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Apprentices enjoys greater information spillovers when learning to export from peers ^{*}

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Abstract

This paper helps to understand how firms learn from their peers when enter new markets. The results point the existence of information spillovers steaming from close companies: in the same region, sector or export markets'. In fact, exporters learn from very close firms; sectoral peers in their region. There seem to be also a competition effect that hinder spillovers; this comes from companies that without providing new information share the forieng demand. Knowledge externalities seem to be stronger in incoming companies what increase the relevance of these effects for export extensive margin growth.

JEL: F1, F2, R12, F14

Keywords: Exports, firm-level data, local spillovers, region, sector.

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1 Introduction

When companies start selling abroad or expand their portfolio of countries grab information from the experiences of other companies in their business environment. Usually useful knowledge comes from already exporting neighbors but also from peers in the sector. In a context with scarce resources and increasing costs in the distance (physical or sectorial) that separates the experienced exporter and the receiver of the externality of knowledge companies will seek information flows coming from companies closest to them, that is from exporters in the specific region and sector of the incoming company ¹.

On the basis of this information, the company will decide its entry strategy to new markets. In this sense, information spillovers are important for extensive margin. Local and product knowledge externalities about the potential market are insignificant for intensive margin, when companies have first hand information about the foreign market, in this case demand evolution drives export intensity.

The learning process might differ also between experienced companies on international markets and new exporters. The former group, have information about how their companies performed in previous markets, might have developed specific internal process of learning about external markets and have accumulated information on export process. For latter group, the entry decision is a first experience and don't have accumulated information. This latter group will more probably rely on spillovers more than the companies with more sophisticated information process in the first group. What's more experienced companies with more sophisticated decision process might have lower entry sunk cost than new entrants.

In this paper, we analyze information spillovers steaming from similar companies in a regional-sectorial basis. The specific aim of this document is to disentangle if, independently of experience, all companies benefit from knowledge spillovers in their process of approaching new unknown markets. Knowledge externalities are analyzed from an extensive margin point of view. Extensive margin, [Bernard et al. \(2009\)](#), represents 50% of international trade growth in a 10 years period, [de Lucio et al. \(2011\)](#), being net entry (new exporting companies) more relevant than portfolio diversification. Companies' first steps on international trade are fundamental for country wide export growth. The methodology allow us to show that information externalities steaming from peer companies exist and are particularly relevant for new exporters.

The paper contributes to the literature on spillovers in two dimensions. First, it relates

¹The last sentence of [Fernandes and Tang \(2014\)](#) paper states: "Another natural extension of our research is to explore learning not only about demand in different countries, but also about demand for different products" This paper follows this suggestion focusing simultaneously in both; the regional, sectorial (and country portfolio) dimensions of the learning process. We also analyze and present results for both dimension independently.

to spillovers on international trade literature. The paper of [Fernandes and Tang \(2014\)](#) presents a positive spillovers from export activities; they conclude that international sales in the neighborhood reveal information to entrants about foreign market demand and thus enhance new exporter relationships performance: Entry probability and initial sales are higher in areas with higher export activities concentration.² [Timoshenko \(2015\)](#) focus on the learning process that drives company decisions on adding countries and products for new firms and for existing exporters. She shows that new exporters learn about their product appeal differently than older exporters because they have less information about international demand. We combine these ideas and identify learning differences across firms related to international experience.

Second, the paper relates to the empirical literature of geographical concentration of knowledge spillovers illustrated in the seminal paper of [Glaeser et al. \(1992\)](#)³; this strand of literature find that regional and sectoral knowledge spillover might have firm positive growth effects. The debate still continues, see the meta study of [Beaudry and Schiffauerova \(2009\)](#). We consider that our approximations make a contribution showing the existence of information spillovers for internationalization at regional/sectoral concentration level and negative effects of competition. Again this literatures

The analysis also relates to the export dynamics research branch literature; more specifically results support the “learning to export” hypothesis. [Freund and Pierola \(2015\)](#) states that firms, facing uncertainty in foreign markets, decide to take low risk (small sales) and in case of success increase quickly its export value, as we show in section 4 this is more clear cut among new firms. This literature stress the role of country specific fixed and sunk export costs or profit uncertainty and exhibits informational externalities ([Albornoz et al. \(2012\)](#) or [Melitz \(2003\)](#) and [Bernard et al. \(2007\)](#) and [Chaney \(2008\)](#)). Finally, it also relates to survival literature and trade duration literature, [Besedeš and Prusa \(2006a\)](#), [Besedeš and Prusa \(2006b\)](#). Our results point ...

Findings qualify previous results. First companies learn more specifically from very similar companies (exporting firms in the same sector and region); sectoral dimension of the learning process is as important as regional one. Second learning spillovers from companies with experience in previous export destinies is relevant for entry decission, initial sales and growth. Third there exists a competition effect. Finally, spillovers affect different companies in different manners according with their stage in the internationalization process and their access to useful information about potential markets.

From an economic policy perspective, the presence of positive external effects of exporting activities is one of the more prominent arguments to justify internationalization

²[Kamal and Sundaram \(2016\)](#) find that the presence of neighboring exporters increase the likelihood of matching with the same importer of the neighboring exporters for the first time exporter. [Requena and Castillo \(2007\)](#) focus on industry province spillover on international trade.

³For the Spanish case see [de Lucio et al. \(2002\)](#)

promotion policies. Additionally, the paper shows that it is possible to identify some strategic lines for business internationalization, especially in relation to the promotion and efficient furtherance of information externalities. Ultimately the presence and outward expansion of companies is key to understanding the competitiveness of an economy, [Fernandes and Tang \(2014\)](#). Knowledge of the microeconomic foundations of the internationalization of the economy and the learning process of firms in its internationalization process allows a better selection of markets and a more adequate design of internationalization policies. Fostering knowledge spillover for internationalization is more interesting for companies with no previous experience selling abroad.

The paper is organized as follows. Next section explain the model. The data used is presented in section 3. Section 4 carries out the empirical analyses; this section, presents the core results of the document. Section 5 recapitulates and provides some policy recommendations.

