Geographical and Industrial Spillovers in entry decisions across export markets

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GEOGRAPHICAL AND INDUSTRIAL SPILLOVERS IN ENTRY DECISIONS ACROSS EXPORT MARKETS

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Abstract: This paper addresses sequential entry decisions in export markets. It focuses on externalities derived from previous export activity in countries close to those for which a potential entry decision is taken (*geographical spillovers*) and externalities derived from previous presence of other firms in the same industry (*industrial spillovers*). The empirical analysis uses Spanish microdata for the period 2000-2010 in a gravity function framework that also integrates country and firm characteristics. The results suggest the positive effect of both geographical and industrial spillovers to explain entry decisions in export markets, though both are smaller in magnitude than the effects coming from previous presence.

Keywords: Sequential entry, spillovers, export activity
JEL code: F10, F14

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1. Introduction

The literature on International Trade has extensively analyzed firms' decisions to enter in foreign markets. On this matter, different papers have studied the persistent nature of export decisions, which are likely related to sunk costs that firms face when they decide to enter. It is usually assumed that the current choice of entry in export markets depends on previous decisions - i.e., lagged explanatory variable- (Esteve and Rodríguez, 2013). A complementary literature addresses the whole pattern of export activity by analyzing the duration of export activity spells (Besedes and Prusa, 2006a, 2006b; Esteve *et al.*, 2013).

The analysis of export decisions, or even the duration of the export activity, does not usually consider multi-market characteristics of export strategies. This sharply contrasts with the empirical evidence, which points out that multi-market (and multi-product) exporters represent an important share of total exports in developed countries. It suggests that geographical or industrial spillovers coming from previous export decisions in other markets could make easier entry in new export markets. This paper analyzes the existence of such externalities, which support the presence of a sequential pattern of entry in export markets. The underlying model is based on an entry sequential assumption that suggests that exporting decisions are made in two stages. In the first stage, the firm decides to enter in export activity by selling to a specific market. In the second stage, the firm decides to expand to new export markets. In doing so, previous decisions for geographically close markets would have a positive influence. It does not neglect the presence of entry sunk costs in the second stage, but merely that such costs would be lower if firms have a previous stronger position in the regional area.

The spillover effects considered in this paper are twofold. On the one hand, those effects coming from previous entry decisions in countries with similar economic, social or cultural characteristics. We assume that these characteristics depend on the proximity between markets, so we refer them as *geographical spillovers*. On the other hand, the entry decision in a specific market could also depend on previous choices taken by other firms that elaborate similar products. This previous entry by other firms located in the same home country generates an information externality that may influence firms that decide *ex novo* to enter in this new market. We refer it as an *industrial spillover*. This information externality is usually

considered as a main argument to justify export promotion policies (Volpe and Carballo, 2010).

By contrast to some other countries in which detailed information on export activities by individual firms (microdata) can be obtained, restrictions for the Spanish case lead us to use the data provided by the network of Spanish Chambers of Commerce (Cámaras de Comercio), which are complemented with some basic information provided by SABI (Bureau van Dijk Electronic Publishing). The analyzed period covers the years 2000-2010. These microdata are combined with country information in the context of a gravity function approach. However, in contrast to the traditional gravity function, the variable to be explained is a binary variable that analyzes the entry decision by each firm in each market and year. Therefore, the analysis focuses on the extensive margin of trade; the lack of data about trade volumes does not allow us to analyze the intensive margin. The empirical analysis combines probit and fixed effects logistic regressions. The latter allows us to control for observable and unobservable firm characteristics, taking advantage of panel features of the set of decisions taken by each firm across export markets.

The remainder of the paper is organized as follows. Section 2 reviews the recent literature related to sequential entry into export markets. In Section 3, data and some descriptive results are presented. The econometric analysis and main results are contained in Section 4. Finally, Section 5 concludes.

2. Previous research

The recent literature about sequential exporting has increased in the last few years. A common starting point is the influential work by Melitz (2003), who introduces asymmetries across firms in productivity and emphasizes the relevance of fixed costs of exporting. These fixed costs should be faced for every country the firm decides to export. As a consequence, the total fixed export costs are larger the more foreign countries the firm chooses to serve. A characteristic of the Melitz's model is that it assumes that fixed export costs are homogenous between different export markets, by contrast to variable trading costs. However, it could be expected that fixed costs were specific for each market. The differences between fixed export costs would arise by differences in uncertainty levels, due to imperfect information about the

market size, the requirements for product adaptation in the new market, or the performance of the distribution channel, among others. If that is the case, there are at least two possible ways to reduce uncertainty and, therefore, entry costs. On the one hand, firms may adopt a sequential entry process, in which previous steps could help to current decisions. On the other hand, new exporters may benefit from strategies followed by other firms in that new destination.

The literature about sequential entry has increased considerably in the last decade. Chang (1995) was one of the first papers in addressing the sequential process of internationalization, although applied to FDI flows. In particular, the author analyzed the entry process of the Japanese manufacturers in the U.S. market. He observed the existence of two differentiated stages in the entry process. In the first stage, firm enters in a new country through its main business line in order to reduce competition risks with domestic firms. In a second stage, firm gradually introduces other products or activities, including those that initially do not show a clear comparative advantage in the new market. The empirical evidence suggested that sequential entry allowed Japanese firms to develop a set of more competitive skills in foreign markets. With this strategy, Japanese firms were able to increase significantly their presence in international markets.[1]

A complementary perspective, closer to the objective of this paper, addresses the sequential entry in different export markets, instead of analyzing entry in lines of business in a specific foreign market. Eaton *et al.* (2008) provide a very good example of this line of research. Their results point out a very high rotation rate in export destination for Colombian firms, that is compatible with a two-stage entry process: the firm export to one export market and, if that action is successful, it expands gradually in a greater number of destinations. Therefore, the sequential entry of firms, along with the probability of survival as exporter, depends crucially on the firm's success in the choice of its first destination.

