148)			(0.177)	(0.151)	(0.161)	(0.148)	(0.249)	(0.321)
MNE		−0.151		−0.198	0.261	0.058	0.241	0.234	0.452
		(0.207)		(0.324)	(0.234)	(0.445)	(0.233)	(0.232)	(0.563)
Urbanisation			0.183	0.263	0.302	0.243	0.328	0.392	0.435
			(0.239)	(0.272)	(0.242)	(0.321)	(0.230)	(0.441)	(0.563)
Distance to destination						−0.278 *	−0.163 *		−0.233 *
						(0.052)	(0.059)		(0.108)
GDP *per capita* of destination						−0.236	0.094		0.034
						(0.338)	(0.226)		(0.280)
Destination-specific constant (fixed effect) (omitted France)									
Portugal					−0.738 *	−0.750 *	−0.754	−0.740 *	−0.831
Germany					−1.270 *	−1.283 *	−1.287 *	−1.273 *	−0.978 *
UK					−1.446 *	−1.461 *	−1.462 *	−1.454 *	−1.069 *
Italy					−1.473 *	−1.477 *	−1.488 *	−1.468 *	−1.632 *
USA					−2.160 *	−2.164 *	−2.184 *	−2.152 *	−3.346 *
Mexico					−2.363 *	−2.357 *	−2.367 *	−2.367 *	−3.437 *
Netherlands					−2.054 *	−2.060 *	−2.078 *	−2.046 *	−2.333 *
Belgium					−1.656 *	−1.666 *	−1.675 *	−1.661 *	−2.092 *
Morocco					−3.696 *	−3.676 *	−3.683 *	−3.691 *	−2.327 *
Algeria					−3.219 *	−3.351 *	−3.376 *	−3.232 *	−2.587 *
Tunisia					−3.788 *	−3.736 *	−3.751 *	−3.764 *	−2.600 *
Chi test of zero fixed effects					294 (11)	295 (11)	284 (11)	278 (11)	251 (11)
[*p*-value]					[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Chi test of equal fixed effects					89 (11)	88 (11)	89 (11)	78 (11)	76 (11)
coefficients [*p*-value]					[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Destination-specific constant * firm size							0.056		0.182
							(0.188)		(0.146)
Chi test of these coefficients = 0							12.23		10.49
[*p*-value]							[0.34]		[0.48]
Destination-specific constant *province specialisation index							0.014		0.056
							(0.470)		(0.574)
Chi test of these coefficients = 0							11.72		16.24
[*p*-value]							[0.38]		[0.13]

TABLE IV
(Continued)

	(1) GMNL	(2) GMNL	(3) GMNL	(4) GMNL	(5) GMNL	(6) GMNL	(7) GMNL	(8) MNL	(9) MNL
Number firms	437	437	437	437	437	437	437	437	437
Number of choices	12	12	12	12	12	12	12	12	12
Log-Likelihood	−943.3	−945.55	−944.93	−941.72	−842.55	−824.91	−728.63	−900.82	−884.04
Pseudo-R^2	0.163	0.060	0.072	0.162	0.264	0.281	0.295	0.198	0.202

Note: Dependent variable: rank of destination choice alternatives (destination country of exports) ordered by sales volume. Explanatory variables: Concentration indicators are constructed using $\log(1 + n_{rjk})$ where n is the number of firms in province r exporting product j to a destination k in 1998. *Localisation* refers to local firms exporting the same product j, *MNE* refers to firms with foreign capital participation and *urbanisation* refers to firms exporting any product except j. Standard errors are in parenthesis. The asterisk (*) means "significant at a level of 5%".

the model with different number of destinations and to check the robustness of the parameters. Multinomial logit estimations rely on the assumption of identical independent error terms. If these assumptions are not meet in the data, a violation of the independence of irrelevant alternatives (IIA) property will lead to biased estimates. The IIA property implies that the relative probability of choosing two alternatives does not depend on the availability or characteristics of other alternatives. Although the inclusion of firm-specific characteristics interacting with destination-specific constants might contribute to reduce the risk of violation of IIA, the coefficient estimates still depend critically on the sample of firms and destination choices. To investigate whether the results in Table IV are robust, we re-estimate the model with different sub-samples.[15] We have selected three groups of destinations from the sample: all destinations but France, European destinations only, and border destinations only. Since France concentrates nearly half of the total first destination choices, we check whether France itself has certain characteristics that could lead to violations of the IIA assumption. Second, we remove non-European destinations since they have in common larger transportation costs. Finally, we select the three border destinations (France, Portugal and Morocco) to check whether our estimates change when we control for borderlines.