2 Theoretical insights

Following [Fernandes and Tang \(2014\)](#) and [Melitz \(2003\)](#) we consider a monopolistic competition framework with constant elasticity of substitution, σ , between the different product varieties. Each firm i faces its own demand, D , and exhibits productivity level, ρ , draw from a distribution function, $G(\rho)$. The company i gross profit when sells to the market m is:

$$\pi^0(D_{im}, \rho) = D_{im}\rho^{\sigma-1} \quad (1)$$

Each company is aware of its own productivity before entering a new foreign market, although it does not know the potential profit linked to the export due to the randomness of the firm specific demand that the company faces in the new market. In particular, the demand, $\ln(D_{im})$, can be broken down into three components:

$$\ln(D_{im}) = \frac{k}{n_m} + d_m + z_{im}, \text{ where } \sigma > 1 \quad (2)$$

Where $\frac{k}{n_m}$ is a constant, k divided by the number of companies n shipping to the market m ; this is the main different with [Fernandes and Tang \(2014\)](#) model. By dividing the constant by the number of companies we represent the residual demand that a firm faces in monopolistic competitive framework. The greater the number of companies serving a market the lower demand the company faces.

Equation 2 has a specific market component, the same for all firms, $d_m = P_m^\sigma Y_m$; P_m and Y_m are the price index and the total market expenditure, respectively; and z_{im} is

the firm specific product appeal in the market, this parameter is unknown for the firm before start to export and known afterwards. For simplicity, it is assumed that $\ln(D_{im})$ components do not vary over time.

Company does not know d_m and z_{im} , this uncertainty disappears once it exports to the market. The preliminary judgment for both cases is normally distributed according to: $d_m \sim N(\bar{d}_m, v_{d_{im}})$ and $z_{im} \sim N(0, v_{z_{im}})$ respectively. Productivity and product appeal are independently distributed. An heterogeneous performance of exporters in market m relates with higher $v_{z_{im}}$ and implies more uncertainty about the target market. Firms with less prior knowledge about market demand will have higher $v_{d_{im}}$, less experienced companies are supposed to have less prior knowledge than experienced ones. The learning implications of this higher uncertainty, higher rely on spillovers for less experienced companies will be check in the empirical section.

In this context expected demand, depends on number of competitors in the market, median market-specific component $\bar{d}_m$ and variance of product appeal across firms, $v_{z_{im}}$, and follows:

$$E(D_{im}) = e^{\left[\frac{k}{n_m} + \bar{d}_m + \frac{(v_{z_{im}} + v_{d_{im}})}{2} \right]} \quad (3)$$

Firms will export if expected profit is higher than the sunk cost for entering the market K_m^e , this condition determines the minimum productivity level, $\underline{\rho}^{(\sigma-1)}$, for entering the market:

$$\underline{\rho}^{(\sigma-1)} = \frac{K_m^e}{e^{\frac{k}{n_m}} e^{\left[\bar{d}_m + \frac{(v_{z_{im}} + v_{d_{im}})}{2} \right]}} \quad (4)$$

The quantity that a firm chooses when exporting is expected revenue, $\sigma E[D_{im}] \rho^{\sigma-1}$ divided by its price, $p(\rho)$; that is a constant mark-up, $\frac{\sigma}{\sigma-1}$, over marginal cost, $\frac{c}{\rho}$.

$$x_{imt} = \frac{\sigma E[D_{im}] \rho^{\sigma-1}}{\frac{\sigma}{\sigma-1} \frac{c}{\rho}} \quad (5)$$

Learning process

Firms learn from very close neighbors, cn , that export in $t-1$, cn_{t-1} , and infers the demand level according the average export revenue of the companies exporting to an specific market and the productivity distribution. $\bar{d}_{m,t-1}^{nb}$ is the demand level of the market that the firm infers.

The learning process described in [Fernandes and Tang \(2014\)](#) and [DeGroot \(2004\)](#) shows that companies infers market demand from competitors and revise its prior, $\bar{d}_m$ is

the mean of the market specific component, being $\bar{d}_{m,t}^{post}$ the mean of the new estimated demand

$$\bar{d}_{m,t}^{post} = E[d_{zm,t}] = \delta_t \bar{d}_{m,t-1}^{nb} + (1 - \delta_t) \bar{d}_m \quad (6)$$

$0 \leq \delta_t \leq 1$ the belief actualization parameter. When $\delta_t = 1$ firm update completely its prior on its peers' signal, $\bar{d}_{m,t-1}^{nb}$, when $\delta_t = 0$ firm do not update at all their prior demand, there are not learning process.

With this framework $\delta_t = \frac{v_{d_{im}}^{cnm,t-1}}{v_{z_{im}} + v_{d_{im}}^{cnm,t-1}}$. The weight the firm puts on the demand inferred from peers is increasing in the number of close peers and the variance on the market demand the firm has and decreasing in the variance of the firm product appeal.

The variance of the estimated market demand, d_{zm} is actualized according $v_{d_{zm,t}} = \frac{v_{z_{im},t-1} v_{d_{im}}}{v_{z_{im}} + v_{d_{im}}^{cnm,t-1}}$ increasing in previous product appeal and decreasing in the number of close peers and market demand variance. An increase in the number of close firms exporting reduces variance what produce an increase in the weight that entrants put on the signal from peers.

REPASAR A lower market demand variance increase An recution in the variance of product appeal variance of estimated market demand.

All in one an increase in the number of close firms exporting produce an increase in the actualization parameter and in the weight the firm in the signal. Better knowledge about foreign markets, a decrease in the variance of expected demand, reduces the size of the actualization parameter, the signal is less relevant, this will be the hypothesis to be tested in the empirical section. Finally, higher product appeal variance implies lower weight on the signal. When sector and regions differ, product appeal would be more different across firms, this is an additional reason to think that firms from the same region and sector have more similar product appeal and consequently higher actualization parameter. Empirical section will rely in this idea although we test different options. Increasing similarity of products (same region and sector) will make spillovers more evident.

Consequently a firm will more probably enter in new foreign market when the expected demand increase in relation to its prior, lowering the productivity threshold below its actual productivity level. In this context entry will more probably occurs when the actualization parameter is higher: more close firms exporting, less knowledge about international markets and more similar are product appeals across firms. Firms will enter in a new market when the signal is more positive, less dispersed and has less uncertainty about the potential demand in the market. In the empirical section we contrast that experienced exporter, with more information about international markets that reduce the market demand variance, will rely less on spillovers.