Sequential exporting has also been addressed more recently in Albornoz *et al.* (2012), who study that process by considering sunk cost and uncertainty that firms face. Their results point out that uncertainty about entry success into export markets is a key ingredient to understand

[1] Chang (1995) also notes that the successful Japanese internationalization process was due also to the amount and duration of the FDI flows. Japanese firms opted by small volumes of FDI in the long run, in contrast with the occidental strategies to internationalize by large investments flows in the short time.

export patterns of Argentinean exporters. More specifically, they point out that uncertainty about export success is central to understand export pattern, since that uncertainty is strongly correlated with time and markets. They develop a model to analyse these implications in which i) the firm finds out its profitability level as consequence of his entry into the export market, ii) the firm can take new decisions about the entry in new markets and iii) once the firm decides to enter in new markets and overcome sunk cost, the correlation between export profitability across markets generates incentives to enter into new markets sequentially. Accordingly, the model suggests that exporting firms benefit from information spillovers that promote entry into new markets, through the reduction of entry sunk costs. The paper also suggests a number of trade spillovers that affect the mechanisms of coordination policy between markets. For example, exports in a country could increase as a consequence of liberalization trade policies taken by other countries.

In dealing with entry into foreign market, Segura-Cayuela and Villarrubia (2008) emphasize the presence of uncertainty and information spillovers. They combine a framework of monopolistic competition with heterogeneous firms in their productivity levels and entry decision in foreign markets under uncertainty. They conclude that uncertainty about size market and about traded products substantially affects firm's entry mechanism into foreign markets: export, horizontal FDI, vertical FDI, etc. Additionally, empirical evidence suggests that firms re-enter in foreign markets in which they had been exporting previously with the same product. Blum *et al.* (2013) address this issue observing the existence of multiple exporting spells to specific export destinations. Moreover, they suggest that firms use to sell the same product they sold to that specific country in previous periods. Paper also analyzes different ways of entry and exit in export markets. Specifically, they analyze the behavior of perennial and occasional exporters. The results indicate that perennial exporters are highly efficient and invest more capital to serve in domestic and foreign markets, regardless of the state of demand. By contrast, occasional exporters are less efficient, smaller and they vary their export decisions according to demand level. They suggest that increasing marginal cost and stochastic demand are main determinants to explain entry and exit behavior of occasional exporters.

The relevance of fixed and variable export cost is also addressed in di Giovanni and Levchenco (2012), who analyze link between entry costs and the extensive margin. In this sense, they develop a multi-country model based in Melitz (2003) and Eaton *et al.* (2011) to

explain the importance of fixed and variables cost of trade and the extensive margin for welfare. In the same spirit, Eaton *et al.* (2012) use a standard heterogeneous-firm to model the importance of entry cost in trade relationships. Departing from that model, they estimate a gravity equation with aggregated bilateral trade and production data and, then, they simulate entry costs in different markets. The results show that reductions in trade costs increase substantially entry in new bilateral trade relationships, although the value of this new flow is small. In particular, a reduction of 10% in trade barriers increases bilateral trade in 206 new relationships.

Related with the influence of information spillovers, Morales *et al.* (2011) address the entry process into export markets considering the concepts of gravity and extended gravity. On the one hand, the concept of gravity refers to the similarity between the firm's domestic market and the importing country. On the other hand, the concept of extended gravity is related with the similarity between previous and new entry destinations and it measures how costly the adaptation process in new markets is. This latter concept is very similar to the concept of geographical spillover defined in this paper.

Previous papers are examples of a growing literature which indicates that sunk entry costs are reduced substantially as a consequence of previous entries in close markets. Firms are able to develop some kind of *learning-by-exporting* related with previous experience in export markets, which allows them to overcome more easily sunk entry costs. Sheard (2012) also follows this line of research. His paper predicts that more productive firms choose to enter in a large number of markets and quickly. In contrast, firms with lower productivity levels tend to export in a few numbers of small markets, before exporting to large scale.

As it was commented previously, entry decisions may also be affected by previous decisions taken by other firms that export to the same area. This is a part of a literature that emphasizes the influence of information spillovers in the choice of export markets. The study of Requena and Castillo (2007) is an example for Spanish firms. Using a sample of new young exporters, the authors identify the existence of local information spillovers in explaining export destination decisions. They conclude that only the within-industry agglomeration of Spanish exporters affects significantly to the probability of exporting to the same destination in 1994.

In relation to trade duration, Esteve *et al.* (2013) apply a survival analysis with Spanish data and obtain two relevant conclusions. Firstly, they conclude that export status presents highly persistence, while the destination portfolio is very dynamic. Secondly, they suggest that heterogeneity, measured at the firm and destination levels, is key to explain exporting survival. Besedes and Prusa (2006a) also analyze trade duration, finding that US import flows have a very short duration. In another paper, Besedes and Prusa (2006b) estimate a Cox proportional hazard model to obtain the main determinants of the trade durations. They conclude that higher product differentiation reduces exit hazard and they also show that the value of the initial trade flow positively affects trade duration.