The results of estimating the model with the restricted samples are shown in column 1 to 3 in Table V. The baseline specification is column (6) of Table IV. The estimates on LOCALISATION are robust through each sub-sample. The coefficients are always positive and statistically significant. While the coefficient on MNE is again not significant in any sub-sample, the coefficient on URBANISATION is positive and significant in the sub-sample of European destinations.

4.4. *Alternative measures of agglomeration*

An alternative to count firms is to use export values. If the "home base" of the firm is the correct locus for the origin of export spillovers, as this is normally where the main development work takes place (Porter, 1992), we can construct quotient ratios using export values as indicator

of LOCALISATION, MNE and URBANISATION economies. Following Henderson et al. (1995), Aitken et al. (1997) and Malmberg (2000), and taking into account that we are measuring agglomeration economies related to the destination of exports, the quotient ratio in our analysis is constructed as

$$\frac{\text{industry-province exports to country } \kappa}{\text{industry exports to country } \kappa} \Big/ \frac{\text{total province exports to country} \kappa}{\text{total Spain exports to country } \kappa} \tag{6}$$

Note that each measure of agglomeration uses different types of firms; for example, equation (7) uses only export sales from multinational firms to construct the MNE quotient index.

A problem with the quotient index is that the export value is not always registered by the plant where the production actually took place, but in the place where the legal unit (that is, the firm) is registered. With multi-plant firms, certain provinces acquire a higher export value and other regions a lower export value than they should. Comparing the distribution of export values between CAMERDATA in 1988 and aggregate figures from ESTACOM-ICEX database in 1994, correlation was very high (0.71 across 48 provinces). The main difference between the two data sets was the level of concentration of exports in Madrid; 38% of total export value according to CAMERDATA and 12% of total export value according to ESTACOM-ICEX. As few large multiple-plant exporters whose legal unit is located in Madrid mainly explain this gap, we report our estimation with and without the firms located in the province of Madrid.

Table V, columns (4)–(7), presents the results of estimating the generalised McFadden choice model using as explanatory variables the quotient index described in equation (7). The results are very similar to those in Table IV using firm counts to measure agglomeration. Again, in all the specifications, the coefficient on LOCALISATION economies is positive and significant, while the coefficients on MNE and URBANISATION are not significant. We conclude that the hypothesis of information and imitation spillovers in the export activity among domestic firms operating in the same industry is robust for alternative measures of agglomeration. In columns (5) and (7), the coefficient on *per capita* GDP of the destination is now positive and significant, confirming the importance of including gravity variables in a model of export destination decision.

4.5. *Single versus multiple destination exporters*

The generalised McFadden choice model allows for firms to choose more than one destination based on a ranking of preferences. We ranked the firms' preferences about export destination according to sale volume. However, it is difficult to assess based on volume sales whether a firms prefers equally to export to both France–Portugal or Germany–UK relative to the choice of each destination separately.

We therefore investigate this issue using two different approaches. First we go back to Table IV where we check for the consistency of the GMNL parameters by estimating a multinomial conditional logit model (MNL), that is, we estimate the probability to choose one destination only, the *first* export destination. From columns (8) and (9) we observe that there are not significant differences among the estimated coefficients using one or another model. Moreover the Hausman's specification test failed to reject the null hypothesis, that the difference in the coefficients is not systematic. The associated χ^2 values, omitting any destination-specific dummy, were 2.72 and 4.44, respectively, while the critical value at the 5% with 3 (5) degrees of freedom is 7.8 (11.1). Hence the GMNL model is not inappropriate.