Initial sales, see equation 5, depends also on expected demand and behaves similar to entry; initial sales are higher with the strength of the signal, in general with the number of companies revealing the signal and the interaction of both (the signal correspond to more firms). ⁴

We can obtain also additional information about initial sales and the relative performance of experienced companies versus new in international markets companies. The lower v_{dim} is, the lower δ and $\bar{d}_{m,t}^{post}$ are; firms with more experience will have lower initial sales. Lower entry cost (fixed and variables) for experienced companies help to explain this behavior. ⁵

Finally initial sales will be lower the higher the number of competitors is. This will be checked in the empirical section through control variables.

Firm will continue exporting to the new market as far as the operating profit is higher than exporting cost, K_m .

$$Pr[\pi^t(D_{im}, p) > K_m] = Pr[D_{im}\rho^{\sigma-1} > K_m] = Pr[e^{(d_m^* + z_{im})} D_{im}\rho^{\sigma-1} > K_m] \quad (7)$$

Survival positively correlates with lower per-period fixed cost and higher true demand and productivity. Once the company knows true demand don't have need to infer demand in the market and the spillover disappeared. However when a positive shock is observed, entry increase, low productivity entrants will exit afterwards, and controls will be needed in the empirical section.

Once the firm enter the market knows the true demand and its growth will be determined by the difference between observed demand and ex-ante estimation.

$$\triangle x_{im} = \ln \frac{x_{mt+1}}{x_{mt}} \quad (8)$$

⁴Fernandes and Tang (2014) points that the net effect on initial sales of the number of exporters will depend on the relative strength of two effects. The first effect is how the number of exporters affects posterior demand

$$\frac{\partial d}{\partial n} = \delta_t = \frac{v_{dim} cn_{m,t-1}}{v_{zim} + v_{dim} cn_{m,t-1}}$$

The second one is how the number of firms affect the variance of the signal

$$\frac{\partial C}{\partial n} = v_{dim,t} = \frac{-v_{zim,t-1} v_{dim}^2}{(v_{zim} + v_{dim} cn_{m,t-1})^2}$$

The sum of both effects is always positive

$$\frac{v_{dim} cn_{m,t-1}}{v_{zim} + v_{dim} cn_{m,t-1}} - \frac{v_{zim,t-1} v_{dim}^2}{(v_{zim} + v_{dim} cn_{m,t-1})^2} > 0$$

$$(v_{dim} cn_{m,t-1}) * (v_{zim} + v_{dim} cn_{m,t-1}) - (v_{zim,t-1} v_{dim}^2) > 0$$

$$(cn_{m,t-1} v_{zim} + v_{dim} cn_{m,t-1}^2) - (v_{zim,t-1} v_{dim}) > 0$$

$$(cn_{m,t-1} v_{zim} + v_{dim} cn_{m,t-1}^2) > (v_{zim,t-1} v_{dim})$$

$(cn_{m,t-1})/(v_{dim}) + (cn_{m,t-1}^2)/(v_{zim,t-1}) > 1$ In general the effect will be positive when product appeal is less disperse and companies have experience, low market variance

⁵The net effect on initial sales for v_{zim} is ambiguous.

So the growth rate will depend negatively on previous expected demand level in t .

We propose a model that focus on differences across firm on their prior knowledge about the potential market, which reduces market demand variance. This modelization is built on [Fernandes and Tang \(2014\)](#) that shows how more information about the potential market previous to entry derives in more precise estimation of potential demand, a lower mistake rate, higher entry probability, higher initial volume of exports, leaving less room for growth. This effects will be lower in experienced companies.

We also shows that competition from non-core firm reduce demand all the things equal. With a lower estimated demand the entry probability and the initial sales will be lower while growth .

Additional to what [Fernandes and Tang \(2014\)](#) analyses:

1. Firms will more probably enter in a foreign market, when more companies reveal a positive signal about the demand in the potential market, and more with the interaction of this two variables
2. Initial exports to a new market will be higher with the strength of the signal when entry decision is taken, growth will be lower and survival is not affected.

But also, the previous model implies:

3. Experienced companies will rely less on information spillovers.
4. Spillovers will be more evident the more similar are the companies, so they will be clearer at the regional and sectoral dimension than at both scopes independently.
5. Competition effect will be playing a negative role for growth and survival

The model doesn't incorporate strategic or dynamic considerations

3 Data preliminaries

Data set comes from the Customs Database, collected by the Customs and Excise Department of the Spanish Tax Agency, which covers the universe of export transactions in Spain. For each transaction, we know a firm's univocal identification code given by Customs, the product at the 2-digit level Combined Nomenclature (CN) classification⁶, the destination⁷ of the export transaction, the free-on-board (FOB) value in euros of

⁶2 digits provide enough detailed classification and avoid information transfers between sectors that might be produced with more detailed classification. We exclude chapter 99

⁷A great number of export destinies are almost insignificant and are not considered by entrant firms, we keep destinies that represent 99% of export volume, that is 90 countries

the transaction, and its regional origin at the NUTS 3 classification (provinces)⁸. Our database covers the period 2000-2015⁹. Spain is divided into 50 provinces (Eurostat’s NUTS III classification), which are shown in Map 1 that presents the percentage of new relations across provinces. New relations vary from a minimum of 34% of relations to a maximum of 78% in Santa Cruz de Tenerife (Canary Islands) of total relations, only three provinces are over 60%. As it is shown in Map 2, about 15% of transactions are new stable relations¹⁰. The province with more percentage of new stable relations is A Coruna. This area is not especial in any sense from an export point of view. The distribution across provinces don’t have any specific pattern, related to traditional international trade variables like export size, coastal or border region. Across provinces, we observe significant variation of new relations and on its stability.

When it is compared map 2 with map 1 we observe that there is not a clear cut correlation. Although A Coruna have the highest share of new stable relations it also has a lower than average new relations share, meanwhile Basque country provinces have both a lower than average percentage of new relations and a lower than average new stable transactions.