3. Data and descriptive analysis

This paper combines microdata with industry and country information. As usual, the main problem lies on acceding to firm-level data on export activity. The Spanish Customs does not provide access to that information.[2] Therefore, the database here used is the Directory of Spanish Exporting and Importing Firms, which is elaborated by the Spanish Chambers of Commerce in collaboration with the Spanish Tax Agency. This is the only publicly available source with firm level data about export markets and products for Spanish firms. The sample currently covers the period 2000-2010. Products are defined according to the Combined Nomenclature at 2 digits.[3] Unfortunately, the information about products and countries is not crossed, but it is tabulated apart from one another. Additionally, the database provides information on the overall volume of exports grouped in three segments: less than one hundred thousand euros, between that amount and one million euros, and more than one million euros.

That database has been matched with accounting information contained in the SABI database, elaborated by Bureau van Dijk Electronic Publishing. The matching procedure has led to a final simple of 7,756 firms. However, many of those firms (38% of total) are trading firms (NACE Rev.1: 51 and 52). We exclude them from the analysis because the nature of fixed entry costs for trading firms may be different to those producers that export their own

[2] Many studies of internationalization for Spanish firms use the Encuesta Sobre Estrategias Empresariales (ESEE). However, that database only provides quadrennial information on export destinations aggregated in four broad geographical areas.
[3] The database is accessible in http://aduanas.camaras.org/.

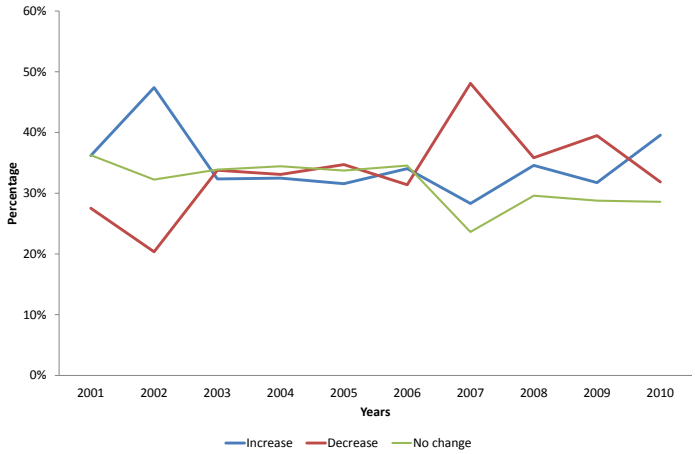
products. In particular, it is more likely that entry and exit decisions could be the result of shipments upon requests and not based on strategic decisions taken by firms. The final number of manufacturing firms is 3,859 and an average firm is in the panel in 7.5 years. Though it is not a completely balanced panel, the majority of firms (91.1% of total firms) are in the sample in consecutive years.

Table 1: Distribution of firms according to # of export markets

	2000	2005	2010
1 country	29.5	25.0	21.4
2-5 countries	34.7	36.5	32.1
6-10 countries	13.0	13.3	15.0
11-25 countries	15.5	16.5	19.6
26-50 countries	5.9	6.9	8.8
> 50 countries	1.4	1.8	3.1
Average # of countries (per firm)	7.7	8.7	10.6
Median # of countries (per firm)	3.0	3.0	5.0
Total # of firms	3,220	3,352	2,314

Table 1 shows the distribution of firms according to the number of export markets in 2000, 2005 and 2010. As can be seen, almost one fourth of all exporters only sell in one country. As expected, the distribution is highly asymmetric, with a large share of firms exporting to very few countries: almost have of them export to less than six countries. Anyway, this concentration is smaller than obtained by Mayer and Ottaviano (2008). They concluded that 42.6% of French firms exported to one country, while 15.5% of them exported to more than ten countries. Apart from differences between countries, the sample here used may have some biases towards medium and large-sized firms, for which more presence in export markets is expected. Additionally, the average number of destination countries for Spanish exporters increases throughout the analyzed period from 7.7 to 10.6. This growth is compatible with a huge turmoil in the firm level behavior. As can be seen in Figure 1, the percentage of firms that do not change their total number of exporting countries in two consecutive years was pretty stable around 35% before the crisis. After 2007, that percentage decreased to 28% and it was compensated with a remarkable growth in the number of firms that reduced their number of foreign markets.

Figure 1: Distribution of firms (%) according to changes in the number of foreign markets



As it is expected (see Table A1 in Appendix), Spanish firms mainly trade with other firms located in the EU countries. In particular, Portugal and France were the two main destinations in all years of the considered period. Geographical distance is, obviously, a main explanatory factor: eleven of the fifteen most frequent export markets are integrated in the EU. Only the United States, Mexico, Morocco and China are non-EU countries in that short list. This geographical distribution is in accordance with the aggregated data of the Balance of Payments which point out that 70% of Spanish exports were traded with the EU countries.

Table 2: Distribution of firms according to # of exported products

	2000	2005	2010
1 product	39.2	29.2	34.3
2 products	22.3	18.3	21.3
3 products	13.0	13.1	12.8
4 products	7.2	9.2	8.1
5 products	4.8	6.9	5.1
6-10 products	10.3	15.4	11.9
11-25 products	2.9	7.2	5.8
> 25 products	0.3	0.7	0.7
Average # of products (per firm)	3.0	4.2	3.7
Total	3,220	3,352	2,314

Finally, Table 2 shows the distribution of exported products according to the Combined Nomenclature (CN), which distinguishes 98 chapters. As can be seen, approximately one third of exporters only trade one product. That percentage raises to more than 50% when firms that export two products are also considered. Again, this result is similar to Mayer and Ottaviano (2008), who obtain that the percentage of French exporters that only trade one

product is 35%, and only 19% of them export more than ten products.[4] The average number of exported products by firm is about four. However, it has increased throughout the period: firms exported three products in average in 2000, while it reached 3.7 in 2010. The most frequently exported products correspond to *Machinery and mechanical appliances* and *Plastic and articles thereof*, which are exported by about 30.2% and 20.2% of firms in the sample, respectively. Only 7.9% of all exported products could be considered as high-tech products, according to the usual OECD classification. By the opposite, almost 60% of exported products are characterized by low or medium-low technological intensity.