Next we follow the procedure of Grubert and Mutti (1996) and Devereux and Griffith (1998) of estimating a binary choice model (in our case logit) of the choice facing a firm as to whether or not to export to a given market, independent of whether the firm exports to other countries. Here what we are saying is that the choice of exporting to Germany, for example, is independent of whether the firm is exporting to UK, France or Portugal. Thus, the dependent variable y_i^c is

$$y_i^c = \begin{cases} 1 & \text{if firm i export to country c} \\ 0 & \text{otherwise.} \end{cases} \tag{7}$$

TABLE V
Estimation of decision about where to export by SMEs in 1994. Robustness analysis

	Excluding France	European destinations	Border destinations	Quotient index				Binomial logit model	
				With Madrid		Without Madrid			
	(1) GMNL	(2) GMNL	(3) GMNL	(4) GMNL	(5) GMNL	(6) GMNL	(7) GMNL	(8)	(9)
Localisation	1.586*	2.048*	1.371*	0.276*	0.186*	0.332*	0.334*	0.452*	0.327*
	(0.168)	(0.199)	(0.230)	(0.118)	(0.102)	(0.149)	(0.139)	(0.055)	(0.032)
MNE	0.154	0.264	0.343	0.671	0.664	0.554	0.564	−0.108	0.091
	(0.287)	(0.275)	(0.429)	(0.539)	(0.542)	(0.544)	(0.541)	(0.184)	(0.115)
Urbanisation	0.313	0.849 *	−0.617	−0.461	−0.423	−0.812	−0.947	−0.176*	−0.108*
	(0.253)	(0.313)	(0.462)	(1.780)	(1.742)	(2.675)	(2.123)	(0.039)	(0.027)
Distance to destination	−0.157*	−0.179*	−0.336*		−0.303*		−0.414*	−0.269*	−0.396*
	(0.075)	(0.068)	(0.093)		(0.047)		(0.077)	(0.047)	(0.060)
GDP *per capita* of destination	−0.271	−0.548	1.496*		1.793*		1.687*	−1.882	−2.244
	(0.446)	(0.737)	(0.634)		(0.822)		(0.738)	(1.125)	(1.524)
Destination-specific constant [*p*-value]	28 (10)	34 (6)	13 (2)	89 (11)	70 (11)	88 (11)	63 (11)		
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]		
Number firms	275	370	246	437	437	385	385	242	195
Number of choices	11	7	3	12	12	12	12	12	12
Log-Likelihood	−482.53	−485.96	−171.41	−927.84	−887.56	−882.23	−859.34	−3695	−1331.1
Pseudo-R^2	0.201	0.222	0.388	0.262	0.294	0.265	0.267	0.254	0.054

Note: The asterisk (*) means significant at a level of 5%. GMNL stands for generalised (rank-ordered) multinomial logistic model. The baseline specification is Table IV, columns (5) and (6). Columns (1)–(3) were estimated with destination-specific fixed effects only. European destinations are France, Germany, UK, Italy, Portugal, Belgium and Netherlands. Border countries are France, Portugal and Morocco. Columns (4)–(7) use export values to construct concentration indicators. Columns (8) and (9) use as concentration indicators $\log(1+n_{rjk})$ and include 10 industry-specific dummy variables (see Appendix Table A1 for the industry groups).

The 437 SMEs were separated into two groups. The first group includes 242 single-destination exporters. The observations for the 12 destinations are stacked together, so there are 2904 choices in this framework. The results of estimating this model on the sample of single-destination exporters are presented in Table V, column (8). The presence of other domestic firms in the same industry exporting to one particular destination has a significant impact on the destination choice of small exporters, while the presence of MNEs has no impact no the destination decision. The coefficient on distance is negative and significant, and the *per capita* GDP of the destination is not significant. Surprisingly, the coefficient on URBAN is negative and statistically significant.

Since it is independent of the choice for any other country, this model can be applied to firms that choose more than one location. Column (9) presents the results of estimating the model on the second group of firms, 195 multiple-destination firms in our selection of 12 destinations; this yields 2340 possible choices. The results are the same as those in column (8) suggesting that the hypothesis of information spillovers can be extended to firms selling in more than one destination. Of equal interest, the results indicate that small firms at best do not benefit from being close to multinational firms, at least in their choice decision about exports.