The correlation between the percentage of old relations in one year and the percentage of new export transactions that become consolidated is very high and positive (0,97). The higher the share of old relations in one year the lower the share of new relations that are occasional. The greater the number of companies with consolidated relationships, the greater the likelihood that a new relationship will be consolidated and the lower the probability of occasional relations.

Table 1 provides some descriptive statistics on Spanish provinces’ for the period 1997-2015. Column 2 presents total number of relations (firm*province*product*country). Next column calculates the share of new relations, for Spain it is 42.3%, and the following the share of stable relations, those that continue during year $t + 1$ after entry, among new ones 36% (15.2/42.3) of new relations remain active one year later. Finally, columns 5 and 6 in table 1 are calculated over the total of Spain, present exports values shares over total exports¹¹ and shares for new relations. 46% of Spanish exports are located in Barcelona and Madrid, these regions also concentrate almost half of the total transactions, a similar figure is observed in what concern to the percentage of total relationships. The next

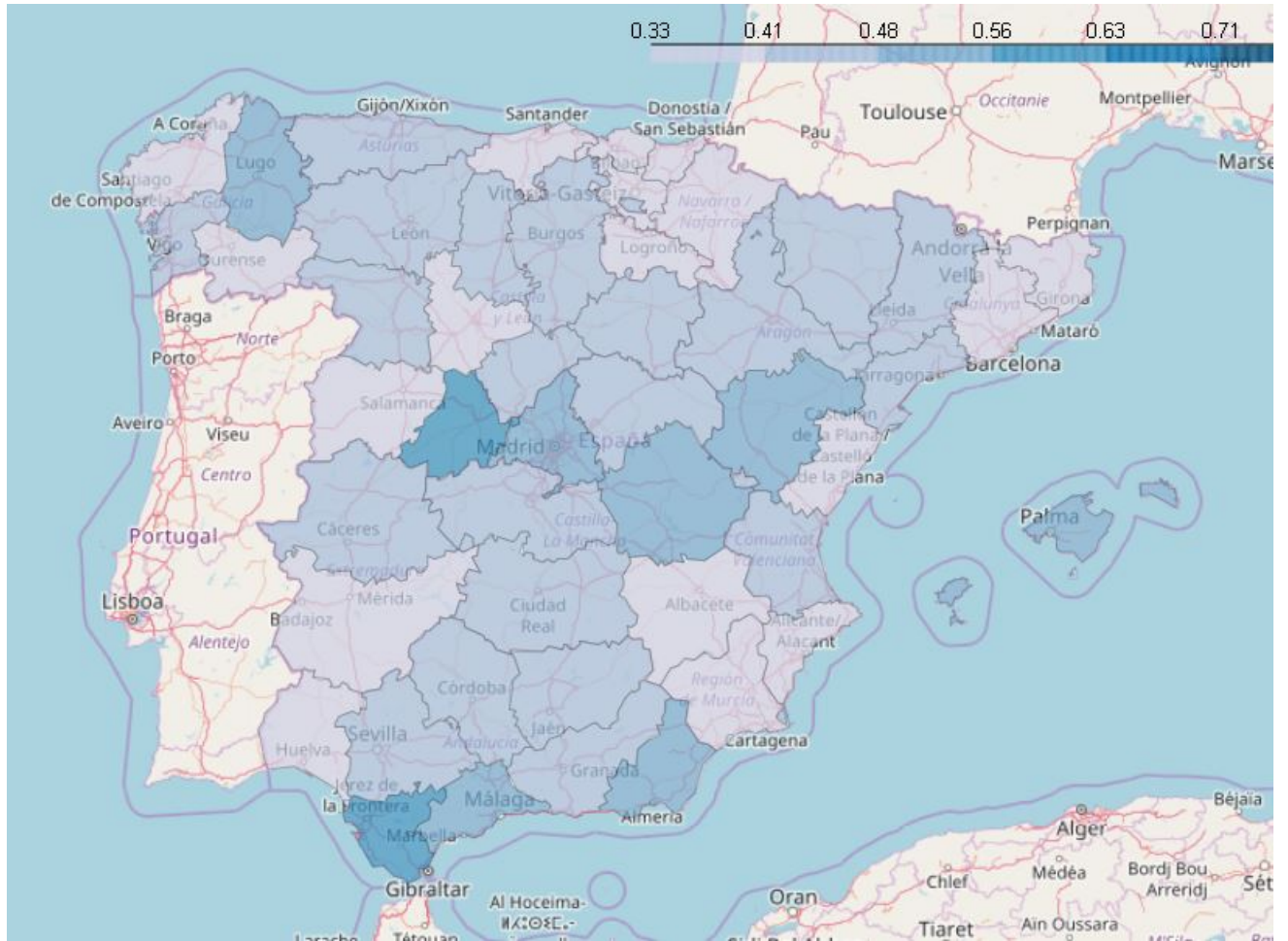
⁸Note that a firm has a unique origin, that is its unique fiscal province. Although a firm might export more than one product we decided to keep the main product. This strategy has a important advantage without losing relevant information; this strategy maintains the dataset across estimations and makes comparisons easier.

⁹We use 2003, 2006, 2009 and 2012 because computational restrictions, robustness checks have been made with different periods

¹⁰Due to their special geographic features, for the empirical analyses, we do not include the two autonomous cities located in Africa (Ceuta and Melilla), note that we keep the island regions (Balearic Islands and Canary Islands).

¹¹The shares are calculated over the total exports of the period.