In summary, the descriptive analysis confirms three basic features of Spanish exporters. First, firms use to export only a few products in a few markets. Second, main destination countries are those integrated in the EU area (in particular, those which share border with Spain). Third, only a reduced percentage of exported products have a high tech intensity. This exploratory analysis is complemented in the next Section once we explain how the variable related to entry decision is constructed.

4. Econometric approach and results

The previous descriptive analysis suggests that, as expected, distance play a main role in explaining entry decisions in export markets. A standard way to deal with this issue is by using a gravity function, with distance and economic size of the importing country as explanatory variables. However, this paper does not try to explain the cross-country pattern of Spanish exports, but to address the regional and industrial spillover effects associated to previous decisions, taken by the firm or by other firms in the same industry. Given that the study is focused on entry decisions in new markets, those strategies related to current presence in a country (that is, decisions related to continuing or exiting from current export markets) are excluded from the empirical analysis. In other words, we are interested in each entry decision (e_{ijct}) in a country *c* in time *t* taken by firm *i,* which belongs to the industry *j,* conditioned to that firm was not exporting to that specific country *c* in *t-1*. More specifically, the decision to analyze corresponds to the conditional probability:

[4] We should remember that the product classification followed by the dataset is highly aggregated, so this comparison should be taken with caution.

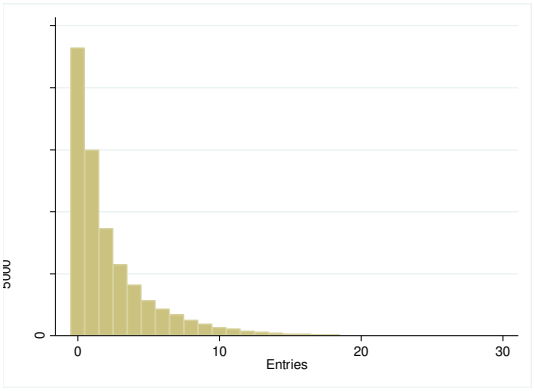
$$P(e_{ijct} / e_{ijct-1} = 0) \qquad i=1,...N \text{ firms}, j=1,..S \text{ industries}, c=1,....M \text{ countries}$$

This definition implies a reduction in the initial set of potential decisions, insofar as a firm in *m* countries at *t-1* takes *M-m* entry decisions at *t*. In constructing the set of countries M, we have dropped those markets in which the number of occurrences (that is, firms exporting to that country in a specific year) is lower than 20. It implies that the initial number of considered countries, that was equal to 242, is reduced to 206.

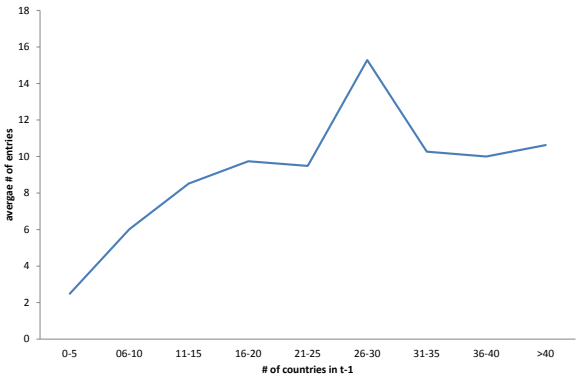
The total number of observations with complete data for all the variables is close to 3 million, which refer to 3,221 firms. Only 1.47% of them (i.e., 41,455 observations) correspond to entries. This low rate of occurrence for value 1 (entries) is the consequence of considering all potential decisions by each firm/year for all countries in which it is not operating in the previous period. This seems imply some kind of zero inflated models. However, this is not a count model, insofar as the dependent variable is binary, and it does not count events. Figure 2(a) shows the distribution of entries for the whole period 2001-2010. As may be expected, the number of entries uses to be small. In average, a typical firm enters in 1.98 markets per year. Additionally, the Figure 2(b) shows the average number of entries in *t* conditioned on the number of countries that firm exported in *t-1*. As can be seen, the average number of entries increases with the total number of export markets in the previous year, though the positive relationship seems to be less intense once firms export to more than 20 countries.

Figure 2: Distribution of entries by year (all years)

a) # of annual entries in 2001-2010



b) Average # of entries (*t*) conditioned to the number of markets (*t-1*)



The relationship suggested by the Figure 2(b) can be tested by using a Poisson regression model. In this case, the dependent variable counts the total number of positive entries for each firm/ year. This approach counts the number of events and the dependent variable takes values from 1 to 67 (maximum number of entry by firm/year). The Table 3 shows the results of the Poisson model when the previous number of foreign markets, firm size and distance are considered. The latter measures the average number of kilometers to new export markets.[5] As can be seen, the number of countries in period *t-1* affects positively to the total number of entries. However, distance has a positive effect on the total number of entries, indicating that more simultaneous entries are correlated with an increase in average distance. Finally, firm size has, as expected, a positive effect on the number of entries. In particular, firms with more than one hundred employees enter simultaneously in more countries.