5. Conclusions

This study investigates the impact of information spillovers on firms' choice of export destination. Although case-studies indicate that new exporters take into account the destination chosen by other exporters, there is no econometric evidence on this area. If information and imitation are important in the firm's decision about where to export, an interesting issue is to identify the source of these externalities. This paper examines whether the geographical concentration of different types of exporters selling to a particular destination stimulates other firms to export to this destination. By the type of decision analysed, these benefits from the concentration are more likely to be generated by information spillovers rather than by skilled labour pool or linkages.

We have divided the sources of externalities generated by geographical concentration of exporting firms in three: localisation (firms operating in the same industry), multinationals, and urbanisation (heterogeneity of firms). In our application for the Spanish exporting manufacturers, the results confirm the hypothesis that local exporters in the same industry affect positively the destination choice of small size exporters. There is no evidence of any influence from multinationals or agglomeration of local firms belonging to other industries. We also quantify the importance of information spillovers on the destination decision of exports. Our estimates suggest that for a province increasing the number of firms exporting one product to one particular destination by 1% would increase the likelihood of choosing this destination by a new small-sized exporter in the same industry by 1.6%. Localisation economies also emerge as major mechanism of transmission of information about export markets after controlling for firm-specific characteristics, geographic origin characteristics and gravitational factors such as economic size or physical distance to the export markets.

The significance of the findings contributes to the recent literature on SME exporting highlighting the meaning of local networks for the development of exporting in SMEs (Spence, 2003). Our results provide an explanation for how the benefits from locating close to each other realise in the case of new exporters and supports the importance of local networks to promote export start-ups.

There are two interesting topics related to our paper to be addressed as future research. First, like the majority of previous researchers, we are unable to access the role of trade promotion agencies sponsored by the central or local governments. Second, our findings show that localisation spillovers are important determinants of the export destination location decision but it is also possible that they "speed-up" the decision to export. Testing the later issue awaits the development of panel data-sets that incorporate non-exporting firms at the beginning of the period that gradually start exporting to test this hypothesis.

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APPENDIX

TABLE A1
Descriptives of 454 new exporting SMEs in 1994

By province	Number	By industry	Number	By employment	Number
Barcelona	92	Food & drink	67	1–10	142
Valencia	54	Textile, clothing & leather	102	11–20	183
Madrid	52	Paper & printing	20	21–50	84
Sevilla	43	Chemicals,rubber&plastic	46	51–100	45
Vizcaya	30	Non-metallic products	32		
A coruna	26	Metallic products	62		
Guadalajara	15	Machinery	29		
Girona	13	Electric & electronic equip.	14		
Alicante	12	Transport equipment	8		
Pontevedra	10	Other manufactures	74		
Others	107				
Total	454	Total	454	Total	454

Note: The firms were set up between 1990 and 1994 and they employ less than 100 workers. Source: Own elaboration using database from Camerdata (1990–1994)

TABLE A2
Descriptives of census of manufacturing exporters

Employment Interval	Number firms	Export/sales ratio (%)	Multinationals (%)	Average number of destinations	Average number of products
21–50	1064	21.7	3.6	5.1	3.5
51–100	1826	21.0	7.4	6.3	4.3
101–200	1157	18.6	10.3	8.8	6.0
201–500	821	17.5	13.7	12.2	8.1
501–750	143	15.4	19.6	14.1	11.1
751–1000	93	16.8	20.4	17.5	14.7
1001–2000	78	14.2	17.9	21.1	18.3
2001–5000	29	15.4	24.1	24.1	26.5
5001-	18	18.1	27.8	24.5	48.2
All firms	5229	19.8	9.1	8.3	6.0

Note: The product classification [column (6)] is the four-digit combined nomenclature and includes 628 different products in the manufacturing sector. Since the majority of firms are multi-product and multi-destination, we count each pair as one observation (destination, product) in the construction of the agglomeration measures.
Source: Own elaboration using Census of exporters (Camerdata, 1988).

Notes

[1] Similar definitions of "localisation", "multinationals" and "urbanisation" have been used by Aitken et al (1995), Head et al. (1995) and Malmberg (2000).