Figure 1: Percentage of total relations that are new, 2003-2014



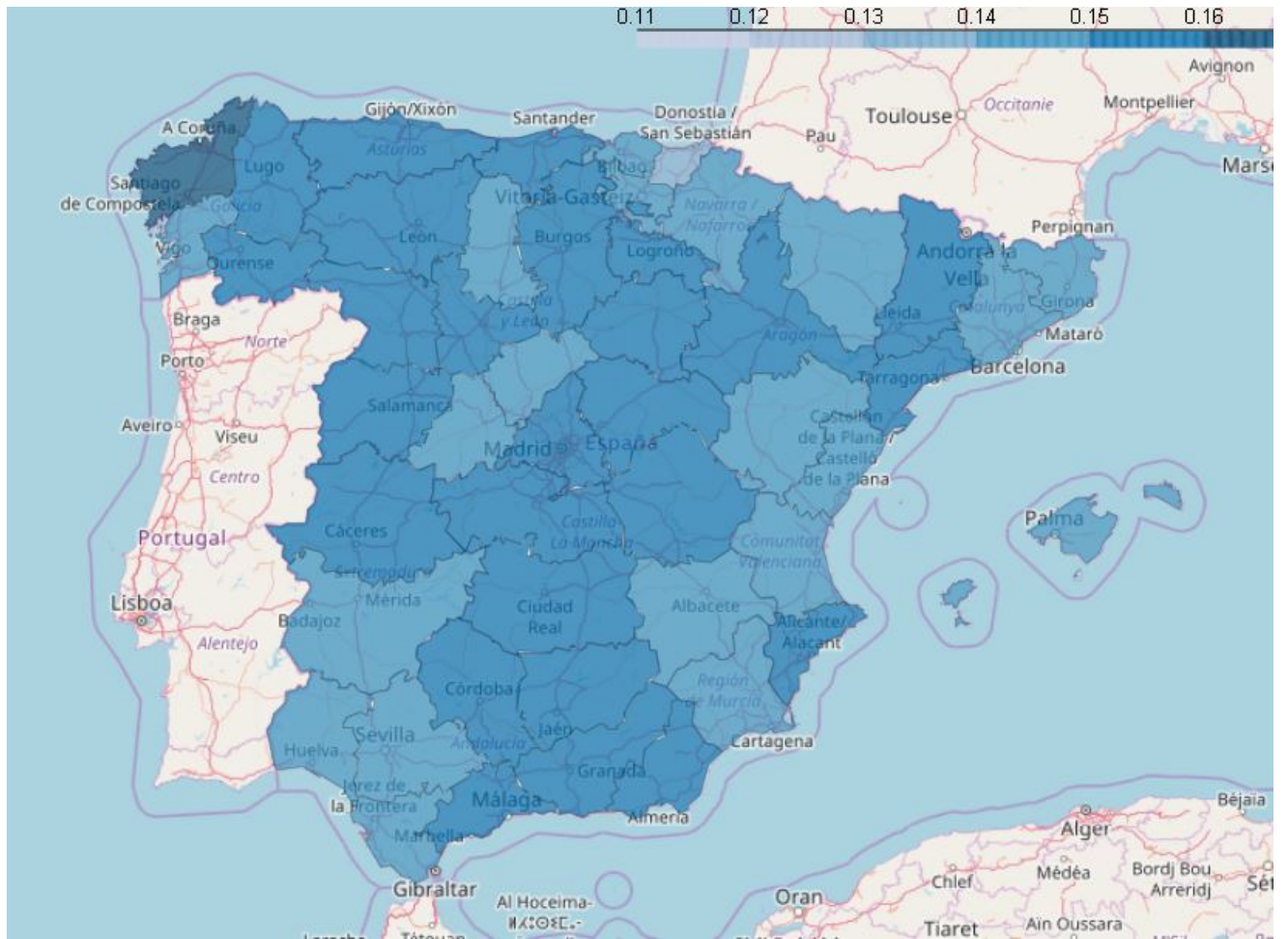
Source: Own elaboration using the Customs database.

provinces in the ranking are Valencia, 5.8%, Pontevedra, 3.6% and Zaragoza, 3.5%. It is interesting to observe that Madrid's share of total exports is much higher than that for relations. Average transaction value is higher in Madrid than in other regions although it also has higher share of new transactions with a slightly low survival probability, only 33% of new relations survive.

3.1 New exporting firms vs old firms in new markets

Extensive margin is as important for export growth in the long run as intensive margin, see [de Lucio et al. \(2011\)](#). Extensive margin might be split into two different submarkets. First we have pure extensive, that is those firms that sell for the first time on international markets, also called new exporting firms; and second, we have those other firms that having exported decided to start selling to a new market. The second group, have international experience and probably additional sources of information about the

Figure 2: Percentage of new stable relations, 2003-2014



Source: Own elaboration using the Customs database.

Table 1: Descriptive, provinces with more export relationships

Prov.	Total	New	New Stable	Exports Sh.	Relat. Sh.
Barcelona	1 952 830	40.4	15.1	22.0%	30.4%
Madrid	896 457	48.7	16.0	24.0%	14.0%
Valencia	471 233	42.5	14.7	5.8%	7.3%
Pontevedra	113 294	41.7	15.2	3.6%	1.8%
Zaragoza	144 566	40.8	15.5	3.6%	2.3%
Total	6 413 901	42.3	15.2	100%	100%

Source: Authors' calculations based on the Customs' database.

distribution of market demand. We will go deep into this classification in the empirical section.

Table 2 provides information about the distribution of total relations according firm and transaction regularity. As mentioned above firms might be stable on international

markets and introduce new destinies in their portfolio. This new countries might be, at the same time, regular or occasional. Previously exporting companies represents 90% of each year total firm-sector-country tripla.

Table 2: Percentage of total relations by firms and transaction type

		Trade relation			
		Old stable	New stable	New occasional	Total
Firms	Existing	58	13	19	90
	New stable		2	2	4
	Occasional			5	5
	Disappearing			1	1
	Total	58	15	27	100

Source: Authors' calculations based on the Customs' database.

The incoming company to the international market might stop exporting next period, these companies represent 5% of transactions; these are occasional exporters, all trade relationships of these companies are sporadic. It might happen also that the company continue selling abroad but to a new market; the relation might disappear but the firm still sells to a new market, these are new stable firms with occasional relations. Finally, new internationalized companies might continue with the same transactions they started in period t during the next year, this is a new firm with new stable transaction. Table 2 shows that 9% of total transactions belongs to new firms, 4% to new firms that are stable, and 5% to occasional firms.

As indicated, 42% of total relationships are new; 15% will continue and 27% will disappear. Almost 60% of the commercial relations that star in year t will not be feasible in $t+1$. New relationships that remains active in year $t+1$ are 6 times more frequent among existing companies than among new companies¹²; this point out that existing companies might have better learning process from neighbors or different decision mechanisms.

New exporting firms by definition do not have any previous international experience so they are not able to learn from peers on external markets, their knowledge about foreign demand comes from local neighbors or from sectoral peers.