Table 3: Total number of entries: Poisson regression model

# countries t-1	0.0833*** (0.0008)
Average_dist_entry	0.0042** (0.0018)
Size 50-100	0.0075 (0.0133)
Size >100	0.0397*** (0.0126)
Constant	0.9006*** (0.0110)
# observations	12,485
Pseudo R^2	0.1086

Note: ***. ** indicates significant at 1% and 5%

As was previously explained, the main objective of the paper is to analyze main determinants of entry decisions in each foreign market. With that aim, a gravity function approach is followed. In particular, the empirical equation to estimate is:

$$P(e_{ijct} / e_{ijct-1} = 0) = \beta_0 + \beta_1 GDP_{ct} + \beta_2 Dist_c + \beta_3 Risk_{ct} + \beta_4 Size_{it} + \beta_5 TFP_{it} + \beta_6 Products_{it} + \beta_7 Presen_{ict-2} + \beta_8 Spill\_R_{ict-1} + \beta_9 Spill\_I_{ijct-1} + \varepsilon_{ijct} \quad (1)$$

The explanatory variables can be classified in three groups, according to the combination of the four dimensions considered. Firstly, a set of variables with geographical dimension:

[5] To avoid the influence of "zero" kilometers when the number of entries is equal to zero, only positive events (i.e, one or more entries by a firm/year) are considered in the Poisson regression model.

economic size (*GDP*), distance (*Dist*) and commercial risk (*Risk*) of the destination country. The GDP volume of the importing country has been extracted from the World Bank database, while bilateral distances between Spain and importing countries have been elaborated by using the Great Circle method. Additionally, country risk classification captures minimum premium rates linked to transfer and convertibility risk and cases of force majeure. It is based on the Arrangement on Officially Supported Export Credits, elaborated by the OECD. This variable takes values in the range [0, 7], where higher values indicate higher non-payment risk by the debtor country. As usual, the expected signs for distance and risk are negative, while economic size is expected to affect positively to the probability of entry.

The second group of variables includes those with a firm dimension and it measures firms' size and performance. On the one hand, firm size (*Size*) is measured with the number of employees and, as usual, it is expected that affects positively the entry in export markets. On the other hand, firm`s performance is approached with an productivity indicator (*TFP*), which has been calculated using the approach of Levinsohn and Petrin (2003). Following the theoretical framework revised in Section 2, it is expected that productivity affects positively entry in new foreign markets. Additionally, the variable *Products* indicates the total number of exported products, defined according to the Combined Nomenclature at 2 digits, and it is expected that it also affects positively. The assumption that underlies to expect such a positive sign is that product diversified firms have more incentives or abilities to enter in new foreign markets. However, this is not an uncontroversial issue, insofar it is not evident that economies of scope arising from diversified production can be successfully used to facilitate entries in new markets.[6]

Finally, equation (1) has three variables with geographical and firm dimension. Firstly, the growing literature on persistence in export activity emphasizes the importance of previous decisions taken by firm. As was previously explained, the sample used is restricted to those decisions about the entry in new countries: i.e., markets in which the firm was not exporting at *t-1*. However, it does not exclude that the firm exported at previous periods (before *t-1*). The hypothesis is that entry barriers should be lower in the case of re-entry. Accordingly, *Presen* takes value 1 when the firm exported to a specific destination in previous periods (*t-2* or before) and 0 otherwise.

[6] Of course, product diversification is a strategy closely related to firm size. However, note that the effect of firm size is already controlled for in the empirical analysis.

The other two variables in this group capture the externalities related to previous presence in the same region (geographical spillover) or previous decisions about the same country of other firms that belong to the same industry (industrial spillover). On the one hand, the variable related with geographical spillovers (*Spill_R*) takes value 1 for the country *c* in period *t* when the firm was exporting to another country that belongs to the same geographical area as *c* in *t-1*, and 0 otherwise. The geographical areas follow a continental classification which distinguishes nine large regions: North America, Central America, South America, Europe, other European countries, Africa, Middle East, Far East and Oceania (see Table A2 in Appendix for details). On the other hand, the variable related with the industrial spillover (*Spill_I*) measures the number of exporting firms in the industry *j* that exports to a country *c* in year *t-1*.[7] The effects for both geographical and industrial spillover are expected to be positive.

Finally, when we consider the influence of regional spillovers, we should re-define the measurement of distance. If the firm was exporting to the region at t-1 (i.e., *Spill_R*=1), then it does not seem appropriate to consider the distance between Spain and the new foreign market, insofar as many of the entry costs that underlie in distance (e.g., cultural distance) are reduced once the firm was present in the region. For that reason, in those cases we define *Dist_ave* as the average number of kilometers between the country *c* and the set of countries in the same region to which the firm was exporting in *t-1*. If the firm was not present in the area, then the usual measurement for *Dist* applies.

A short example clarifies this issue. Suppose a firm that was not exporting to South America in *t-1*, but it decides to export to Argentina in period *t*. In this case, distance refers to the number of kilometers between Argentina and Spain. By contrast, suppose that it was already exporting to Uruguay and Brazil in *t-1*. In this case, the relevant distance for entry decision in Argentina is the average number of kilometers between Argentina-Uruguay and Argentina-Brazil. In that sense, distance could be interpreted as a measure of the average number of "new kilometers" within the region where firm was previously exporting.

[7] See Appendix for more details on the elaboration of both variables.

Table 4 shows the marginal effects for probit regressions of equation (1). The first column shows the basic results of the gravity equation, which indicates the relationship between the entry decision and economic size, distance and country risk. As expected, distance has a negative effect on the probability of entry, while GDP shows a positive sign. Note that the latter coefficient may not be interpreted in the same way than usual gravity functions, in which GDP elasticity of the importer country is close to 1. In this sense, a growth of a billions dollars in the economic size of the foreign market increases the likelihood of entry in 0.17%, this is, an 11.6% of the observed probability of entry. The variable *Risk* also shows the expected sign, pointing out that the higher the risk of non-payment the lower the probability of entry is. The second column includes the variables with firm (but not country) dimension. As expected, firm size also shows a positive relationship with entry decisions.[8] That relationship is compatible with a significant effect of firm productivity, measured with TFP, even though firm size and TFP are positively correlated variables. It must be emphasized that small marginal effects should be considered in relationship with an observed entry probability equal to 1.46%.