[2] Unfortunately, we lack of additional information on individual firm characteristics. In particular, we are not able to distinguish when new firms are independent firms or are subsidies. To the extent that these new firms are subsidies of the parent, co-location in exporting is highly likely, reducing the impact of the agglomeration effects.

[3] Castillo (1994) and Castillo and Requena (2003) offer a detail description of the CAMERDATA's Census of Exporters (1988). Although we had no access to the original data of all manufacturing exporters, there is no reason to think that the sample is not representative of the population. The loss of firms is due to missing information (on total sales and ownership structure), exclusion of provinces (Canary Islands, Balearic Islands, Ceuta and Melilla) and exclusion of products and countries: (a) Exports corresponding to non-manufacturing activities according to "Table of Correspondence TARIC-NACE" (Eurostat, 1991); (b) Exports classified as "special destinations" (destination codes CN 899-999); (c) Exports to Andorra.

[4] The data were collected from http://www.aeat.es/aduanas/estadist/home.html

[5] The only information available about the location of the firm in the dataset is the province (Eurostat NUTS III) where the firm's headquarter is located. Among others, Goicolea et al. (1995) and Castejón and Costa (1996) have used the province as a geographical unit to measure agglomeration in Spanish manufactures. There are alternative geographic units such as the metropolitan area (narrower geographic unit) or a cluster-based region (broader geographic unit). Recent work concerning whether spillovers are provincial in scope found strong evidence of *provincial* spillovers rather than *cluster-based region* spillovers for the Spanish industry (Alonso et al., 2003).

[6] One final source of information could be a well-developed wholesale business or a sector of specialised export services in the local area created by the central or regional government. Unfortunately, it is difficult to control for such an alternative source of positive externalities without extra information on promotional activity that is unavailable to us.

[7] The distance measure was constructed using the following sources: http://shellintenational.org for distance in kilometers between Spanish cities and European destinations; http://haveman.org for international distances.

[8] Considerable anecdotal evidence suggests that many firms in the Spanish border provinces trade extensively with the neighbouring regions of the bordering country (Cádiz with North Morocco, Girona with south France or Vigo with North Portugal). Following the literature on "border effect" that started McCallum (1995), in an application for the Spanish regions, Minondo (2003) finds some evidence of the importance of trade among regions in the frontier with France and Portugal.

[9] *Source:* World Penn Table and Anuario Estadístico del INE (1995).

[10] For each firm producing in certain industry in a specific province, the revealed comparative advantage of this province in this industry is calculated as

$$\frac{\dfrac{\text{industry- province exports}}{\text{industry exports}}}{\dfrac{\text{total province exports}}{\text{total Spain exports}}}$$

where industry is defined according to four-digit Combined Nomenclature.

[11] The rank-ordered logistic regression model (Generalised McFadden choice model) is implemented using STATA 8.0. (StataCorp, 2003, pp. 425–439). The multinomial conditional logit is a particular case in which only the best alternative is considered.

[12] In our case, the Hausman test (Ruud and Hausman, 1987) compares the parameters with the ranking data (an efficient estimator under the null hypothesis that the rest of destination choices is determined with the same decision weights as the first destination choice) and the parameters that use the first destination choice data only (a consistent estimator even if the null hypothesis is false). The statistic proposed to test the validity of the decision weights (preferences about country destination ranked by export sales) is: $q = (\beta_r - \beta_f)\left[\text{var}(\beta_r) - \text{var}(\beta_f)\right]^{-1}(\beta_r - \beta_f)$ where β_r stands for the estimators of the restricted model (MNL) and β_f for the full model (rank-ordered multinomial model, GMNL). The statistic is asymptotically distributed as χ^2 with degrees of freedom equal to the number of explanatory variables.

[13] The self-selection bias with respect to where to export arise because, by their actions, firms reveal that locating in one region has an expected advantage of deciding to export to one particular destination.

[14] The coefficients of the agglomeration measures are robust to alternatives measures of distance (distance without border adjustment) and GDP *per capita* (absolute differences in GDP *per capita* between the destination country and the province where the firm operates).

[15] An alternative way to test the validity of the IIA assumption is the Hausman's specification test for the multinomial model proposed by Hausman and McFadden (1984).

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