All firms have the possibility to learn from other companies experience. When deciding new destinies the sources of information are sectoral and regional peers¹³ but as explained previously the externalities are more intense and clear at the regional-sectoral basis, we focus mainly in this classification although appendix provide analysis at the regional and sectoral basis independently.

¹²New relationships that disappear in year $t+1$ are 2 or 3 times more frequent among existing companies than among new companies

¹³Exporting firms have an additional source of information; they might draw information from the companies they met on international markets and they obtain precious information from its previous experience de Lucio et al. (2018) analyze this point.

One of our objectives is to discriminate among information spillovers derived from a sectoral base and regional base but specific to the market and check that these spillovers are not derived from companies not exporting to the specific market. The spillover could be specific to the new market, coming from sectoral or local information or in contrast information exchange could be not specific to the market but general to the internationalization process. For instance, custom procedures, financial resources for international transactions or logistical aspects. In this case spillovers from exporter would exist independently of the region or sector of origin and export country. We want to check that this is not the case; in order to do that we use as control variables information coming from companies (from the region or the sector) not exporting to the analyzed country and check if this information helps to introduce a new export market; in this sense the information should be general to export process and not specific to the market. These variables also allow us to identify competition effects.

Finally, we have 1% of total transactions that belong to disappearing companies: not new but disappear in $t + 1$, see table 2.

Only stable relationships have the possibility to contribute in the long term to extensive margin. Table 2 shows that 73% of total relations are stable, defined as relations that remain in $t + 1$. 15% of the total number of relations are completely new, 13% are shipped by existing companies in previous period and 2% are created by new companies in foreign markets.

Among new stable companies the share of new stable relations is quite similar to the share of occasional ones, about one half. For existing companies is higher the share of perennial relationships. This might be explained by the fact that existing companies already cover their most profitable markets and therefore new markets are increasingly risky for these kind of companies. It might happen also that fixed cost of entry are lower for already exporting companies that consequently try more difficult markets.

4 Empirical analyses

In this section we present estimation results. First we focus on entry and regional+sectoral spillovers where spillovers are more specifically generated (see annex for sectoral and regional dimension) we incorporate control variables. In this section we address the main question of the paper; differences in the intensity of spillovers across firms. Then we move into initial sales, post entry growth and survival.

Following [Fernandes and Tang \(2014\)](#), the proxy for the signal inferred from similar companies is peers average export growth:

$$\Delta \ln(x_{cm,t}) = \frac{1}{n_{cm,t-1}} \sum_{i \in N_{cm,t-1}} [\ln(x_{icm,t}) - \ln(x_{icm,t-1})] \quad (9)$$

Where $N_{cm,t-1}$ is the set of peer exporting firms. cm stands for close neighbours exporting to a market: the number of peer companies already exporting from the region and sector to an specific market region in period $t-1$, $n_{cm,t-1}$. The growth signal is specific for regions-province, and destinies portfolio.

The standard equation to be estimated in the following subsections have three basis regressors: peers average export growth $\Delta \ln(x_{sm,t})$, number of companies exporting $\ln(n_{cm,t-1})$, and the interaction of both terms.

The source of spillovers, c in the neighbor companies in the region exporting the same product. We also control for the peers' growth rate in other markets $\Delta \ln(x_{s(-m),t})$, the number of companies exporting to other markets $\ln(n_{s(-m),t-1})$ and the interaction of these last two variables, $-m$ stands for the rest of the markets. We included a wide range of fixed effects, all estimations incorporate firm year fixed effects and the appropriate fixed effect according the model specification estimated. This set of fix effects are able to control for local, sectoral, firm, and destination specifics, like public policies or company strategies. Finally, we perform a set of robustness checks¹⁴ like gradual incorporations of variables, different years of analysis, all these information is available upon request.

Dependent variables will be:

- Entry in a new market: it will take value 1 for firm i if it start to export to market, m , in period t , it will be 0 for all potential markets that firm do not serve in period t . This variable is built for all potential destinies.
- Initial sales in the new market $\ln(x_{im,t})$
- Sales growth in the new market, $\Delta \ln(x_{im,t})$ This variable is built for stable transactions, those that remain active in $t + 1$
- Survival, that equals 1 when the new country is supplied by the company during the next two periods, 0 in other case. So the analysis is done for stable relations.

Note that observations for the initial period of the sample and the last two periods are dropped because they are needed to build other variables¹⁵.

¹⁴We do not control for region area, as in [Fernandes and Tang \(2014\)](#), basically because of two different reasons, first because regional areas are quite similar across Spanish provinces, see maps, secondly because activity generally concentrate in a single city so meeting difficulties originated by distance disappears in highly concentrated areas. Results remains quite similar so in the sake of clarity we preferred simplicity.

¹⁵For estimation we use 2003, 2006, 2009 and 2012

4.1 Entry in new markets

Entry variable will be equal to 1 when a firm starts to export to market d , and zero to all destination countries where the company does not sell. For each year we only consider companies that incorporate a new market in their portfolio. We estimate a linear probability model, we include fixed effect and cluster standard errors at the province-product-country-year level. We first estimate the basic model, then we incorporate control variables and finally we consider differences across firms.

Model in section 2 predicts that the probability of entering a new market increases when there is a strong signal about the demand in this market and more when the signal is reported by more exporters. In general we also expect a positive sign for the number of companies already exporting although it might be negative also, model does not provide clear cut prediction on this respect.

Table A4 reports estimations for specific origin-sector spillovers. Column (1) presents basic results, all coefficients are significant and positive, as predicted by the model and in line with the Fernandes and Tang (2014) research.

According to these results, the probability of entering a new market is increasing in the number of companies already exporting, the export growth signal and the interaction between these previous variables, as predicted by the model. Companies will more likely enter new markets where the growth signal is more positive and more companies reveal this signal. These results are quite robust across columns. Neighbors companies in the sector-province provide relevant information for entry decisions, as shown by Fernandes and Tang (2014). Not only regional information but sectoral one are relevant, in fact spillovers are specific when coming from very close peers, firms from the same sector that are exporting to a specific market from the same region.