The third column includes the variable related with total number of products that firm exports and all those variables that combine firm and country/industry characteristics. Variables related with GDP, firm size and TFP do not change its sign, though the latter is not significant. In this column the measurement of *Distance* changes in accordance to previous explanation, but its effect remains negative and significant. The results indicate that firms with a higher total number of exported products have more likelihood of entry in new foreign markets. As expected, the previous presence in the country has a very relevant influence on current decisions. The likelihood of re-entry increases in 0.6%, this is, a 45% when it is considered in relationship with observed probability of entry. Additionally, previous export experience in the same region (*Spill_R*) makes easier current entry in other countries of the same area. It is important to remark that this effect is obtained even after controlling for previous presence in the same country. The positive and significant sign for *Spill_I* suggests that firms deciding to enter in a new foreign market also take into account the previous presence of other firms in their industry.

[8] In complementary regressions, size was measured with the three segments of overall volume of exports and results remain unchanged.

Table 4: Entry decision: Probit regressions

				Country fixed effects
	(i)	(ii)	(iii)	(iv)
GDP	0.0017***	0.0017***	0.0002***	0.0001**
	(0.0001)	(0.0000)	(0.0000)	(0.0000)
Dist	-0.0005***	-0.0005***		
	(0.0001)	(0.0001)		
Dist_ave			-0.0006***	-0.0001***
			(0.0000)	(0.0000)
Risk1	-0.0039***	-0.0039***		
	(0.0004)	(0.0004)		
Risk2	-0.0030***	-0.0030***		
	(0.0001)	(0.0002)		
Risk3	-0.0049***	-0.0049***		
	(0.0001)	(0.0001)		
Risk4	-0.0051***	-0.0051***		
	(0.0001)	(0.0001)		
Risk5	-0.0073***	-0.0074***		
	(0.0001)	(0.0001)		
Risk6	-0.0097***	-0.0097***		
	(0.0001)	(0.0001)		
Risk7	-0.0191***	-0.0191***		
	(0.0001)	(0.0001)		
Size50-100		0.0005***	-0.0000	0.0000
		(0.0001)	(0.0000)	(0.0000)
Size>100		0.0008***	0.0001***	0.0001***
		(0.0001)	(0.0000)	(0.0000)
TFP		0.0005***	-0.0000	0.0000
		(0.0001)	(0.0000)	(0.000)
Products			0.0001***	0.0001***
			(0.0000)	(0.0000)
Presen			0.0061***	
			(0.0002)	
Spill_R			0.0006***	0.0001***
			(0.0000)	(0.0000)
Spill_I			0.0002***	0.0001***
			(0.0000)	(0.0000)
# observations	2,805,865	2,805,865	2,805,860	2,805,860
Pseudo R^2	0,0619	0,0620	0.3054	0.3740

Note: ***, ** and * indicate significant at 1%, 5% and 10%, respectively. Marginal effects are reported with standard errors in parentheses.

The last column (iv) in Table 4 shows the results of the Probit regression when country fixed effects are considered. As can be seen, GDP, distance, firm size, total number of exported products and the geographical and industrial spillovers have the expected sign and all of them

are significant. However, the effects for each variable are smaller than obtained in the other columns. In this case, the likelihood of entry in a new destination when firm was previously exporting to that specific region increases in 0.01%. This effect is more reduced if we compare the obtained results without country fixed effects, where probability of entry increases in 0.07%.

The previous estimations do not take into account panel characteristics of the dataset. In fact, there are two bi-dimensional features of firms's decisions that are potentially interesting: firms *x* years (for every country) and firms *x* country (for every year). Given the objective of this paper, which emphasizes differences in decisions across countries adopted by each firm, the second of them is definitively the most relevant. If we concentrate our attention in a specific year, we can take advantage of multiple decisions taken by each firm to control for fixed-firm effects, that is, firm characteristics that are independent of the specific entry decision adopted by each firm in each market. This is the case for *Size* or other firm-level variables, but not for *Spill_R* or any other variable that also has a country dimension.

A well-known technique to estimate panel data in a logistic specification with fixed effects was proposed by Chamberlain (1980). It conditions the observed events (entry or no entry in a specific country) on a sufficient statistic which cancels out the fixed elements in the conditioned likelihood function. This purpose is achieved by conditioning the observed pattern of entry decisions for a given firm in a set of M_i countries ($e_{i,c=1}, e_{i,c=2}, ..., e_{i,c=M_i}$) to the sum of its dependent variables, this is, the amount of 'ones' for the M_i different decisions faced by the firm ($\sum_{c \in M_i} e_{ic}$).The inclusion of firms that decide not to enter in any market or to enter in all countries (an event not observed ever) is irrelevant for the ML estimator. Therefore, the conditional logit excludes those firms from the sample to work with, without any other consequence. Additionally, to test the adequacy of the conditional logit against the pooled probit estimation we implement a Hausman test. The pooled probit will be consistent and efficient under the null hypothesis even with the presence of observable or unobservable fixed firm effects, but inefficient under the alternative. The conditional logit, being consistent under both hypotheses, will be inefficient under the null. For this test, the conditional logit was compared with the pooled probit estimation of the same specification. In particular, we compare the results of the column (iii) in Table 4 (total effects) and the estimations presented in Table 5.

Table 5 shows the results of the fixed effect logistic regression for the set of decisions that correspond to all years of the sample. As can be seen, estimators related with GDP, distance and the geographical and industrial spillovers have the expected effect and all of them are significant with predicted signs. The result of the Hausman test suggests that conditional logit is an adequate specification to deal with (observable and unobservable) firm-fixed effects.

Table 5: Entry decision: Conditional logit regression

GDP	0.2674*** (0.0036)
Dist_ave	-1.1527*** (0.0069)
Presen	1.6567*** (0.0158)
Spill_R	0.5211*** (0.0142)
Spill_I	0.3669*** (0.0071)
# observations	2,420,543
Pseudo R^2	0.3231
Hausman test Conditional Logit vs Pooled probit	21,838 [5] (p-value=0.00)

Note: ***, ** and * indicate significant at 1%, 5% and 10%, respectively. Standard errors in parentheses, and degrees of freedom between square brackets.

5. Conclusions

An emerging literature addresses sequential entry as a mechanism to reduce sunk cost that firms face when they decide to enter in foreign markets. In this context, this paper analyzes entry decisions in new foreign markets taken by Spanish exporters in the period 2000-2010. Its main objective is to address those effects related to previous presence in other markets in the same region (*geographical spillovers*) and, also, those related to export activity in each market taken by other firms in the industry (*industrial spillovers*). The effect of these variables is evaluated controlling for the influence of previous presence of a firm in a specific foreign market, which facilitates re-entry. By implementing a gravity equation framework, other variables concerning firm and country characteristics are also considered.

The descriptive analysis does not only confirm some basic features of export activity for Spanish exporters, such as a more frequent exporting presence in closer countries or the reduced number of exported products and destinations, but also the influence of diversification in foreign markets and firm size to explain the amount of entries.

This paper focuses in explaining individual entry decisions: i.e, entry decisions taken by each firm for each market in each specific year. Accordingly, exit decisions are not introduced in the empirical analysis. It can be argued that a different explanatory model underlies exit decisions. Additionally, in our empirical specification each firm takes a complete set of decisions with respect to all countries where it was not exporting in the previous year. That empirical framework would not be suitable for exits, where the set of decisions would be confined to the specific set of countries where it was previously exporting.

The results point out that distance and risk of export credits have a negative effect on entry decisions. By the opposite, economic size of new markets, firm size and total number of exported products by the firm affect positively entry decisions. The results also indicate a positive influence of previous presence in a specific market on re-entry probability. As expected, this effect is large, suggesting that preceding experience in a country reduces significantly sunk re-entry costs. Once those variables are controlled for, the results point out the relevance of information spillovers both in relationship with previous export activity in the same region and with respect to experience of other firms in the same industry. In particular, the former shows that firms use a sequential exporting strategy, where entry in a country is profitable used to enlarge the range of countries in the same geographical area. This conclusion suggests that export promotion policies focused on entry in a specific country in a new region (e.g., Singapore) would have benefits that spill the country borders, insofar it would be facilitating additional entries in the neighboring countries (East Asia).

Appendix: Descriptive and variable construction

Table A1: Most frequent export markets (% of firms)

	2000	2005	2010
Portugal	35.7	35.8	46.2
France	35.5	36.3	45.4
Italy	25.9	28.2	36.2
Germany	26.9	27.7	35.1
UK	25.1	25.6	30.4
Andorra	20.7	25.7	28.9
USA	23.5	24.9	28.2
Belgium	20.6	21.1	26.7
Netherlands	18.9	20.4	25.7
Morocco	14.2	16.3	23.6
Switzerland	15.5	19.2	23.3
Mexico	15.0	18.0	21.2
Poland	10.0	11.9	19.7
Greece	13.3	15.3	18.6
China	4.6	10.1	16.1

Geographical spillover

Firm *i* decides to export (1) or not (0) to country *c* at time *t*, conditional to not exporting at *t-1* (e_{ict} /e_{ict-1} = 0). That country *c* belongs to a region R_c according to the classification showed in Table A2. Then, the geographical spillover for firm *i* in country *c* at time *t* considers whether or not the firm was exporting to other country in the same region R_c at time *t-1*. Due to the sample is conditional to entry in *c*, that country is not accounted in the set of countries in R_c at time *t-1*.

Industrial spillover

The database provides information on goods exported by each firm, classified in 98 groups of products according to the Combined Nomenclature. That information corresponds to firm's exports as a whole, and it is not crossed for each export destination. Therefore, we assume that each firm exports the same bunch of products to all export destinations. The industrial spillover for a firm *i* exporting to country *c* at time *t* computes the number of firms that were exporting similar products to the country *c* at time *t-1*. Therefore, the procedure is as follows. Firstly, for each firm *i* that belongs to the subsample of firms exporting to a country *c* at time *t*, we calculate the number of firms in that subsample that export any of the products exported by the firm at time *t-1* (column b). Secondly, the industrial spillover is computed as the difference between that number and the total number of goods produced by the firm (column a). Next table shows an example for five firms, in a specific country and year.

	Products				# of firms in each product							
Firms in country c at time t	P1	P2	P3	Total # of products (a)	ds1	ds2	ds3	ds4	ds5	ds6	Total # of firms (b)	*Spill_I* (b-a)
1	2	3	5	3	0	2	2	0	3	0	7	4
2	3	5	6	3	0	0	2	0	3	1	6	3
3	1	2	.	2	1	2	0	0	0	0	3	1
4	4	.	.	1	0	0	0	2	0	0	2	1
5	4	5	.	2	0	0	0	2	3	0	5	3

When the firm is not exporting to country *c*, the industrial spillover is defined as b (not as b-a) and it captures the number of firms exporting at least one of the products to the same country/year.