The results are in general robust to the incorporation of control variables. Control variables (same variables calculated for exports to the rest of markets, all countries that are not the one the company enters) do not modify these results, as expected, column (2). The variable corresponding to the logarithm of the number of companies from other provinces or products that are exporting to the country has invariantly negative sign. That is the more companies exporting from the region or from the sector the lower the entry probability. In other words the greater the competition the lower the residual demand to be attended so less incentive to enter the market.

The rest of columns analyze differences across firms. In all the cases the base line, companies with less experience, coefficients maintain positive sign and significance. In general coefficients are higher than base model; that is companies with less experience enjoys higher spillovers, rely more on information coming from peers, in line with what was predicted in the model. Table ?? presents estimations for entry, columns (5) and (6),

including a dummy variable for existing companies interacting with variables of interest (number of companies, growth and interaction of both). We check for origin product country specifications (check annex for origin country and product country). In all cases the spillovers are less intense for already exporting companies. Putting it in a different way the spillover is more obvious among new companies that start exporting, and peer behaviors is an important source of information, maybe the unique source of information about destination markets, for new incumbents. ¹⁶

Table 3: Entry in a new export market

	(1)	(2)	(3 old)
Ln(n)	0.0042***	0.0007***	0.0151***
Growth	0.0010***	0.0008***	0.0023***
Ln(n)*Growth	0.0003***	0.0004***	0.0006***
	Controls-Rest of regions or sectors		
Ln(n)		-7.3281***	
Growth		-0.0317***	
Ln(n)*Growth		0.0025**	
	Previous experience		
Ln(n)			-0.0129***
Growth			-0.0014***
Ln(n)*Growth			-0.0004***
Obs.	9,406,731	9,406,731	9,406,731
R ² adj.	0.136	0.136	0.137
Firm-Year FE	YES	YES	YES
Prov-Prod-Cou	YES	YES	YES

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

4.2 Initial sales, growth and survival

Initial sales estimations are in table 4 for regional-sectoral spillovers. The annex collect estimation results for regional and sectoral spillovers. Coefficients have the expected sign in all regressions, we find positive values for the number of companies already exporting and the growth these companies had. Accordingly firms obtain information specifically from companies in the same sector and region. Both sectoral and regional peers provide useful information (see annex) about a new potential market but information spillovers

¹⁶Both stable firms on international markets and new firms that start to export benefit from positive information externalities. Occasional firms tend to be less efficient in the learning process (evidence upon request). In general, the information externalities are higher for stable relations, than for occasional ones. This points to the fact that information spillovers are positive for stability.

stems strongly from those peers that are very similar. We find no evidence on initial sales of the interaction term.

These results do not vary when introducing control variables as in [Fernandes and Tang \(2014\)](#) (see annex). Information coming from other sectoral peers in a different region and firms from other sectors in the same region when it is significant have a negative effect on the initial sales of the new relationship, mainly in the sectoral analysis. The negative effects seem to be consequence of the higher competition. Probably firms cannot obtain additional information from these companies located in other regions and selling the same product to an specific market, to that obtained from peers in the tuple sector/region. Companies in other sectors in the same region or in the same sector from other regions do not provide additional information about demand in new potential markets but incorporate competition, and so any increase in the number of these companies induce higher competition without additional information as [section 2](#) concluded. According these results externalities are stronger in low competitions high sectoral specialization local environments, what in the literature is called MAR (Marshall-Arrow-Romer) externalities. The concentration of an industry in a province fosters knowledge spillovers (tacit or codified information). MAR theories perceives competition worst than monopoly ¹⁷.

Competition effects seems to be more significant for firms in the same sector in other regions than for firms in other sectors in the region. Competition from the same sector hinders initial sales strongly than competition from the region (see annex)

The learning process for peers should be more intense and beneficial for companies with no other source of information. Companies with more experience have additional information, external and internal, that can moderate the information spillover coming from peers. To check this hypothesis we built a dummy variable for existing companies to identify the differential effect. The expected sign is negative for experienced companies, although the net effect still is positive. For new companies it is clear that the effect is superior to the one previously estimated.

In [section 2](#) we saw that when companies have better information spillovers they are more precise in their initial export level, they suffer less surprises about real demand in the new market, and consequently their export **growth** is lower in case of survival.

Table in the annex shows detailed estimations. [Table 4](#) present the coefficients for origin-sector-country case. Growth after entry is lower the greater the number of companies and the higher the growth rate that was signaled previous to entry decision.

We also check this hypothesis of different intensity in the learning process between existing and new companies for growth we do not obtain relevant results.

¹⁷Contrary to MAR model, Jacobs argues that spillovers are more intense between industries and emphasizes the positive effect of competition

REVISAR On the other hand we find positive effect on survival for experienced exporters of the interaction term that is not found for new exporters.

These evidence support previous results and shows how incoming exporter are more benefit from this kind of information spillovers.

Table 4: Initial sales, growth and survival. New companies vs old companies

	Initial sales		Growth		Survival	
Ln(n)	0.1803***	0.3975***	-0.2884***	-0.2880***	-0.0396***	-0.0238**
Growth	0.2078***	0.2549***	-0.1518**	-0.0183	0.0078	0.0084
Ln(n)*Growth	-0.0051	0.0060	0.0369	0.0079	0.0016	-0.0081
Previous experience						
Ln(n)		-0.2634***		0.0030		-0.0193***
Growth		-0.0575		-0.1771		-0.0018
Ln(n)*Growth		-0.0140		0.0383		0.0122**
Obs.	149,128	149,128	41,198	41,198	149,155	149,155
R^2 adj.	0.942	0.942	0.888	0.888	0.821	0.821
Firm-Year FE	YES	YES	YES	YES	YES	YES
Prov-Prod-Cou	YES	YES	YES	YES	YES	YES

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.3 Extensions

Occasional exporters

Different experience measures

Value - unit value

5 Final comments

Companies learn from their peers with which they share region of origin, sector or export markets. They decide their entry strategy for new target markets based on that information as they do not know demand curve in the new market till entry.

Fernandes and Tang (2014) analyses regional spillovers and suggest the interest of sectoral spillovers. The combination of both sectoral and regional dimensions simultaneously, what we consider very similar peer companies, is where information externalities seems to be more evident, although we also observe spillovers when each dimension is analyzed independently. We also know that firms might also learn from their peers in different dimensions like current export country portfolio (de Lucio et al. 2018).

Table 5: Entry in a new export market

	(4 exp)	(5 ant)	(6 num des)
Ln(n)	0.0099***	0.0066***	0.0010***
Growth	0.0024***	0.0014***	0.0007***
Ln(n)*Growth	0.0006***	0.0004***	0.0004***
	Previous experience		
Ln(n)	-0.0060***	-0.0056***	0.0064***
Growth	-0.0014***	-0.0007***	0.0006***
Ln(n)*Growth	-0.0003	-0.0002**	-0.0002*
Obs.			
R^2 adj.			
Firm-Year FE			
Prov-Prod-Cou			

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

When all possible dimensions are analyzed, estimations results confirm hypothesis that companies obtain information spillovers from very similar firms that are already exporting to potential new markets. The higher the number of companies and the export growth rate in the sector-province tuple the higher the probability to start new relations, the initial sales, and the lower the growth rate. These results confirm that dynamic information spillovers exist steaming from peers with experience in the potential markets.

We also observe competition effects; information coming from other sectoral peers in a different region and firms from other sectors in the same region do not seem to be useful enough to overcome competition effects and have a negative effect in company performance. Firms cannot obtain additional information about demand in potential markets from these companies to that obtained from peers in the tuple sector/region. Any increase in the number of these companies induce higher competition without additional information externalities. All in one, externalities are stronger in low competitions high specialization environments (MAR Marshal-Arrow-Romer, externalities).

Learning spillovers are more intense for incoming companies than for experienced exporters. Therefore, entry will depend more on peers behavior for new exporters, initial sales will be also higher, and these effect will be less intense for experienced companies.

According these results, for pure extensive margin growth, it is important to foster local relations between companies in the same sector, tailor made policies might have greater impact on increasing export portfolio than wide range policies as these ones have negative competition effects and lower positive external effects. It seems that there exists room for regional export promotion sectoral policies. In the same way, certain initiatives

to encourage networking at the destination can contribute to a more efficient selection of the company's export path. For experienced exporter more sophisticated policies have to be design.

Appendix A ANNEX

Table A1: A. Descriptive relations

Prov.	Total	New	New Stable	New Occassional	Exports share
Barcelona	1.952.830	789.116	295.545	493.571	22,0%
Madrid	896.457	436.281	142.923	293.358	24,0%
Valencia	471.233	200.186	69.561	130.625	5,8%
Pontevedra	113.294	47.212	17.216	29.996	3,6%
Zaragoza	144.566	58.985	22.431	36.554	3,6%
Total	6.413.901	2.711.390	975.197	1.736.193	100%

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Regional spillovers

Table A2: Entry in a new export market

	(1)	(2)	(3 old)	(4 exp)	(5 ant)	(6 num des)
Ln(n)	0.0042***	0.0007***	0.0151***	0.0099***	0.0066***	0.0010***
Growth	0.0010***	0.0008***	0.0023***	0.0024***	0.0014***	0.0007***
Ln(n)*Growth	0.0003***	0.0004***	0.0006***	0.0006***	0.0004***	0.0004***
Controls-Rest of regions or sectors						
Ln(n)		-7.3281***				
Growth		-0.0317***				
Ln(n)*Growth		0.0025**				
Previous experience						
Ln(n)			-0.0129***	-0.0060***	-0.0056***	0.0064***
Growth			-0.0014***	-0.0014***	-0.0007***	0.0006***
Ln(n)*Growth			-0.0004***	-0.0003	-0.0002**	-0.0002*
Obs.	9,406,731	9,406,731	9,406,731			
R ² adj.	0.136	0.136	0.137			
Firm-Year FE	YES	YES	YES			
Prov-Prod-Cou	YES	YES	YES			

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A3: Initial sales, growth and survival. New companies vs old companies

	Initial sales	Growth	Survival
Ln(n)	0.3975***	-0.2880***	-0.0238**
Growth	0.2549***	-0.0183	0.0084
Ln(n)*Growth	0.0060	0.0079	-0.0081
Diferential effect existing companies			
Ln(n)	-0.2634***	0.0030	-0.0193***
Growth	-0.0575	-0.1771	-0.0018
Ln(n)*Growth	-0.0140	0.0383	0.0122**
Obs.	149,128	41,198	149,155
R^2 adj.	0.942	0.888	0.821
Firm-Year FE	YES	YES	YES
Prov-Prod-Cou	YES	YES	YES

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Sectoral spillovers

Table A4: Entry in a new export market

	(1)	(2)	(3 old)	(4 exp)	(5 ant)	(6 num des)
Ln(n)	0.0042***	0.0007***	0.0151***	0.0099***	0.0066***	0.0010***
Growth	0.0010***	0.0008***	0.0023***	0.0024***	0.0014***	0.0007***
Ln(n)*Growth	0.0003***	0.0004***	0.0006***	0.0006***	0.0004***	0.0004***
Controls-Rest of regions or sectors						
Ln(n)		-7.3281***				
Growth		-0.0317***				
Ln(n)*Growth		0.0025**				
Previous experience						
Ln(n)			-0.0129***	-0.0060***	-0.0056***	0.0064***
Growth			-0.0014***	-0.0014***	-0.0007***	0.0006***
Ln(n)*Growth			-0.0004***	-0.0003	-0.0002**	-0.0002*
Obs.	9,406,731	9,406,731	9,406,731			
R^2 adj.	0.136	0.136	0.137			
Firm-Year FE	YES	YES	YES			
Prov-Prod-Cou	YES	YES	YES			

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Initial sales, growth and survival. New companies vs old companies

	Initial sales	Growth	Survival
Ln(n)	0.3975***	-0.2880***	-0.0238**
Growth	0.2549***	-0.0183	0.0084
Ln(n)*Growth	0.0060	0.0079	-0.0081
Diferential effect existing companies			
Ln(n)	-0.2634***	0.0030	-0.0193***
Growth	-0.0575	-0.1771	-0.0018
Ln(n)*Growth	-0.0140	0.0383	0.0122**
Obs.	149,128	41,198	149,155
R^2 adj.	0.942	0.888	0.821
Firm-Year FE	YES	YES	YES
Prov-Prod-Cou	YES	YES	YES

Source: Authors' calculations based on the Customs' database.

Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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