Table A2: Country classification by geographical areas

Country	Region	Country	Region
Afghanistan	Middle East	Latvia	Europe
Albania	Other European countries	Lebanon	Middle East
Algeria	Africa	Lesotho	Africa
Angola	Africa	Liberia	Africa
Antigua and Barbuda	Central America	Libya	Africa
Argentina	South America	Lithuania	Europe
Armenia	Middle East	Luxembourg	Europe
Australia	Oceania	Madagascar	Africa
Austria	Europe	Malawi	Africa
Azerbaijan	Middle East	Malaysia	Far East
Bahamas	Central America	Maldives	Far East
Bahrain	Middle East	Mali	Africa
Bangladesh	Far East	Malta	Europe
Barbados	Central America	Mauritania	Africa
Belarus	Other European countries	Mauritius	Africa
Belgium	Europe	Mexico	North America
Belize	Central America	Moldova	Other European countries
Benin	Africa	Mongolia	Far East
Bhutan	Far East	Montenegro	Other European countries
Bolivia	South America	Morocco	Africa
Bosnia and Herzegovina	Other European countries	Mozambique	Africa
Botswana	Africa	Myanmar	Far East
Brazil	South America	Namibia	Africa
Brunei Darussalam	Far East	Nepal	Far East
Bulgaria	Europe	Netherlands	Europe
Burkina Faso	Africa	New Zealand	Oceania
Burundi	Africa	Nicaragua	Central America
Cambodia	Far East	Niger	Africa
Cameroon	Africa	Nigeria	Africa
Canada	North America	Norway	Europe
Cape Verde	Africa	Oman	Middle East
Central African Republic	Africa	Pakistan	Middle East
Chad	Africa	Panama	Central America
Chile	South America	Papua New Guinea	Far East
China	Far East	Paraguay	South America
Colombia	South America	Peru	South America
Comoros	Africa	Philippines	Far East
Congo, Dem Rep.	Africa	Poland	Europe
Congo, Rep.	Africa	Portugal	Europe
Costa Rica	Central America	Qatar	Middle East
Côte d'Ivoire	Africa	Romania	Europe
Croatia	Other European countries	Russia Federation	Other European countries
Cyprus	Other European countries	Rwanda	Africa
Czech Republic	Europe	Samoa	Oceania
Denmark	Europe	São Tomé and Príncipe	Africa
Djibouti	Africa	Saudi Arabia	Middle East

Dominica	Central America	Senegal	Africa
Dominican Republic	Central America	Serbia	Other European countries
Ecuador	South America	Seychelles	Africa
Egypt	Africa	Sierra Leone	Africa
El Salvador	Central America	Singapore	Far East
Equatorial Guinea	Africa	Slovak Republic	Europe
Eritrea	Africa	Slovenia	Europe
Estonia	Europe	Solomon Islands	Oceania
Ethiopia	Africa	South Africa	Africa
Fiji	Oceania	South Korea	Far East
Finland	Europe	Sri Lanka	Far East
Former Yugoslav Republic of Macedonia (FYROM)	Other European countries	St. Kitts-Nevis	Central America
France	Europe	St. Lucia	Central America
Gabon	Africa	St. Vincent and Grenadines	Central America
Gambia	Africa	Sudan	Africa
Georgia	Other European countries	Suriname	South America
Germany	Europe	Swaziland	Africa
Ghana	Africa	Sweden	Europe
Greece	Europe	Switzerland	Europe
Grenada	Central America	Syria	Middle East
Guatemala	Central America	Taiwan	Far East
Guinea	Africa	Tajikistan	Middle East
Guinea-Bissau	Africa	Tanzania	Africa
Guyana	South America	Thailand	Far East
Haiti	Central America	Timor-Leste	Fast East
Honduras	Central America	Togo	Africa
Hong Kong, China	Far East	Tonga	Oceania
Hungary	Europe	Trinidad and Tobago	Central America
Iceland	Europe	Tunisia	Africa
India	Far East	Turkey	Other European countries
Indonesia	Far East	Turkmenistan	Middle East
Iran	Middle East	Uganda	Africa
Iraq	Middle East	Ukraine	Other European countries
Ireland	Europe	United Arab Emirates	Middle East
Israel	Middle East	United Kingdom	Europe
Italy	Europe	United States	North America
Jamaica	Central America	Uruguay	South America
Japan	Far East	Uzbekistan	Middle East
Jordan	Middle East	Vanuatu	Oceania
Kazakhstan	Middle East	Venezuela	South America
Kenya	Africa	Vietnam	Far East
Kiribati	Oceania	Yemen	Middle East
Kuwait	Middle East	Zambia	Africa
Kyrgyz Republic	Middle East	Zimbabwe	Africa
Laos	Far East		

Table A3: Descriptive statistics of the explanatory variables

Variable	Name	Mean	Std. Deviation	Min	Max
GDP (Billions $, in PPP)	*PIB*	0.2743	1.02	0.0001	13.14
Distance (km.)	*Dist*	6,158.71	3,823.6	502.7	19,839.6
Country Risk	*Risk*	4.71	2.50	0	7
Number of employees	*Size*	89.49	379.48	1	14,470
Total Factor Productivity (in log)	*TFP*	3.71	0.48	-2.52	6.51
Previous presence in the country	*Presen*	0.20	0.14	0	1
Regional spillover	*Spill_R*	0.31	0.47	0	1
Industrial spillover	*Spill_I*	0.21	0.44	0	14,477

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